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THE GRADUATE SCHOOL

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**RECORD OF
THE UNIVERSITY OF NORTH CAROLINA
AT CHAPEL HILL
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THE GRADUATE SCHOOL

Announcements for the Session 1988-1989

GRADUATE SCHOOL SERIES, No. 108

THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
CHAPEL HILL, NC 27514

Mission Statement

The University of North Carolina at Chapel Hill

The University of North Carolina at Chapel Hill has been built by the people of the State and has existed for two centuries as the nation's first state university. Through its excellent undergraduate programs, it has provided higher education to ten generations of students, many of whom have become leaders of the State and the nation. Since the nineteenth century, it has offered distinguished graduate and professional programs.

The University is a research university. Fundamental to this designation is a faculty actively involved in research, scholarship, and creative work, whose teaching is transformed by discovery and whose service is informed by current knowledge.

The mission of the University is to serve all the people of the State, and indeed the nation, as a center for scholarship and creative endeavor. The University exists to expand the body of knowledge; to teach students at all levels in an environment of research, free inquiry, and personal responsibility; to improve the condition of human life through service and publication; and to enrich our culture.

To fulfill this mission, the University must:

acquire, discover, preserve, synthesize, and transmit knowledge;

provide high quality undergraduate instruction to students within a community engaged in original inquiry and creative expression, while committed to intellectual freedom, to personal integrity and justice, and to those values that foster enlightened leadership for the State and the nation;

provide graduate and professional programs of national distinction at the doctoral and other advanced levels to future generations of research scholars, educators, professionals, and informed citizens;

extend knowledge-based services and other resources of the University to the citizens of North Carolina and their institutions to enhance the quality of life for all people in the State; and

address, as appropriate, regional, national, and international needs.

This mission imposes special responsibilities upon the faculty, students, staff, administration, trustees, and other governance structures and constituencies of the University in their service and decision-making on behalf of the University.

CALENDAR OF EVENTS

1988-1989

Summer Session, 1988

First Term

May 16, Monday	Registration.
May 17, Tuesday	Classes begin.
May 18, Wednesday	Last day for late registration.
May 23, Monday	Last day to <i>drop</i> a course for credit on student's financial account.
May 30, Monday	Holiday.
June 3, Friday	Last day for submitting an application for a degree and an application for admission to candidacy for the master's degree and last day for submitting an application for doctoral degrees for August graduation.
June 6, Monday	Last day to withdraw for credit on student's financial account.
June 10, Friday	Last day to <i>drop</i> a course.
June 17, Friday	Last class day.
June 20-21, Monday-Tuesday	Final course examinations.

Second Term

June 23, Thursday	Registration.
June 24, Friday	Classes begin.
June 27, Monday	Last day for late registration.
June 30, Thursday	Last day to <i>drop</i> a course for credit on student's financial account.
July 4, Monday	Holiday.
July 9, Saturday	Written examinations for master's candidates for the August graduation may not be taken after this date.
July 14, Thursday	Last day to withdraw for credit on student's financial account.
July 20, Wednesday	Last day to <i>drop</i> a course.
July 27, Wednesday	Last class day.
July 29, Friday	Final signed copies of doctoral dissertations and master's theses for candidates for the August graduation must be filed in the Graduate School by this date.
July 28-29, Thursday-Friday	Final course examinations.

Fall Semester, 1988

August 29-31, Monday-Wednesday	Registration.
September 1, Thursday	Classes begin.
September 5, Monday	Holiday.
September 8, Thursday	Last day for late registration.
September 15, Thursday	Last day to <i>drop</i> a course for credit on student's financial account.
October 6, Thursday	Fall Recess begins at 5 P.M.
October 11, Tuesday	Classes resume at 8 A.M.

October 12, Wednesday	University Day.
October 14, Friday	Last day for submitting an application for a degree and an application for admission to candidacy for the master's degree and last day for submitting an application for doctoral degree for December graduation.
October 31–November 4, Monday–Friday	Pre-registration for Spring Semester.
November 2, Wednesday	Last day to withdraw for credit on student's financial account.
November 12, Saturday	Written examinations for master's candidates for December graduation may not be taken after this date.
November 23, Wednesday	Thanksgiving recess begins at 1 P.M.
November 28, Monday	Classes resume at 8 A.M.
November 30, Wednesday	Last day to <i>drop</i> a course.
December 2, Friday	Final signed copies of doctoral dissertations and master's theses for candidates for the December graduation must be filed in the Graduate School by this date.
December 9, Friday	Last class day.
December 12, Monday	Reading Day.
December 13–21 Tuesday–Saturday	Final course examinations.
Monday–Wednesday	

Spring Semester, 1989

January 12–13, Thursday–Friday	Registration.
January 16, Monday	Holiday.
January 17, Tuesday	Classes begin.
January 23, Monday	Last day for late registration.
January 30, Monday	Last day to <i>drop</i> a course for credit on student's financial account.
February 8, Wednesday	Last day for submitting an application for a degree and an application for admission to candidacy for the master's degree and last day for submitting an application for doctoral degree for May Commencement.
March 10, Friday	Spring recess begins at 5 P.M.
March 20, Monday	Classes resume at 8 A.M.
March 20, Monday	Last day to withdraw for credit on student's financial account.
March 24, Friday	Holiday.
March 25, Saturday	Written examinations for master's candidates for May Commencement may not be taken after this date.
April 3–7, Monday–Friday	Pre-registration for Summer and Fall Semesters.
April 14, Friday	Last day to <i>drop</i> a course.
April 27, Thursday	Last class day.
April 28, Friday	Reading Day.
April 28, Friday	Final signed copies of all doctoral dissertations and master's theses for candidates for May Commencement must be filed in the Graduate School by this date.
May 1–9	Final course examinations.
Monday–Saturday	
Monday–Tuesday	
May 14, Sunday	Commencement.

Special Deadlines for Admission Applications

February 1	Last day for submitting a completed application to qualify for fellowship consideration for the Fall Semester.
February 15	Last day for submitting a completed application for admission to the Fall Semester.
April 15	Last day for submitting a completed application for admission to the First Term Summer Session.
May 15	Last day for submitting a completed application for admission to the Second Summer Session.
October 15	Last day for submitting a completed application for admission to the Spring Semester.

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To Graduate Students and Prospective Graduate Students

The University of North Carolina at Chapel Hill is one of the leading graduate research universities in the United States. It is one of the most comprehensive in the nation and provides a breadth of study and experience which is matched by few institutions. There are sixty doctoral-level programs and eighty-one master's-level programs currently active in the Graduate School.

This catalogue provides the basic information you will need to learn about these programs. It includes our admission standards and requirements, tuition and other costs, sources of financial aid including fellowships, graduate degree requirements, and information concerning research institutes and centers as well as brief program and course descriptions. In addition, you will find under each program description a listing of all graduate faculty in that area together with their specific research interests.

The University of North Carolina at Chapel Hill is committed to equality of educational opportunity and does not discriminate against applicants, students or employees. Moreover, The University of North Carolina at Chapel Hill is open to people of all races; we actively seek to promote student diversity at the University by recruiting and enrolling a larger number of black students.

In addition to the resources represented by an outstanding faculty, an outstanding research library (fifteenth in the nation, first in the southeast), and other outstanding facilities, the University has about it a warm and collegial human spirit which many find to be unusually conducive to personal growth and scholarship.

As you consider your future, we hope you will consider this institution, and that you will apply here and find an opportunity to visit the campus.

The Graduate School

THE GRADUATE FACULTY

Included here is the name, terminal degree, and academic appointment of each *full* member of the Graduate Faculty, spring, 1988. More extensive data about each faculty member is provided in the Undergraduate Bulletin.

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 CAMILLA TULLOCH, B.D.S., D.O.C.S., *Assistant Professor of Orthodontics in the School of Dentistry*
 BOONE A. TURCHI, Ph.D., *Associate Professor of Economics*
 CRAIG D. TURNBULL, Ph.D., *Associate Professor of Biostatistics in the School of Public Health*
 ALVIS GREELY TURNER, JR., Ph.D., *Professor of Environmental Sciences and Engineering in the School of Public Health*
 DEREK T. TURNER, Ph.D., *Professor of Operative Dentistry in the School of Dentistry*
 JOHN B. TURNER, D.S.W., *William Rand Kenan, Jr., Professor of Social Work*
 TIMOTHY A. TURVEY, D.D.S., *Associate Professor of Oral and Maxillofacial Surgery in the School of Dentistry*
 ROBERT TWAROG, Ph.D., *Associate Professor of Microbiology and Immunology*
 EUNICE NICKERSON TYLER, M.P.H., Ph.D., *Professor of Health Education in the School of Public Health, Emerita*
 HERMAN A. TYROLER, M.D., *Alumni Distinguished Professor of Epidemiology (1980)*
 RUEL W. TYSON, JR., A.B., B.D., *Associate Professor of Religious Studies*
 J. RICHARD UDRY, Ph.D., *Professor of Sociology and Professor of Maternal and Child Health in the School of Public Health*
 JOAN UHL, Ph.D., *Associate Professor of Nursing*
 PETER R. UHLENBERG, Ph.D., *Associate Professor of Sociology*
 RICHARD H. UHLIG, Ph.D., *Associate Professor of Social Work*
 PRISCILLA R. ULIN, Ph.D., *Associate Professor of Nursing*

- GERALD UNKS, Ph.D., *Associate Professor of Education*
- JAAN VALSINER, Candidate of Science, *Assistant Professor of Psychology*
- ROBERT DALE VANCE, Ph.D., *Assistant Professor of Philosophy*
- CHARLES D. VAN CLEAVE, Ph.D., *Professor of Anatomy, Emeritus*
- HENDRIK VAN DAM, D.R.S., *Professor of Physics*
- WILLIAM F. VANN, JR., D.M.D., M.S., Ph.D., *Associate Professor of Pedodontics in the School of Dentistry*
- JOHN VAN SETERS, Ph.D., *James A. Gray Professor of Biblical Literature*
- JUDSON VAN WYK, M.D., *Kenan Professor of Pediatrics and Biology*
- JAMES E. VENEY, Ph.D., *Professor of Health Policy and Administration in the School of Public Health*
- WILLIAM F. VIA, JR., D.D.S., M.S., *Professor of Oral Diagnosis in the School of Dentistry, Emeritus*
- WALTER NEEF VICKERY, Ph.D., *Professor of Slavic Languages*
- FREDERICK WRIGHT VOGLER, Ph.D., *Professor of French*
- ANTHONY JOHN VOGT, Ph.D., *Professor of Political Science*
- ROBERT BROWN VOITTE, JR., Ph.D., *Professor of English, Emeritus*
- GRANT A. WACKER, Ph.D., *Associate Professor of Religious Studies*
- PAUL WOODFORD WAGER, Ph.D., *Professor of Political Science, Emeritus*
- HARVEY MAURICE WAGNER, Ph.D., *Professor of Business Administration*
- ROBERT HOWARD WAGNER, Ph.D., *Professor of Pathology and Biochemistry*
- JONATHAN M. WAHL, Ph.D., *Professor of Mathematics*
- RUTH C. WALDEN, Ph.D., *Assistant Professor of Journalism*
- PETER FRANKLIN WALKER, Ph.D., *Professor of History*
- EARLE WALLACE, Ph.D., *Professor of Political Science, Emeritus*
- WESLEY HERNDON WALLACE, Ph.D., *Professor of Radio, Television, and Motion Pictures, Emeritus*
- MARCUS BISHOP WALLER, Ph.D., *Professor of Psychology*
- THOMAS S. WALLSTEN, Ph.D., *Professor of Psychology*
- STEPHEN J. WALSH, Ph.D., *Associate Professor of Geography*
- THOMAS WARBURTON, Ph.D., *Professor of Music*
- WILLIAM B. WARE, Ph.D., *Professor of Education*
- DONALD WILLIAM WARREN, D.D.S., M.S., Ph.D., *Kenan Professor of Dental Ecology in the School of Dentistry (1980) and Professor of Surgery in the School of Medicine*
- BARBARA H. WASIK, Ph.D., *Professor of Education*
- ELIZABETH WATKINS, D.Sc.H., *Professor of Maternal and Child Health in the School of Public Health*
- JULIA DAY WATKINS, M.P.H., *Associate Professor of Public Health Nursing, Emerita*
- EUGENE RAY WATSON, Ph.D., *Professor of Education*
- HARRY L. WATSON, Ph.D., *Associate Professor of History*
- JAMES E. WATSON, JR., Ph.D., *Professor of Radiological Hygiene in the Department of Environmental Sciences and Engineering, School of Public Health*
- ROGER N. WAUD, Ph.D., *Professor of Economics*
- NORMAN FRED WEATHERLY, Ph.D., *Professor of Parasitology and Laboratory Practice in the School of Public Health*
- EDGAR LELAND WEBB, D.D.S., *Associate Professor of Fixed Prosthodontics in the School of Dentistry*
- JAMES MURRAY WEBB, M.C.P., *Professor of City and Regional Planning, Emeritus*
- DAVID J. WEBER, M.D., *Assistant Professor of Epidemiology in the School of Public Health*
- WILLIAM PHILIP WEBSTER, D.D.S., M.S., *Professor of Dental Ecology in the School of Dentistry and Professor of Pathology in the School of Medicine*
- STANLEY JOHN WEIDENKOPF, Eng.D., *Professor of Environmental Engineering in the Department of Environmental Sciences and Engineering, School of Public Health, Emeritus*

- KRISTEN A. WEIGLE, M.D., *Assistant Professor of Epidemiology in the School of Public Health*
GERHARD WEINBERG, Ph.D., *William Rand Kenan, Jr., Professor of History*
CHARLES MANUEL WEISS, Ph.D., *Professor of Environmental Biology in the Department of Environmental Sciences and Engineering, School of Public Health*
SHIRLEY F. WEISS, Ph.D., *Professor of City and Regional Planning*
STEPHEN F. WEISS, Ph.D., *Professor of Computer Science*
WILLIAM G. WEISSERT, Ph.D., *Professor of Health Policy and Administration in the School of Public Health*
JOHN WEISZ, Ph.D., *Professor of Psychology*
HENRY BRADLEY WELLS, Ph.D., *Professor of Biostatistics in the School of Public Health, Emeritus*
JOHN T. WELLS, Ph.D., *Associate Professor of Marine Sciences*
WILLIAM SMITH WELLS, Ph.D., *Kenan Professor of English (1955), Emeritus*
GEORGE SCHLAGER WELSH, Ph.D., *Professor of Psychology, Emeritus*
LEROY D. WERLEY, JR., *Associate Professor of Pharmacy, Emeritus*
MEREDITH JANE WEST, Ph.D., *Professor of Psychology*
WILLIAM CURTIS WEST III, Ph.D., *Professor of Classics*
JOHN R. WESTBURY, Ph.D., *Research Assistant Professor of Orthodontics in the School of Dentistry*
FRANCIS M. WHANG, M.S., *Associate Professor of Music*
CLAYTON E. WHEELER, JR., M.D., *Professor of Dermatologic Medicine*
WALTER HALL WHEELER, Ph.D., *Professor of Geology, Emeritus*
GORDON P. WHITAKER, Ph.D., *Associate Professor of Political Science*
JAMES RUSHTON WHITE, Ph.D., *Professor of Biochemistry, Emeritus*
JAMES T. WHITE, D.D.S., M.S., *Associate Professor of Fixed Prosthodontics in the School of Dentistry*
JAMES W. WHITE, Ph.D., *Professor of Political Science*
KINNARD PAUL WHITE, Ph.D., *Professor of Education*
PETER WHITE, Ph.D., *Associate Professor of Biology*
RAYMOND P. WHITE, JR., Ph.D., *Professor of Oral and Maxillofacial Surgery in the School of Dentistry*
WILLIAM ALEXANDER WHITE, Ph.D., *Professor of Geology, Emeritus*
BARRY L. WHITSEL, Ph.D., *Professor of Physiology*
MAURICE WHITTINGHILL, Ph.D., *Professor of Zoology, Emeritus*
DALE WHITTINGTON, Ph.D., M.S., M.P.A., *Associate Professor of City and Regional Planning*
RONALD WIEGERINK, Ph.D., *Professor of Education*
JACK K. WIER, Ph.D., *Associate Professor of Pharmacy*
JAMES A. WIGGINS, Ph.D., *Associate Professor of Sociology*
TIMOTHY C. WILCOSKY, Ph.D., *Research Assistant Professor of Epidemiology in the School of Public Health*
BENSON REID WILCOX, M.D., *Professor of Medicine*
JAMES A. WILDE, Ph.D., *Associate Professor of Economics*
RALPH EUGENE WILEMAN, JR., Ed.D., *Professor of Education*
R. HAVEN WILEY, Ph.D., *Professor of Biology*
WILLIAM LEON WILEY, Ph.D., *Kenan Professor of French (1955), Emeritus*
CYNTHIA L. WILHELM, Ph.D., *Associate Professor of Rehabilitation Counseling*
ALAN LOTHROP WILLARD, Ph.D., *Assistant Professor of Physiology*
DONALD G. WILLHOIT, Sc.D., *Associate Professor of Radiation Biophysics in the Department of Environmental Sciences and Engineering, School of Public Health*
O. DALE WILLIAMS, Ph.D., *Professor of Biostatistics in the School of Public Health*
JOEL R. WILLIAMSON, Ph.D., *Professor of History*
SAMUEL R. WILLIAMSON, JR., Ph.D., *Professor of History*
EVERETT K. WILSON, Ph.D., *Professor of Sociology*
GLENN WILSON, M.A., *Professor of Social and Administrative Medicine*

- JOHN ERIC WILSON, Ph.D., *Professor of Biochemistry, Emeritus*
ROBERT NEAL WILSON, Ph.D., *Professor of Sociology*
KENNETH R. WING, J.D., M.P.H., *Associate Professor of Health Policy and Administration in the School of Public Health and Assistant Professor of Law*
STAFFORD WING, M.M., *Associate Professor of Music*
BRUCE WINTERHALDER, Ph.D., *Associate Professor of Anthropology*
ANN DRYDEN WITTE, Ph.D., *Professor of Economics*
JOSEPH S. WITTIG, Ph.D., *Associate Professor of English*
WARREN R. WOGEN, Ph.D., *Professor of Mathematics*
RICHARD VANCE WOLFENDEN, Ph.D., *Alumni Distinguished Professor of Biochemistry*
JUDITH WOOD, Ph.D., *Assistant Professor of Library Science*
JULIA T. WOOD, Ph.D., *Associate Professor of Speech Communication*
MATTHEW THOMAS WOOD, D.D.S., M.S., *Professor of Prosthodontics in the School of Dentistry*
ANN M. WOODWARD, M.S., M.M.A., D.M.A., *Professor of Music*
ROBERTA WOOLEVER, Ph.D., *Associate Professor of Education*
CECIL W. WOOTEN, Ph.D., *Associate Professor of Classics*
DEIL SPENCER WRIGHT, Ph.D., *Alumni Distinguished Professor of Political Science*
FRED B. WRIGHT, Ph.D., *Professor of Mathematics*
JOHN JOSEPH WRIGHT, M.D., M.P.H., *Professor of Health Policy and Administration in the School of Public Health, Emeritus*
EARL RAYMOND WYNN, M.S., *Professor of Radio, Television, and Motion Pictures, Emeritus*
PRISCILLA B. WYRICK, Ph.D., *Associate Professor of Microbiology and Immunology*
STEVEN DALE WYRICK, Ph.D., *Assistant Professor of Pharmacy*
RICHARD ASA YARNELL, Ph.D., *Professor of Anthropology*
DAVID E. YODER, Ph.D., *Professor of Speech and Hearing in the Department of Medical Allied Health Professions*
LLOYD ROBERT YONCE, Ph.D., *Professor of Physiology*
JAMES W. YORK, JR., Ph.D., *Professor of Physics*
FORREST W. YOUNG, Ph.D., *Professor of Psychology*
WILLIAM JAY YOUNT, M.D., *Professor of Medicine and Professor of Microbiology and Immunology*
DENNIS JOHN ZABOROWSKI, M.F.A., *Professor of Art*
RICHARD HAROLD ZAFFRON, Ph.D., *Assistant Professor of Philosophy*
CARL ZEITHAML, D.B.A., *Associate Professor in the School of Business Administration*
WILLIAM N. ZELMAN, Ph.D., *Associate Professor of Health Policy and Administration in the School of Public Health*
MICHAEL WILLIAM ZENGE, M.M., *Professor of Music*
PAUL ZIFF, Ph.D., *William Rand Kenan, Jr., Professor of Philosophy*
CHARLES G. ZUG III, Ph.D., *Professor of English*

GENERAL INFORMATION

History

The University of North Carolina at Chapel Hill was the first state university to admit students. It was chartered in 1789 and formally opened in 1795; from early in its history, it has encouraged research and creative activity.

As early as 1853-54 the catalogue of the University carried an announcement of graduate course work. In 1876, after the institution had been closed for the period 1871-75, the catalogue announced the requirements for the master's degree, and the next issue carried an announcement of regulations governing the degrees of Master of Arts, Master of Science, and Doctor of Philosophy. Several graduate degrees were awarded before the turn of the century, the first degree of Doctor of Philosophy being conferred in 1883, but it was not until 1903 that a separate Graduate School with a dean was established.

In 1920, from an earlier advisory committee, the Administrative Board of the Graduate School was organized. In 1922, the graduate faculty voted, first, to vest in the Administrative Board legislative powers in matters that affected graduate education; second, to authorize the Administrative Board to admit members to the teaching faculty of the Graduate School; and, third, to vest in the Administrative Board the responsibility for authorizing curricula and course carrying graduate credit. At present, the Board consists of twenty-one members appointed by the Chancellor upon nomination by the Dean, after an advisory vote by the graduate faculty.

All master's degrees offered by the University and the degrees of Doctor of Philosophy, Doctor of Education, and Doctor of Public Health are conferred by the Graduate School.

Organization

Work toward advanced degrees in The University of North Carolina at Chapel Hill proceeds under policies and regulations established by the graduate faculty. The immediate direction of the Graduate School is in the charge of the Administrative Board, of which the Dean is Chairman, consisting of twenty-one members of the faculty who represent the following seven divisions:

The Division of the Humanities

- The Department of Classics
- The Curriculum of Comparative Literature
- The Department of English
- The Curriculum in Folklore
- The Department of Germanic Languages

The Curriculum in Linguistics
The Department of Philosophy
The Department of Religious Studies
The Department of Romance Languages
The Department of Slavic Languages
The Department of Speech Communication

The Division of Fine Arts

The Department of Art
The Department of Dramatic Art
The Department of Radio, Television, and Motion Pictures
The Department of Music

The Division of Biological Sciences

The Department of Anatomy
The Department of Biochemistry and Nutrition
The Department of Biology
The Curriculum in Ecology
The Curriculum in Genetics
The Department of Microbiology and Immunology
The Curriculum in Neurobiology
The Department of Pathology
The Department of Pharmacology
The Department of Physiology
The Curriculum in Toxicology

The Division of Social Sciences

The Department of Anthropology
The Department of City and Regional Planning
The Department of Economics
The Department of Geography
The Department of History
The Curriculum in Leisure Studies and Recreation Administration
The Department of Physical Education
The Department of Political Science
The Department of Psychology
The Department of Sociology

The Division of Physical Sciences and Mathematics

The Curriculum in Biomedical Engineering and Mathematics
The Department of Chemistry
The Department of Computer Science

The Department of Geology
The Curriculum in Marine Sciences
The Department of Mathematics
The Department in Operations Research
The Department of Physics and Astronomy
The Department of Statistics

The Division of Professional Schools I

The Graduate School of Business Administration
The School of Education
The School of Journalism
The School of Library Science

The Division of Professional Schools II

The School of Dentistry
The Department of Medical Allied Health Professions, School of
Medicine
The School of Nursing
The School of Pharmacy
The School of Public Health
The School of Social Work

The Summer Session

One of the first summer schools in America was established at The University of North Carolina at Chapel Hill in 1877. Eighteen sessions were held during the next thirty years. The Summer Session has operated annually since 1907 and has come to be an integral part of the academic organization of the University.

Curricula and courses that are offered during the Summer Session are comparable to those of the fall and spring semesters. With few exceptions, students may make progress toward fulfilling requirements for all graduate degrees offered by the University.

The Summer Session is divided into two terms of approximately five and one-half weeks each. The summer program is planned to meet the needs of graduate students who are fulfilling degree requirements in this institution, visiting graduate students who desire to take courses for transfer to other institutions, teachers and administrators who desire to meet state certification requirements, and other students who have special educational objectives.

Graduate students who wish to be admitted or readmitted in the Summer Session to a degree program should write to the Dean of the Graduate School. The requirements for admission to a degree program starting in the summer are the same as those in the regular academic year. Those who

desire a copy of the Summer Session catalogue, or other information, and those wanting to enroll in the summer as *visiting* students should write to the Director of the Summer Session, The University of North Carolina at Chapel Hill, CB# 3340, 102 Peabody Hall, Chapel Hill, N.C., 27599-3340, or telephone (919) 966-4364.

Visiting Scholars

Registration as a Visiting Scholar at The University of North Carolina at Chapel Hill entitles the registrant to certain privileges of the University at Chapel Hill and its facilities for the duration of the visitor's stay in the University.

Eligibility for registration as a Visiting Scholar is limited to those who (1) are *not* on the University payroll as employees in any capacity and (2) are visiting the University under the sponsorship of an academic department or school for the furtherance of scholarly interests. Visiting Scholars may include faculty members on leave from other institutions of higher learning, postdoctoral fellows, or others who hold the terminal degree in their fields and are invited to visit by a department or school.

Persons interested in applying for Visiting Scholar status should communicate with the appropriate department or school within the University. Further details concerning University privileges to Visiting Scholars are available from the EPA/Faculty Benefits Office, CB# 3350, 200 Carr Building.

The University Year

Two semesters of approximately 17 weeks each and a summer session consisting of two five and a half week terms constitute the University year. The requirements for admission to graduate programs and for graduate degrees in the summer session are the same as those in the regular academic year. For the schedule of events of particular interest to graduate students, one should consult the Calendar of Events printed at the front of this catalogue.

ADMISSION, FELLOWSHIPS, AND FINANCIAL AID

Admission

Application for admission should be made on forms provided by the Graduate School. Inquiries concerning admission and requests for application forms should be directed to:

The Graduate School
The University of North Carolina at Chapel Hill
CB# 4010, 200 Bynum Hall
Chapel Hill, N.C., 27599-4010
(919) 966-2611

It is advisable to apply for fall admission by February 1, but applications submitted as late as July 1 will be considered for admission if space is available. Only when the application and all supporting materials are received by February 1 can an individual be considered for a Graduate School fellowship. (Departmental awards may continue to be available thereafter.) Applications for admission in the spring semester must be received by October 15, but earlier submission of applications is advisable.

Admission to the Graduate School of The University of North Carolina at Chapel Hill is necessarily a selective process. Only applicants with academic records of high quality should seek admission. Admission to the Graduate School does not imply financial assistance of any kind. The award of financial assistance is a separate decision. The prospective student must hold the bachelor's degree from an accredited college or university in this country or its equivalent in a foreign institution—based on a four-year curriculum. The student's record should be a strong one overall with an average grade of B or better in the major subject area. Meeting this requirement does not insure that an applicant will be admitted.

It is customarily expected that the prospective student will have completed an undergraduate major in the subject of graduate interest. This expectation does not extend to schools and departments that represent disciplines not commonly offered at the college level or to others for which a high level of aptitude and academic achievement in general may constitute the basis for admission. Students who are taking, or have taken, graduate work elsewhere must be in good standing at that institution to be eligible for admission to this Graduate School.

The Administrative Board of the Graduate School has empowered the Dean to grant admission on a provisional basis to applicants who apply in the middle of the senior year of college, contingent on completion of the bachelor's degree prior to enrollment.

Many departments require specific tests or materials from applicants. Graduate Record Examination scores are required for applicants to all programs except Studio Art, Dentistry and Dramatic Art. The test should be taken no later than October to insure that scores will be submitted in time to process the application for fall admission, particularly if the applicant is interested in financial assistance. Applicants whose native language is not English are required to submit acceptable scores on the Test of English as a Foreign Language (TOEFL) in addition to the usual requirements. (See page 52 for required scores by foreign applicants.)

Diversity among student backgrounds and points of view is desired. To that end, admissions committees also consider an applicant's accomplishments and personal qualities that are brought to their attention by the applicant or by his or her references. A careful evaluation of accomplishments and promise is at the heart of the process.

Other matters relating to admission, including details on the appropriate test or tests, are discussed in the instructions accompanying the application

forms, and in the sections of this catalogue pertaining to schools and departments. Your attention is called to these descriptions which contain information necessary to successful completion of admission requirements.

Admission to the Graduate School entitles one to begin a program of studies that leads to a graduate degree. Admission to the Graduate School is distinct, however, from admission to candidacy for such a degree. Until admitted to candidacy for a degree, the student is regarded as being in the Graduate School for the purpose of earning semester hours of credit and of acquiring knowledge and otherwise profiting from association with the faculty and other students. After being admitted to candidacy for a degree, a student is regarded as having the encouragement of the appropriate faculty to proceed toward a graduate degree, and is held responsible by the Graduate School for completing a specific program of study and research as determined by consultation with a faculty adviser and described on the application for admission to candidacy.

Foreign Students

Applications for admission from non-U.S. applicants are processed in the same way as those from U.S. applicants, except for the following important distinctions. The foreign student often is supported by the U.S. Government, private foundations, Fulbright travel, home government funds or, in some cases, University programs. In these instances, the sponsor's financial responsibilities are clearly established and the sponsor issues the necessary immigration documents for the exchange visitor. In those cases where the foreign student is supported by personal funds or is provided with a teaching or research assistantship, the necessary certificate of eligibility is issued by the Graduate School. Students who plan to use personal funds to finance their education must provide the University with verification that the necessary funds are available. (The University will provide a form for this purpose.) In any case, an offer of admission will not be made until the applicant has provided positive information that adequate funds for his or her education are available.

All foreign applicants, except those from countries where English is the native language and those who have received a degree from a university in the United States, must provide proof of English language proficiency by receiving acceptable scores on the Test of English as a Foreign Language (TOEFL). The required minimum total score on the TOEFL test is 550, with a minimum score of 50 for each of the three sections of the TOEFL test. Some programs require a score as high as 575. In addition, each new student must (1) take the *University's English Proficiency Test at the beginning of the first semester of study* and (2) enroll in and attend a noncredit course entitled "*English for Foreign Students*" (Linguistics 116X). This course is waived for those receiving adequate scores on the *University's Proficiency Test*. Linguistics 116X, lasting through the student's first semester, is designed

to improve English communication skills and thereby enhance the student's capabilities as a graduate student. If the course is not passed, it must be taken again.

Fellowships and Financial Aid

Financial support for graduate students is offered in the form of (1) University fellowships and assistantships; (2) work-study assistantships; (3) departmental assistantships; (4) fellowships and other awards sponsored through federal, state, and private grants; (5) GI benefits; and (6) student loans. Though some awards are restricted to incoming graduate students, many, if not most, are available to all graduate students.

Some awards are made directly from the Graduate School, and others are dispensed by departments. Before a student or prospective student may be considered for any award by the Graduate School, that student or prospective student must be nominated to the Graduate School by the appropriate department. Prospective students who wish to be considered for any award must have completed the Application for Admission to the Graduate School. An applicant for financial aid already enrolled in the Graduate School should notify the departmental Director of Graduate Studies of his or her desire to be considered for financial aid.

All applications from prospective students for Graduate School awards must be received in the Graduate School by February 1. Departmental awards are under the departments' jurisdictions and may still be available after February 1. Announcements of awards will be made in early March.

A student receiving financial support from the University, whether through a nonservice fellowship or a service appointment, is expected to take a full-time program of study leading toward a degree. Failure to register in any term during tenure of an award may be expected to result in automatic termination of that award. An award is also subject to cancellation if a student fails to meet the terms of that award or fails to maintain a satisfactory level of academic performance.

Students are urged to apply for fellowships available through national, regional, and foundation sources, as well as for those offered by The University of North Carolina at Chapel Hill.

For a fellowship or assistantship awarded by the Graduate School, payment arrangements are specified in an award letter to the student. For awards granted by departments, appointees should inquire of the appropriate department for information concerning payment arrangements.

In addition to fellowships and assistantships from the Graduate School and from departments, significant levels of support for graduate students are provided by the Student Aid Office. See pages 00 and 00 for instructions. It is extremely important for graduate students to complete and submit the Financial Aid Form (FAF) so that it will be on file prior to the time when a loan or work-study employment is needed. The nature of the federal

appropriation process is such that these funds often become available on extremely short notice, and failure to have an FAF on file may mean that the graduate student will fail to qualify for an award.

University Fellowships and Assistantships

The Graduate School offers approximately twenty named fellowships to entering doctoral students each year. These fellowships each carry an academic year stipend of \$12,000 and payment of tuition and fees. The tenure of a named fellowship is three years, to be used by the fellow within a period of five years from the date of matriculation. Fellows are chosen from applicants nominated by schools, departments or curricula in a campus-wide competition. Applicants to doctoral programs may not apply for these fellowships directly, but must be nominated by their academic unit. The named fellowships are restricted to applicants for doctoral degree study. Candidates for the master's degree, in those academic units for which the master's degree is required prior to formal admission to doctoral study, are eligible for nomination, provided that clear indication of the intent to continue in the doctoral program at this institution after receiving the master's degree is made at the time of application to the Graduate School.

The endowed fellowships include: the Pogue Fellowships, the William R. Kenan, Jr. Fellowships, the William N. Reynolds Fellowships, the Mrs. Victor (Edna Angle) Humphreys Graduate Fellowship and the Whitaker Fellowships.

The Board of Governors of The University of North Carolina system sponsors Fellowships in Science and Technology. Three year nonservice awards are made each year to one doctoral student each in the Curriculum in Biomedical Engineering and Mathematics and in the Departments of Chemistry, Computer Science, Environmental Sciences and Engineering, and Physics and Astronomy. The stipend is \$9000 and tuition and fees are paid. The stipend may be supplemented by the department.

The Graduate School supports doctoral dissertation research by offering approximately 50 dissertation fellowships. The R.J. Reynolds Industries Research Fellowships carry a stipend of \$4000 for one semester for off-campus dissertation research plus payment of tuition and fees.

Dissertation Awards to be used for the completion of the doctoral dissertation on-campus carry a stipend of \$5000 for six months. Several fellowships are available for doctoral research in specific countries: the Werner P. Friederich Fellowship in the Humanities to Switzerland, Georges Lurcy Fellowship to France and the Instituto de Cooperacion Iberoamericana Fellowship to Spain. Stipends, allowances, and emoluments of these fellowships vary.

The largest program for the support of graduate students by the Graduate School is the Merit Assistantship program. These awards are made in behalf of the Graduate School directly by the admitting school, department, or

curriculum. The minimum stipend of a Merit Assistantship is \$9000 for the academic year. Nonresident Merit Assistants qualify for payment of tuition at the North Carolina resident rate. Appropriate academic duties of not more than 20 hours per week may be assigned.

Minority Presence Awards

Under the Board of Governors general Minority Presence Grant Program, black students may be eligible for special financial assistance if they are residents of North Carolina, enrolled for at least three hours of degree-credit coursework, and demonstrate financial need.

The Minority Presence Grant Program for Doctoral Study provides stipends of \$9000 for the academic year, with an option of additional support in the amount of \$500 for study in the summer session, for black residents of North Carolina who are selected to participate. Recipients must be full-time students pursuing doctoral degrees at The University of North Carolina at Chapel Hill.

Patricia Roberts Harris Fellowships

The Patricia Roberts Harris (PRH) Fellowship Program, formerly the Graduate and Professional Opportunities Program, (PRH) is a federal program administered by the Department of Education which provides fellowships for the purpose of increasing the representation of minorities and women in graduate and professional education. The Graduate School participates in this program in the fields of Dentistry, Political Science, Psychology and Public Health. The PRH fellowship provides a stipend of \$6900 plus tuition and fees. The stipend may be supplemented by the student's department and need is a criterion for award.

The target groups for the Graduate School are Blacks and Native Americans. Continuation of the PRH Fellowship Program is contingent upon funding from the U.S. Department of Education.

External Fellowships for Study Abroad

Each year the Graduate School is invited to nominate candidates for fellowships for study abroad. For 1988-89 these include:

Belgian American Educational Foundation, Inc. Fellowship for study and research in Belgium.

Winston Churchill Foundation Scholarship for study at Churchill College, Cambridge University.

German Academic Exchange Service (DAAD) Fellowship for study and research in the Federal Republic of West Germany.

Stipends and allowances vary.

Departmental Fellowships

Several departments offer fellowships funded from private sources. Students are nominated for these fellowships by their departments and selection is made by faculty committees or by the Graduate School. For additional information concerning such fellowships the applicant should contact the appropriate department. Listed below are examples of such fellowships:

The W. C. Coker and the Mrs. W. C. Coker Fellowships in Botany through the Department of Biology; The Samuel Kress Fellowship and the Emily Pollard Fellowship in the Department of Art; the Kent James Brown Fellowships in the Department of Germanic Languages; the Mellon Fellowships in City and Regional Planning; the Waddell Fellowships in the Department of History; the George E. Nicholson, Jr. Fellowships in the Department of Statistics; the Georges Lurcy Fellowship in the Department of Economics, and the Microelectronics Center of North Carolina Fellowships in the Curriculum in Biomedical Engineering and Mathematics, and the Departments of Chemistry, Computer Science, and Physics and Astronomy.

Departmental Assistantships

Approximately 1800 graduate assistantships, research assistantships, or teaching assistantships, with stipends ranging up to \$10,000, are available through specific departments.

Graduate assistantships also are available through the various research institutes and centers of the University. (See pages 83-94 for a listing of these units.)

Residence Hall Staff Positions

Upperclass and graduate students who have had experience in residence hall living may apply for resident assistantships (RA's) and positions as assistant residence directors (ARD's) by writing for further information and application forms to the Department of University Housing, Carr Hall. To be assured of consideration, applications should be returned by January 15. Personal interviews are required as part of the application process.

Federal and State Fellowships and Traineeships

A number of State and federally-funded fellowships and traineeships are available in some departments. To be eligible for these fellowships and traineeships, students must be pursuing graduate training in specified fields of study. Interested students should request additional information from their departments.

National, Regional, and Foundation Fellowships

These awards are made to an individual rather than to the University. Recipients are chosen through competitions expressive of the terms of each award.

Examples of these awards follow:

NSF Graduate Fellowship—The Fellowship Office, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. Pre-application packets are available in the Graduate School Fellowship Office, 218 Bynum Hall.

American Association of University Women Fellowships—Applications are available through local chapters.

Tuition Payment for Award Holders—Unless tuition is expressly provided by the terms of the award, an award recipient must pay tuition at the rate determined by his or her residence status. However, a nonresident graduate student awarded an assistantship or a fellowship may be eligible for a reduced tuition rate no less than that paid by North Carolina residents.

Tuition and Fees Scholarship

The 1983 North Carolina General Assembly revised G.S. 116-144 to direct the Board of Governors of the University of North Carolina to fix the tuition and required fees charged to nonresident students. The Board of Governors identified two groups of nonresident students to which special tuition rates would be extended: undergraduate students deemed by their institutions to have special talents and qualifications and who are thereby awarded a scholarship of at least \$250 per academic year and graduate students who serve as teaching assistants or research assistants or in similar instructional or research assignments and who are paid a stipend of at least \$2000 per academic year.

A qualifying assistantship entitles the recipient to the privilege of paying tuition and fees at the same rate that is charged residents for tuition purposes of the State of North Carolina. The difference in the cost of tuition and fees for nonresidents and that for residents is provided as a scholarship in recognition of special talents and qualifications and does not represent compensation for the service component of the assistantship.

Dates of Award Payments—Graduate students are reminded that, for some appointments, stipends are not paid until after work is performed. This means that payment checks due many graduate students will not be received until thirty days after registration for each semester. Students are advised to make arrangements for their own support during the time prior to the arrival of a first payment in each semester.

Other Financial Aid

Graduate students in need of assistance to meet their educational and living expenses should apply to the Student Aid Office for financial aid. Although assistance to graduate students is limited, financial support may be available from University or federal loan programs and from the federal College Work-Study Program, either hourly-paid campus jobs or teaching/research assistantships. A student must be enrolled in a degree program on at least a half-time basis in order to receive University or federal financial aid.

All financial aid from the Student Aid Office, including Guaranteed Student Loans, is based upon a student's financial need, which is the difference between reasonable costs of attendance and the student's available resources. The University expects a student and his/her family to contribute, insofar as they are able, to educational and living expenses, and the ability of the student and family to help with the costs of attendance is measured by a standard system, used nationally by all colleges and universities. Financial support from assistantships, part-time work, spouse's earnings, fellowships, tuition remissions and other awards must be considered in calculating a student's eligibility for aid.

To apply for loan and Work-Study assistance, a graduate student must complete the *Financial Aid Form (FAF)* and submit it to the College Scholarship Service, with the instruction that a copy of the statement be sent to the UNC-CH Student Aid Office (code number 5816). A request for financial aid from the Graduate School or a graduate department will not serve as an application for assistance from the Student Aid Office; the *FAF* is required of all applicants. The *FAF* may be obtained from college financial aid offices or from the UNC Student Aid Office. All sections of the form must be completed.

The preference deadline for receiving the *FAF* from new and returning students is **March 1**. A student should not wait for admission to a graduate program before applying for aid. Applicants should complete the document as soon as tax information for the preceding calendar year is available, preferably by February 15. Students who apply after March 1 will receive assistance only if resources permit. When financial aid funds are limited, preference is given to undergraduate students.

In addition to the *FAF*, all financial aid applicants who have attended other colleges or universities must submit a *Financial Aid Transcript* for each school previously attended. Copies of the form may be obtained from the UNC Student Aid Office.

A student's request for financial aid will be considered after the *FAF* and *Financial Aid Transcripts* from all previous schools have been received by the Student Aid Office. An award decision cannot be made until an applicant has been admitted to a graduate program, so the student should ensure that the admission procedure is completed as early as possible.

Perkins Loans: Federal funds are allocated to the University for the Perkins Loan Program, formerly the National Direct Student Loan Program, through which eligible students may borrow to meet their educational and living expenses. A student may borrow up to \$18,000 for undergraduate and graduate study, but because of limited allocations to UNC-CH, the maximum award usually cannot exceed \$3,000 per year. Repayment at 5 percent interest begins after a student terminates at least half-time student status, and the borrower must agree to a payment schedule of at least \$30 per month before he/she leaves the University. Under certain circumstances, such as military service, continued student status, or a period of required internship, the repayment of a loan may be postponed. A student who completes the *FAF* will be considered for assistance from the Perkins Loan Program if funds are available.

University Loans: Graduate students may receive assistance from University Loan funds, usually at 5 percent interest, with repayment beginning immediately after termination of student status. The maximum loan is ordinarily \$2,500 per year. A student who completes the *FAF* may be considered for a University Loan.

College Work-Study Employment: Part-time jobs on campus and a limited number of teaching or research assistantships are available to needy students through the federal College Work-Study Program (CWSP). Jobs are assigned by the Student Aid Office, and work is generally available in all University offices and departments. Assistantships are approved by the Student Aid Office on the recommendation of the Graduate School and the various departments. Part-time campus jobs generally pay \$4.75 per hour, and assistantships provide a stipend comparable to other graduate service awards. A student who completes the *FAF* will be considered for Work-Study assistance.

Guaranteed Student Loans: Graduate students may also borrow from the Guaranteed Student Loan Program on the basis of financial need. An eligible graduate student may borrow up to \$7,500 per year, with a limit of \$54,750 for undergraduate and graduate study. A loan may not exceed the difference between standard costs of attendance (established by the Office of Student Aid) and other assistance available to the student. Repayment of a GSL at 7-9 percent interest begins six months after a borrower ceases to be at least a half-time student. A student must complete the *FAF* in order to be considered for a Guaranteed Student Loan. A North Carolina student, or a resident of another state, may receive a loan from the College Foundation, Inc., the primary lender for University students. However, if the student has borrowed from another agency, the student should apply each year to the previous lender so that repayment of the loan will be confined to a single source. The Student Aid Office will prepare Guaranteed Student Loan applications for eligible students who are referred to the College Foundation. A student who borrows from another lender should submit the separate application to the Student Aid Office. Additional forms

may be necessary to document eligibility for GSL assistance, and the Student Aid Office will notify the applicant if more information is required. Processing of a GSL application may take as long as eight weeks, so the process should be started as early as possible.

SLS/PLUS Loans: A graduate student may borrow from the Supplemental Loan Program (SLS) or the parent of a dependent graduate student may borrow from the Parent Loan Program (PLUS). Loans are not based on financial need, but credit worthiness of the borrower is examined. Interest is based on current market rates up to a maximum of 12 percent. A student or parent may borrow up to \$4,000 per year, not to exceed the difference between costs of attendance and other assistance. A separate SLS or PLUS application is required and must be submitted to the Student Aid Office for certification. The forms can be obtained from a GSL lender, or the Student Aid Office can provide the names of other lending agencies.

Additional Information: Questions about financial aid and requests for the necessary forms should be directed to the Office of Student Aid, The University of North Carolina at Chapel Hill, 300 Vance Hall, P.O. Box 1080, Chapel Hill, NC 27514. Telephone 919-962-8396.

TUITION AND FEES, STUDENT HEALTH, AND UNIVERSITY HOUSING

Tuition and Fees

Tuition and fees are assessed on a semester basis and are due at registration. Payments may be made in advance, in person or by mail. However, the entire amount for tuition and fees is due by the last day of registration. Payments may be mailed to: University Cashier, The University of North Carolina at Chapel Hill, CB# 1400, 103 Bynum Hall, Chapel Hill, North Carolina 27599-1400. Checks should be made payable to The University of North Carolina. The student's social security number should be shown on the face of the check. Accounts not paid in full by the last day of registration are subject to a late payment fee and the student's possible disenrollment.

The estimated total expenses for a graduate student for an academic year (two semesters) are as follows:

	<i>N.C. Resident</i>	<i>Nonresident</i>
Tuition	\$ 504.00	\$4,106.00
Fees*	337.00	337.00
Books and Supplies	325.00	325.00
Dormitory Room Rent (Average double-room)	1,258.00	1,258.00
Meals (Approximately)	1,797.00	1,797.00
Personal Expense (Approximately)	700.00	700.00
TOTAL	\$4,921.00	\$8,523.00

*All new graduate students are required to pay an Orientation Fee of \$8.00 and an ID Card fee of \$5.00 for their initial semester.

Each student is responsible for payment of his or her University bills. If someone other than the student is responsible for payment of his/her bill, the University Cashier should be notified in ample time so that a bill may be sent to the proper person or agency.

Students who are expecting to receive financial aid, scholarship funds, fellowship funds, or payment for service appointments should bring with them sufficient funds (cash or travelers checks) to take care of living expenses for approximately fifteen days. This should provide sufficient time for appropriate funds to be made available.

The last day to *drop a course* for credit on student financial accounts is two weeks from the first day of classes for each semester.

Withdrawals are prorated over a period of nine weeks at a rate of one-tenth of the semester's bill after deduction of a \$25.00 administrative charge. The last date for credit on student financial accounts for *withdrawal* is nine weeks after registration.

A nonrefundable application fee of \$35.00 must be submitted with the Application for Admission to the Graduate School. An applicant who has been offered admission for the fall or spring semester reserves his or her place by the payment of a \$35.00 nonrefundable enrollment deposit which is credited toward tuition for the semester for which he or she is admitted. Such deposits are not required for the Summer Session. Advance deposits are not refundable if the applicant fails to enroll.

The following represents the schedule of tuition and fees for the Fall and/or Spring Semesters, 1988-1989. The schedule of tuition and fees is subject to change without prior notice.

Tuition and Fees by Hours
(Per Semester)

	<i>N.C. Resident</i>	<i>Nonresident</i>
0 Hours (Thesis Only—No Credit)	\$284.50	\$ 534.50
0-2.9 Hours (Credit Hours & Thesis Credit)	231.50	681.50
3-5.9 Hours (Credit Hours & Thesis Credit)	294.50	1,195.50
6-8.9 Hours (Credit Hours & Thesis Credit)	357.50	1,708.50
9 or More Hours (Credit Hours & Thesis Credit)	420.50	2,221.50
Master of Business Administration (Includes MBA Fee of \$25.00 and MBA Computing fee of \$20.00)	465.50	2,266.50

Student Health Service

The University offers a comprehensive program of health care for its student body and provides a Student Health Service with both inpatient and outpatient facilities.

The Health Service is staffed with physicians, psychiatrists, clinical psychologists, counselors, pharmacists, and a full nursing complement. In addition to programs for physical and mental health, there are also programs in Sports Medicine and Health Education. All clinical sections of the Student Health Service operate on an appointment basis. Same day appointments are available for each practitioner so that patients who become acutely ill may be seen by their primary care provider. Students should call and arrange for a time to be seen in order to minimize waiting time and ensure appropriate attention from the health professional.

At the discretion of the attending physician, a student may be admitted as an inpatient. Charges are made by Student Health Service for inpatient hospitalization, prescriptions, dermatology, ENT, and orthopedics as well as routine procedures not directly related to a student's health (such as pre-employment physical examinations). Certain highly specialized services (major surgery, consultations, certain types of laboratory and X-ray procedures) not available at the Health Service are rendered by the North Carolina Memorial Hospital or commercial laboratories at standard rates.

The University also provides the opportunity to purchase supplemental hospitalization insurance through a group program which provides coverage for married students and their families as well as for single students. It is strongly recommended that students have additional health insurance such as the one offered.

North Carolina law requires all students new to the University to document immunization records or undergo vaccination. Failure to comply results in cancellation of registration 30 days after classes begin.

Housing, Food, Laundry, and Linen Service

Each University student is required to maintain a correct local address with the University.

THE DEPARTMENT OF UNIVERSITY HOUSING

The Department of University Housing at The University of North Carolina at Chapel Hill, consistent with the academic mission of the University, endeavors to provide eligible students a supportive environment within which to live while attending the University. We seek to provide a basic level of living space for as many students as possible consistent with economic realities and program goals. We maintain the physical quality and the integrity of our buildings at a level conducive to security and comfort, and do so in the belief that provision of a safe and healthy living environment supports and contributes to the learning process.

The Department of University Housing is part of the Division of Student Affairs. The Director works with a professional staff who manage housing contracts and assignments, student and staff development, business affairs, maintenance and operations, student family housing, and conference services. The Training and Programming staff is composed of Area Directors and Assistant Area Directors, Resident Assistants, Desk Assistants, Secretaries, and Night Assistants. Each residence area is managed by an *Area Director*, a full-time professional staff member. The Area Director has responsibility for the operation of the residence area. This responsibility includes supervising student staff, advising student government, developing well-rounded educational programs, counseling with individuals and small groups, and fulfilling all management functions necessary for operation of the area. The *Assistant Area Director* shares with the Area Director the responsibility for the operation of a residence area. The *Resident Assistant*, a full-time upperclass or graduate student, serves as educator, counselor, administrator, regulator, resource, and friend for the residents of a floor or comparable living unit in the halls. The *Operations staff* is comprised of tradespeople and custodial employees. Their purpose is to help keep the buildings functioning properly and to clean public areas.

The major purpose of University Housing is to provide students with a living environment that will allow them to take full advantage of the

educational opportunities here at Carolina. In addition, we try to enhance the students' development outside of their academic experience.

In order to accomplish this goal we provide many services to each of our residents. Our staff in each building help in the transition for those new to University Housing and in the continual growth of those who choose to return. This is accomplished by providing various programs or simply being available to talk. Overall, University Housing works to provide students with an environment that is optimal for student living and learning on our campus.

The University of North Carolina follows the principle that all persons shall have equal opportunity and access to facilities in any phase of University activity without regard to handicap, sex, race, creed, color, age, or national origin. Under this principle, educational, cultural, social, housing, extra-curricular and employment opportunities are available on an equal basis. However, receipt of the application by and advance payment to the Department of University Housing does not guarantee admission to the University or to a residence hall. The Department of University Housing reserves the right to refuse for just cause any application for space and to return any advance payment within two weeks of receipt of the completed application.

The Department of University Housing is an Equal Opportunity/Affirmative Action Employer.

Craige Residence Hall

The following information, excerpted from "Hallways and Highrises," specifically describes Craige Residence Hall:

The Department of Housing at UNC-Chapel Hill is committed to providing economical and convenient housing facilities for those single graduate and older undergraduate students who choose to live on campus. With this goal in mind the Department has designated Craige Residence Hall for this purpose. Craige also serves as the home of a majority of UNC's international students. A diverse blend of academics and talents presents Craige residents with a unique opportunity to discover the personal growth and enjoyment of undergraduate life, appreciate the stimulus and intellectual challenges of graduate study, sample a wide variety of international cultures, and experience the style of living that only southern hospitality can offer, and all this under one roof—Craige Hall.

Craige is a six-story building, four wings per floor, arranged in a suite system with three or four suites per wing. Each suite houses eight people, and there are four bedrooms and a shared bathroom per suite. Suite doors open onto a covered, open air balcony. The maximum hall population is 650 residents.

Each room has one wall modular jack for telephone hookup. Telephones are not provided; residents are responsible for providing their own telephone for the room. Telephone service connection applications are available in each hall. Southern Bell offers a reduced service connection charge for applications returned early during the Fall and First Summer semesters. Residents are encouraged to check into the phone services available upon arrival to the hall.

NOTE: The University is not responsible for room telephone connection, disconnection, or service. Disputes over telephone bills must be handled between student subscribers and the telephone company.

Assignments to University housing are made by the Contracts Office. Application for housing does not guarantee assignment. Early application is advised.

Additional information regarding residence hall accommodations including contract responsibilities, cost, and application procedure is available by writing to: Department of University Housing, Contracts Office, CB# 5500, Carr Building, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27599-5500.

Student Family Housing

The University owns and operates a Student Family Housing complex known as Odum Village, which consists of 306 one- and two-bedroom apartments conveniently located one mile south from the center of campus and adjacent to the medical complex. A brochure and application may be obtained by writing to Student Family Housing Office, The University of North Carolina at Chapel Hill, CB# 5510, Community Service Building, Chapel Hill, N.C. 27599-5510. Early application is advisable.

Summer Session Housing

Information regarding summer housing may be obtained by writing to: Department of University Housing, Contracts Office, CB# 5500, Carr Building, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27599-5500.

Student Dining Facilities

University Dining Services, managed by Marriott Corporation, operates at six on-campus locations. These locations are situated in Lenoir Dining Hall, Chase Hall and four residence halls; Craige, Hinton James, Ehringhaus, and Morrison.

All students assigned to a residence hall are required to purchase a minimum \$100.00 meal plan per semester. Payments will be made directly to University Dining Services. Other meal plans will be available on a semester basis. Meal plans are honored at all above-stated locations on campus. Meals are also available on a cash basis. University Dining Services will contact all residence hall students by mail and during the Testing and Orientation Program Sessions regarding meal plans and services available. For additional information, contact University Dining Services, CB# 1505, Lenoir Hall, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27599-1505 or call (919) 962-0200.

Privately Owned Residence Hall Accommodations

Some graduate students are housed in privately owned Granville Towers, located just off the UNC campus about one block from the Carolina Inn. The three towers of these supervised residence halls have a cafeteria dining commons. The fee charged includes room and board. All correspondence should be directed to the Granville Towers Business Office, University Square, Chapel Hill, North Carolina 27514.

Laundry, Dry Cleaning, Linen, Pillow, and Blanket Service

Laundry Service: Finished laundry service at reasonable cost is provided by the University Laundry to students who wish to use it. There is also an economical wash-dry-fold service (nothing finished). Both services are available on a Cash-and-Carry basis at any of six laundry call offices.

Linen Rental Service: A complete linen rental service is also available through the University Laundry. The service consists of two sheets, one pillow case, and three bath towels exchanged on a weekly basis through the six laundry call offices. A nominal fee includes a refundable deposit, covers the entire academic year, and is payable when the service is requested. Pillows may be rented for the school year. Blankets are available for a deposit with provision for a refund when the blanket is returned in good condition.

Dry Cleaning: Complete dry cleaning service is available at all six laundry call offices on a cash-and-carry basis.

Laundry call offices are located in Granville Towers, Craige, Ehringhaus, James, Joyner, and Morrison residence halls and also at the Laundry Plant on West Cameron Avenue (962-1261).

GENERAL UNIVERSITY REGULATIONS AND POLICIES

Persons enrolled in the Graduate School are regarded as members of the student body of The University of North Carolina at Chapel Hill and are held responsible for conducting themselves in conformity with the moral and legal restraints found in any law-abiding community. They are, moreover, subject to the regulations of the student government under the Code of Student Conduct, which is divided into two components and reads as follows.

The Honor Code

It shall be the responsibility of every student at The University of North Carolina at Chapel Hill to obey and to support the enforcement of the Honor Code, which prohibits lying, cheating or stealing when these actions involve academic processes or University, student or academic personnel acting in an official capacity.

Academic work and insuring its integrity is a joint enterprise involving faculty and students. Because many graduate students serve as teaching assistants, it is incumbent upon graduate students to familiarize themselves with both the specific student and faculty responsibilities listed below:

The Honor Code: *Student Responsibilities*

- To conduct all academic work within the letter and spirit of the Honor Code which prohibits the giving or receiving of unauthorized aid in all academic processes.
- To consult with faculty and other sources to clarify the meaning of plagiarism; to learn the recognized techniques of proper attribution of sources used in the preparation of written work; and to identify allowable resource materials or aids to be used during examination or in completion of any graded work.
- To sign a pledge on all graded academic work certifying that no unauthorized assistance has been received or given in the completion of the work.
- To comply with faculty regulations designed to reduce the possibility of cheating—such as removing unauthorized materials or aids from the room and protecting one's own examination paper from view to others.
- To maintain the confidentiality of examinations by divulging no information concerning an examination, directly or indirectly, to another student yet to write that same examination.
- To report any instance in which reasonable grounds exist to believe that a student has given or received unauthorized aid in graded work. Such report should be made to the Office of the Student Attorney General or the Office of Student Affairs.

- To cooperate with the Office of the Student Attorney General and the defense counsel in the investigation and trial of any incident of alleged violation, including the giving of testimony when called upon. Nothing herein shall be construed to contravene a student's rights enumerated in Section V.A.2.b of *The Instrument*.

Extracted from *The Instrument of Student Judicial Governance*, pp. 6-7.

The Honor Code: *Faculty Responsibilities*

- To inform students at the beginning of each course and at other appropriate times that the Honor Code, which prohibits giving or receiving unauthorized aid, is in effect. Where appropriate, a clear definition of plagiarism and a reminder of its consequences should be presented, and the extent of permissible collaboration among students in fulfilling academic requirements should be carefully explained.
- To identify clearly in advance of any examination or other graded work the books, notes or other materials or aids which may be used; to inform students that materials or aids other than those identified cannot be used; and to require unauthorized materials or aids to be taken from the room or otherwise made inaccessible before the work is undertaken.
- To require each student on all written work to sign a pledge when appropriate that the student has neither given nor received unauthorized aid. Grades or other credit should not be awarded for unpledged work.
- To take all reasonable steps consistent with existing physical classroom conditions—such as requiring students to sit in alternate seats—to reduce the possibility of cheating on graded work.
- To exercise caution in the preparation, duplication and security of examinations (including make-up examinations) to insure that students cannot gain improper advance knowledge of their contents.
- To avoid, when possible, reuse of instructor-prepared examinations, in whole or part, unless they are placed on reserve in the Library or otherwise made available to all students.
- To exercise proper security in the distribution and collection of examination papers; and to be present in the classroom during an examination when the instructor believes that his presence is warranted or when circumstances, in his opinion, make his presence necessary.
- To report to the Office of the Attorney General or the Office of Student Affairs any instance in which reasonable grounds exist to believe that a student has given or received unauthorized aid in graded work. When possible, consultation with the student should precede reporting. Private action as a sanction for academic cheating, including

the assignment for disciplinary reasons of a failing grade in the course, is inconsistent with faculty policy and shall not be used in lieu of or in addition to a report of the incident.

- To cooperate with the Office of the Student Attorney General and the defense counsel in the investigation and trial of any incident of alleged violation, including the giving of testimony when called upon.

Faculty Council Legislation

These responsibilities are not all inclusive. They constitute but the minimum required of members of the faculty and of the student body. Nor are they mutually exclusive. The obligation of a faculty member or a student to uphold the values of academic integrity in this University shall not be lessened or excused by any failure of the other to comply with his responsibility.

It should be noted that because any act of personal academic dishonesty strikes at the core of the University's mission, faculty, students and administration have decided the normal sanction for an academic cheating conviction is suspension, unless unusual mitigating circumstances exist.

The Campus Code

"It shall be the further responsibility of every student to abide by the Campus code; namely, to conduct oneself so as not to impair significantly the welfare or the educational opportunities of others in the University community."

All nonacademic conduct that infringes upon the rights or welfare of others at the University is thus embodied in the Campus Code. Violations of the Campus Code are handled in the same manner as violations of the Honor Code.

Alcoholic Beverages

A POLICY ON STUDENT POSSESSION AND CONSUMPTION OF ALCOHOLIC BEVERAGES IN FACILITIES OF THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL has been promulgated by the Vice Chancellor for Student Affairs, with the approval of the Chancellor, to inform students of the conditions under which alcoholic beverage use consistent with Federal, State, and local laws and ordinances is permitted in University facilities and on University property. Copies of the policy may be obtained from the Office of the Dean of Students or the Associate Vice Chancellor for Student Affairs; both are located in Steele Building.

Transportation and Parking

Any person parking a motor vehicle on campus between 7:30 a.m. and 5:00 p.m., Monday through Friday (7:30 a.m.–9:00 p.m. in resident student

areas) must display the appropriate permit for that lot or parking area. After 5:00 p.m. students may park in any unreserved employee parking area without being cited. A limited number of metered spaces are available on campus.

Any student, except freshmen, may apply for a parking permit but the number of permits available in some zones is limited. Charges vary according to zone location. Pre-registration for the fall term begins in April and ends the last day of final exams. Permits are assigned according to year in school with graduate students having first priority. Prices may increase after July 1st each year. Students are responsible for being familiar with all parking regulations. The campus map has a summary of the rules and regulations and will be helpful in avoiding citations. **Warning:** Firelanes and areas zoned for permit parking are strictly enforced. Parking in violation could result in fines and possible towing.

Bus Passes are available for purchase each day at the UNC-CH Transportation and Parking Office. The Transportation and Parking Office is located off of Manning Drive near Morrison Dorm. Regular window hours are from 7:30 a.m.-5:00 p.m. Monday through Friday.

Drug Policy

Students, faculty members, administrators, and other employees of The University of North Carolina at Chapel Hill are responsible, as citizens, for knowing about and complying with the provisions of North Carolina law that make it a crime to possess, sell, deliver, or manufacture those drugs designated collectively as "controlled substances" in Article 5 of Chapter 90 of the North Carolina General Statutes. Any member of the university community who violates that law is subject both to prosecution and punishment by the civil authorities and to disciplinary proceedings by The University of North Carolina at Chapel Hill. Disciplinary proceedings against a student, faculty member, administrator, or other employee will be initiated when the alleged conduct is deemed to affect the interests of The University of North Carolina at Chapel Hill.

Penalties will be imposed for violation of the policies of The University of North Carolina at Chapel Hill only in accordance with procedural safeguards applicable to disciplinary actions against students, faculty members, administrators, and other employees. The penalties that may be imposed range from written warnings with probationary status to expulsions from enrollment and discharges from employment.

Every student, faculty member, administrator, and other employee of The University of North Carolina at Chapel Hill is responsible for being familiar with and complying with the terms of the policy on illegal drugs adopted by the Board of Trustees. Copies of the full text of that policy are available in the office of the Assistant to the Chancellor.

Smoking Ban

In Fall 1975 by student referendum and Faculty Council action, smoking in classes was banned. Both students and faculty are expected to refrain from smoking in classrooms.

Disciplinary Records

Disciplinary files and records of cases that resulted in "not guilty" findings will be destroyed immediately after the hearing that rendered the "not guilty" verdict. Disciplinary files and records on other adjudicated cases will be maintained for ten years after all appeal rights have expired or have been exhausted, and then destroyed. Files on pending cases will be maintained indefinitely.

Release of information contained in a student's disciplinary file or other records is governed by the provisions of the 1974 Family Educational Rights and Privacy Act.

Nondiscrimination Policy

The University of North Carolina at Chapel Hill is committed to equality of educational opportunity and does not discriminate against applicants, students, or employees based on race, color, national origin, religion, sex, age, handicap or veteran status. Any complaints alleging failure of this institution to follow this policy should be brought to the attention of the Assistant to the Chancellor. Moreover, The University of North Carolina at Chapel Hill is open to people of all races and actively seeks to promote racial integration by recruiting and enrolling a larger number of black students.

STUDENT AFFAIRS

The Office of the Vice Chancellor for Student Affairs (located in 102 Steele Building) coordinates the Division's programs and provides guidance and leadership for its departments. The Office also acts in a consulting role for faculty, administrators, and students who wish to raise issues which concern the University community, with a particular focus on student needs. Members of the Office of the Vice Chancellor also serve on various University committees to represent the Division's several constituencies.

The Office of the Dean of Students (located in 01 Steele Building) is actively concerned with broad areas affecting student services and student involvement at the University. The staff operates as an advocate for student needs, as an information center for referrals and questions from throughout the University community, as a contact office for student organizations on campus, and as a provider of specific support services to individual

students and to officially recognized student groups. Among the staff's responsibilities is assisting the University in upholding its ideals of personal conduct—both academic and nonacademic—through educating members of the University community about the student judicial system and through overseeing the system's operation. Staff members advise the Student Congress and the Executive and Judicial Branches of Student Government and design programs to address campus issues, such as mediation and rape awareness. The office also implements services for and provides assistance to some of the more than 250 officially recognized extracurricular organizations, and also helps students, parents, and University staff with personal problems or crises involving students.

Students are encouraged to explore the opportunities offered by the Division of Student Affairs throughout their University career, either directly through the respective departments, or through the Office of the Vice Chancellor.

Orientation Office

The Orientation Office is responsible for familiarizing new students with the University. The Orientation Office strives to minimize new students' anxiety and increase their confidence, and to make them comfortable within the University environment. The orientation program promotes a smooth transition to the new academic and physical environment, familiarizes new students with University procedures, and offers early social opportunities. The office administers orientation programs for all new freshmen, transfer students, and graduate and professional students. The programs are designed to address the specific needs and different concerns of these groups.

Services for Handicapped Students

It is the purpose of The University of North Carolina at Chapel Hill to provide equal opportunity for higher education to academically qualified students with visual, hearing, physical, or learning disabilities. Students are encouraged to be as independent as possible within the limits of their capabilities. Handicapped Student Services will aid disabled students in integrating themselves into the University program.

Early application for any semester or session is recommended. It is further advised that applicants communicate with the Student Affairs Office concerning their interests and physical limitations. A visit to the campus before acceptance or matriculation is recommended, at which time the applicant may better judge the campus in relation to his or her needs. Arrangements for such a visit, and further information, may be obtained by writing to the Coordinator for Handicapped Student Services at CB# 5000, Steele Building, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27599-5000, 919-966-4041 (voice/TDD).

Student Development and Counseling Center

The Student Development and Counseling Center (SDCC), located in Nash Hall, offers a wide variety of testing, educational, and informational services to students. The Center provides its services to students experiencing the typical problems that confront adults during their studies at the University. To this end, the Center provides career testing, individual and group counseling, and brief structured programs and courses designed to enhance personal, social, academic, and intellectual development. Many of these programs have the goal of improving students' academic and career credibility. The Center also seeks to help the *exploring* student—those who wish to improve their learning ability, increase their reading speed and comprehension, and improve their study skills, as well as those who are experiencing problems adjusting to a large, complex, and demanding University. The services of the SDCC are provided, on a strictly confidential basis, by professional licensed or certified counselors and educators. The Center at Nash Hall houses a state-of-the-art information facility containing a comprehensive career resource room which allows the exploring student quick access to information about different majors, educational programs, and careers. The SDCC also administers the Reading Program (in Phillips Hall Annex), which helps students with their reading and study skills. The program offers an individualized approach to improving academic skills, beginning with an individual diagnosis of reading and study habits, and continuing until students reach their desired levels of performance. The Program is essentially laboratory in nature, allowing individual students to concentrate on the skills they wish to improve. Students are sometimes referred by professors or advisers, but more often investigate on their own initiative the services offered by the Reading Program.

University Career Planning and Placement Services

University Career Planning and Placement Services assists students who have, for the most part, identified their career direction.

Services for upperclassmen and graduate students include workshops on resume-writing, interviewing, and job-seeking skills; resume-referral to employers; individual counseling; on-campus interviewing; job vacancy notebooks; and a credentials file for students in selected curricula. Some services are limited to students in a UNC-CH degree or certification program who are within two semesters of graduation.

Additional resources and programs include occupational and employer information, career panels, career and graduate/professional school fairs, and an alumni network service.

University Career Planning and Placement Services is located in 211 Hanes Hall.

The International Center

The International Center, located in the Frank Porter Graham Student Union, assists students and faculty from other countries with their adjustment to life in Chapel Hill. The Center advises individuals and University departments on legal matters pertaining to international students and faculty. Activities are offered which, in addition to helping international students benefit as much as possible from their stay here, also promote interaction between students from the United States and international students, and generally encourage the University and local community to benefit from the presence of international students. Activities include a special orientation, the Host Family Program, the Campus Friends Program, lectures, discussions, and various cultural programs. Work/Study/Travel Abroad information is available at the Center for U.S. students, as well as Study Abroad Scholarship information. The Class of '38 Summer Study Fellowships are administered by the Center.

The Campus Y

Since its founding 126 years ago, the Campus Y has been a starting point for the development of many programs responding to students' concerns. In particular, the Y serves as a bridge between the University and the local community; providing opportunities for cooperation in addressing the needs of both groups. Students participate in Y-sponsored committees, some of which are engaged in community outreach (such as the Big Buddy, Elderly Exchange, and Tutoring programs), while some are concerned with social issues (such as Human Rights Week and the Women's Forum). Other Y committees are involved in global action (such as Hunger Responsibility and the South African Scholarship Fund) or in fund-raising for the Y (e.g., the Crafts Bazaar). In addition to involvement in these and other committees (27 this year), the opportunity exists for students to serve on the Y Student Executive Committee, for which elections are held in the spring. All students are welcome to visit the Campus Y office (in Room 102 of the Campus Y Building) to learn about volunteer service and University, local, and global issues.

The Carolina Union

The Carolina Union is a student organization, headed by the Carolina Union Activities Board, which plans and carries out social, cultural, and educational programs for the entire student body. Programs range from informal band parties and human relations workshops to major speakers and popular and cultural concerts.

Composed of a president and chairpersons of standing committees (selected through open interviews in spring semester), the Carolina Union Activities Board provides valuable experience for the students involved.

Students interested in committee work may apply in early fall or contact the committee chairpersons (Room 200 in the Union). The Carolina Union is housed in the Frank Porter Graham Student Union Building, which also houses the offices of the major student organizations on campus, including Student Government, The Graduate and Professional Student Federation, *The Daily Tar Heel*, *The Phoenix*, *Cellar Door*, *Yackety Yack*, the Black Student Movement, the Residence Hall Association, Student Television, and the Student Consumer Action Union.

The Union building provides many facilities for the use of students. There are lounges with comfortable furniture, art galleries, a movie theatre, bowling lanes, billiards tables, pinball and video games, a lounge for chess, checkers and cards, lockers for student use, a photography darkroom, a large-screen color television, vending machines, and an information desk and box office.

Also housed in the Union building is the Central Reservations Office (Room 201), which serves recognized student organizations by providing meeting spaces, both in the Union and in other buildings throughout the campus.

Extracurricular Student Organizations

The University requires that extracurricular student organizations be officially recognized each academic year. This recognition process is designed to ensure that student organizations which are affiliated with the University do not discriminate on the basis of race, religion, national origin, handicap, age, veteran status, or sex as defined by law. In addition, official recognition provides student groups with the following benefits: applying for use (through reservation) of specified University facilities, property, services, or equipment pursuant to the Facilities Use Policy; use of the University's name in the organization's title, so long as University sponsorship or endorsement is not implied or stated; the privilege of applying for funding from the Student Activity Fee which is legislatively apportioned by the Student Congress; and the assistance of University staff. Applications for official University recognition must be completed annually, in order to ensure that active students are aware of University policies and to provide staff with information concerning University-affiliated student organizations.

Applications are available in the Office of Student Affairs, 01 Steele Building. All information in and attached to the application is considered public information upon the granting of recognition.

The Graduate and Professional Student Federation is a union of graduate and professional students organized on the basis of school, departmental, and curricula organizations. The GPSF provides communication between graduate and professional students, represents graduate and professional students, both within and outside the University community, and provides structures capable of dealing with ongoing issues and concerns. It also allo-

cates and administers the funds appropriated to it from student fees. Every duly enrolled graduate and professional student is a member of GPSF.

Student Government

Because graduate students may be appointed as Teaching Assistants it may be helpful to have an understanding of the student government system. Listed below are student officers and organizations:

I. Executive Branch

- A. Officers—President, Treasurer, Executive Assistants, Elections Board Chair.
- B. Examples of committees that address various areas of student concern:

AAUS/ASG	Handicapped Services
Campus Liaison	Parking
Campus Security	Publicity
Chancellor's Committees	Special Projects
Education/Academic Affairs	UNITAS/Housing
Grievance Task Force	

II. Judicial Branch

Undergraduate Court. This body maintains original jurisdiction with respect to all violations of the Code of Student Conduct except those in which another court may have specified jurisdiction.

Student Attorney General's Staff. The staff investigates alleged violations of the Code of Student Conduct and brings to trial those charges sufficiently supported by evidence; the staff also advises and assists students accused of violations.

University Hearing Board. This court has original jurisdiction in cases deemed inappropriate for hearing within another court and appellate jurisdiction with respect to cases appealed from other courts.

III. Legislative Branch

The Student Congress (SC). The legislative branch of Student Government is unicameral (one house), consisting of 27 representatives elected by the student body, with the President and the Treasurer of the Student Body serving as nonvoting ex officio members. The Speaker of the SC is elected from among the 27 representatives. Graduate and professional students and on- and off-campus undergraduates are proportionally represented in the Congress.

The Congress handles a vast amount of legislation and, as one of its primary responsibilities, prepares a budget with appropriations

totalling \$350,000. A predetermined amount, set by the Trustees, of fees paid by each student provides the source for the Student Government Budget.

The representatives are elected in the spring for one-year terms, and each member serves on one of three standing committees—Finance, Rules and Judiciary, and Student Affairs. A fourth committee, Ethics, is comprised of senior members of the Congress.

PUBLICATIONS, RESEARCH FUNDS, THE LIBRARIES, AND COMPUTER SERVICES

Scholarly Journals

The University has published scholarly journals since 1884, when *The Journal of the Elisha Mitchell Scientific Society* first appeared. Among the literary and linguistic publications are *Estudios de Hispanofila*, *Hispanofila*, *North Carolina Studies in Romance Languages and Literatures*, *Romance Notes*, *Studies in Philology*, and *The University of North Carolina Studies in Germanic Languages and Literature*. *The Southern Economic Journal*, a quarterly journal, publishes articles by southern as well as other economists, and the *North Carolina Law Review* is aimed at stimulating research and publication by faculty and students in the School of Law. Research summaries and publications of faculty, alumni, and advanced students in history political science, and the social sciences appear in the *Institute for Research in Social Science Monographs and Working Papers*, *Social Science*, *Popular Government*, and the *James Sprunt Studies in History and Political Science*. *The Chapel Hill Workshop Reports*, published by the School of Social Work, is widely used in inservice training in the children's institutional field. *The High School Journal* attracts contributions from educational practitioners and theorists from all parts of the country, and *Social Forces* is one of the best known journals in sociology and related fields. While most of these journals welcome scholarly contributions from other parts of the country, they also serve to reflect something of the persistent and viable spirit of research activity that is an important part of this University.

Endeavors, published by the Office of Research Services, features outstanding research programs underway on the campus and highlights the diverse research activities of the University.

The University of North Carolina Press

The University of North Carolina Press is the primary publishing arm of the University in the scholarly field. In addition to its publication of the journals of research, it carries on a book publishing program of about sixty new titles a year. Although these books are the work of scholars from all parts of the world, the presence in the University of a professionally staffed book publishing organization, with facilities for the international distribution of works of scholarship, is a stimulus to research and writing by members of the University community. The Press's program is an important contribution to the development of that aspect of the University's service which has to do with the advancement of learning.

Research Funds

In addition to research sponsored by research institutes and that financed by contracts, grants, and cooperative agreements from outside agencies, the University Research Council awards grants twice a year (during the fall and spring semesters) for study, research, and publication by the University's faculty members. Information and application forms for these grants are available from the Office of Research Services, 300 Bynum Hall. The Smith Graduate Research Fund supports small grants for thesis and dissertation research expenses. Information and application forms for these grants are available from the Graduate School, 200 Bynum Hall. Additional funds for research are awarded twice yearly by the Graduate School as R.J. Reynolds Research Fellowships for doctoral students whose dissertation research must be conducted off-campus and a limited number of Graduate School Transportation Grants are available for doctoral students in their last year of research who present papers at professional meetings.

The University Library

The general collections of the University Library are housed in the 422,659 square foot Walter Royal Davis Library. Among other research facilities, the Davis Library includes 780 open and closed carrels for assignment to graduate students, and an additional 2087 lounge, carrel, and table seats for general use. There are 146 studies available for assignment to faculty doing research in the Davis collections. The building also includes 12 lounges, 36 small rooms that are available for group study, several special reading rooms for use of graduate students, and a number of typing rooms and other special study areas. The Robert B. House Undergraduate Library and the Louis Round Wilson Library, recently renovated to house the Special Collections, also are available to graduate students.

The University Library contains over 3,400,000 bound volumes and over 2,627,000 microforms, constituting one of the more important collections in the South. It has been selected with great care, the purpose being to make it an effective working library, a laboratory for the use of students in those departments in which research must be carried on mainly by means of books, as well as an instrument contributing to general culture. The holdings increase through gift and purchase at the rate of approximately 120,000 volumes a year.

Notable among the special collections is that of North Caroliniana, which contains over 400,000 items and thus is the most complete library of North Carolina history and literature in existence. Other special collections include: the Southern Historical Collection of more than 8 million manuscripts, bearing on the social history of the South; the University Archives, containing over 1.6 million items; the Chemistry Collection, including exceptional sets of periodicals in English, German, French, Russian, and other lan-

guages; the English Collection, which contains the publications of most of the important societies concerned with the study of English language and literature; important research collections relating to graphic arts, prints, maps, city and regional planning, folklore, and books by and about the Negro; the C. Alphonso Smith Library of Southern literature; the Archibald Henderson Collection of American drama; the seven Whitaker collections of Johnson, Dickens, Cruikshank, Shakespeare folios, costume plates in color, the First Editions on the Grolier Club List of 100 Books Famous in English Literature; the Burton Emmett Collection of Materials Relating to the Graphic Arts; a Judaica collection containing some 3,000 items; the Nash and Pendleton King collections of books relating to Romance Languages and literature; the Hanes Collection of the Estienne Family, containing some 340 items printed by the eminent 16th and 17th century family of French printers; the George Bernard Shaw Collection of clippings, posters, playbills, and first editions of the author's works; the Augustus Thomas Collection; the Tannenbaum Shakespeare Collection; the William Henry Hoyt Collection of French Revolutionary and Napoleonic materials; the Bernard Flatow Collection of 16th and 17th century cronistas of the Spanish Explorations of Central and South America; and the Elisha Mitchell Scientific Society Collection, comprising the exchanges received since 1884 from more than 200 of the leading scientific societies throughout the world.

The collection of the Hanes Foundation for the Study of the Origin and Development of the Book comprises 700 incunabula and 600 early manuscripts, a considerable collection of critical materials for the study of rare and early books, 2,000 books illustrating the development of printing from the fifteenth century to the present day, a collection of Babylonian and Sumerian clay tablets, and other materials depicting the development of the written and printed word.

The document collections in the University Library comprise a rich body of resources, including exceptional files of federal and state publications, in which there is special strength on the federal, congressional and departmental series; state legislative journals, laws, collected documents, colonial and state records; and records of constitutional conventions.

The Law Library, containing over 245,000 volumes, is located in the building occupied by the School of Law. It contains material useful to students of history and government. Advanced students also have the privilege of using the valuable manuscripts of the State Department of Archives and History and the State Library at Raleigh. Departmental libraries containing special collections for graduate study and research are assigned to Art, Botany, Chemistry, City and Regional Planning, Geology, Institute of Government, Library Science, Mathematics and Physics, Music, and Zoology.

The University Library receives more than 40,000 periodicals and other serials annually. Also available are the learned journals, which record con-

temporary research in all the great fields of investigation, such as the sciences; history and economics; philosophy and sociology; education; classical and modern foreign languages and literatures; and English philology, folklore, and literature. The Library is a member of important philological, biographical, and scientific associations, and receives their publications regularly. More than 200,000 bound volumes of periodicals of permanent worth are available from the beginning of their publication, constituting a working collection of great value to advanced students. The Library also receives the publications of such organizations as the Smithsonian and Carnegie institutions, the Rockefeller Foundation, the Hispanic Society of America, the Russell Sage Foundation, and of many universities, including foreign universities and academies, which issue monographs important in advanced research. The Library is a regional depository for United States government documents, United Nations documents and UNESCO publications, and has an important collection of foreign documents. Facilities are available for the reproduction of books and manuscripts on microfilm, and microfilm readers are provided for graduate and research students.

In addition to the collections available in-house, the Library provides access to a multitude of external resources. It enjoys the privilege, through interlibrary loan, of borrowing from other libraries, for the use of graduate students, unusual publications which it does not possess. The resources of the libraries at UNC-CH, Duke University, and North Carolina State University are readily available through the online catalog, developed by the Triangle Research Libraries Network. A Union Catalogue includes cards covering special collections in 43 other libraries of the state. In recent years, the Library has established a substantial program of electronic access to machine-readable datafiles, compact disks, and remote databases. Searches of these resources may be carried out by librarians or by graduate students with staff assistance.

Both Davis and House Libraries have open stacks and single exit control. Faculty members and graduate students writing theses may obtain from the Circulation Department Intercampus Borrowers Cards which entitle them to direct borrowing privileges and stack access at Duke and the other fifteen campuses of The University of North Carolina.

Health Sciences Library

The Health Sciences Library is the primary library for the University of North Carolina Schools of Dentistry, Medicine, Nursing, Pharmacy, and Public Health and the North Carolina Memorial Hospital; it serves as well the health information needs of the entire University at Chapel Hill and health personnel throughout the state. The library has an excellent collection to support curricular, research and patient care information needs consisting of over 238,000 volumes and approximately 10,000 serial titles, over 4,600 of which are currently received. Information about the collection

is accessible through the Triangle Research Libraries Network online catalog. The library building, completed in 1982, has seating for over 700 users. A large learning resources center includes a microcomputer learning center. Library users have free access to the open stack collections.

Borrowing privileges are given to faculty, students and staff of the University of North Carolina at Chapel Hill and the North Carolina Memorial Hospital, as well as area health professionals upon application. The library provides photocopy services and an interlibrary loan service for materials which are not available on campus.

Information Services librarians are available during almost all of the library's service hours to aid users in locating information, to instruct in the use of library resources, and to provide additional resource assistance. Online search services, with access to MEDLINE and about a hundred other databases, are also provided. Information Management Education Services faculty offer a variety of instructional programs, including orientation, workshops, and course lectures, designed to teach information management skills.

Computer Services, Equipment, and Access

The University of North Carolina at Chapel Hill attempts to maintain modern and versatile computing systems. There is a wide variety of decentralized computing services on campus, including microcomputing facilities provided by the Microcomputing Support Center (MSC), micro- and mini-computers located in a number of departments, an IBM 4381-PS and a Digital VAX 11/780 located on the ground floor of Phillips Hall in Academic Computing Services (ACS), and an IBM 3081-K located at the Triangle Universities Computation Center in the Research Triangle Park. In addition, ACS provides dial-in access and communications switching capability for a broadband data network which includes the IBM 4381 computer, many of the mini- and microcomputers, interactive terminals, and a variety of printers and plotters located in buildings throughout the campus, including several residence halls. This network and the services available through it are continually expanding.

Access to computer services by faculty and students is facilitated by ACS, MSC, and the Institute for Research in Social Science (IRSS), through the offering of numerous, noncredit computer-related short courses each semester. In addition, all have user services which provide assistance to users. Faculty can make arrangements for in-class computer-related instruction by contacting ACS, MSC, or IRSS.

RESEARCH INSTITUTES AND CENTERS

The intellectual life of the University and the research activities of graduate students and faculty alike receive valuable encouragement and support from various institutes. These institutes do not operate as instructional agencies within the University; rather, they serve to obtain financial and organizational assistance for the scholars who constitute their membership. Those centers and institutes listed below include the principal institutes and centers providing opportunities for graduate students in training.

Institute for Research in Social Science

The Institute for Research in Social Science was founded at the University of North Carolina at Chapel Hill by Howard W. Odum in 1924. Its primary functions are (1) to foster and stimulate interdisciplinary research and communication and (2) to develop and provide research resources for the social science community, both faculty and student, at this University.

To promote interdisciplinary research, the Institute sponsors faculty research and study groups, and assists faculty members in the development of proposals and the administration of research grants. To stimulate interdisciplinary communication, the Institute holds conferences and colloquia and publishes books and journals.

The Institute develops and provides important research resources to social scientists on this campus:

Data Collection. Consultation is provided in research design, construction of measurement instruments, sample design, and selection of appropriate data collection methods, especially the use of personal, telephone, and mail surveys. With the School of Journalism, the Institute sponsors the Carolina Poll, a telephone survey of a representative sample of adults from 600 North Carolina households.

Data Analysis. The Social Science Statistical Laboratory develops and maintains computing software, hardware, and expertise in data analysis. IBM PS/2 Model 30 microcomputers serve as terminals to campus mainframe computers and are also networked to a local file server to provide on-site computing using PC SAS, SPSS PC+, and Systat. A high speed laser printer is linked to the campus mainframe computers. Staff offer short courses and provide individual consultation in data analysis, data management, programming, and use of hardware.

Data Archiving. The Social Science Data Library acquires and maintains computer-readable data to meet a variety of teaching and research needs. The Louis Harris Data Center is the national depository for all Harris public opinion surveys. The Data Library is a member of the Inter-University Consortium for Political and Social Research and the Roper Center. Virtually

all computerized data of interest to social scientists are available either in our collection or by special order.

Editing and Publishing. The Editorial Division provided copy editing and publishing services to social science faculty members. Copy is edited for form, style, and clarity. The Institute publishes both soft and hard cover books. The soft cover series, currently 53 titles in print, includes research reports and working papers for specialized distribution. Monographs of more general interest are considered for the joint IRSS-UNC Press hard cover series.

Institute of Latin American Studies

The University of North Carolina at Chapel Hill has a tradition of interest in Latin America that is over a half-century old. Courses in the languages, history, politics, geography, and social life of the area were instituted as early as 1915 and made part of a special curriculum. This interest was further manifested in 1940 with the establishment of the Institute of Latin American Studies.

Today the Institute is composed of political scientists, historians, anthropologists, sociologists, geographers, economists, health professionals, and linguists actively engaged in the study of Latin American life and culture. The individual and collective activities of this distinguished group of Latin Americanists have established UNC-CH as one of the major centers of Latin American Studies in the country. The University of North Carolina at Chapel Hill has a rich library collection of Latin Americana, and the language instruction facilities of the Department of Romance Languages are among the finest available anywhere.

Major functions of the Institute are: (1) to encourage and stimulate study and research on and the teaching of Latin American subjects at The University of North Carolina at Chapel Hill; (2) to serve as a campus medium for interdisciplinary communication of Latin American Studies related information, including the sponsorship of a variety of gatherings on campus—Latin American guest lectures and seminars, films and slide shows, Latin American luncheons—to bring together interested faculty and students from different disciplines; and (3) to promote the exchange of scholars and students, and to encourage close relationships between UNC-CH and institutions of higher learning in Latin America.

The Institute offers an undergraduate (BA) degree program in Latin American studies. An M.A. program with a certificate in Latin American studies is offered in cooperation with all university departments and curricula.

Over fifty courses dealing directly with Latin American Studies, ranging from the undergraduate level to that of advanced graduate students, are offered by the Institute's faculty members in their respective disciplinary departments. For over thirty years these participating departments have

awarded disciplinary degrees (B.A., M.A., Ph.D.) to students who have specialized at UNC-CH in Latin American studies.

Each semester a current list of Latin American related course offerings at both UNC-CH and at Duke is made available by the Institute for distribution. For further information about Latin American Studies at UNC-CH and for help in designing a program of study, contact the Institute of Latin American Studies, 316 Hamilton Hall.

Institute of Marine Sciences

The Institute of Marine Sciences was established in 1947 as the Institute of Fisheries Research through the efforts of Robert E. Coker, with cooperation from the Department of Conservation and Development, and with financial assistance from the Knapp Foundation, Inc. It is now administered as a research facility of the University with its primary functions being the investigation of basic and applied aspects of marine science.

The Institute, housed in a modern building completed in 1967, is located on Bogue Sound in Morehead City, N.C. The laboratory is well equipped for research in marine science. Special facilities are available for physical, chemical, geological and ecological experimentation and analysis. The collections and library holdings are specialized but serviceable for the research activities of the Institute. The Institute vessel is primarily designed for estuarine and in-shore marine collecting and sampling. Deep water oceanographic research can be carried out on the Research Vessel Cape Hatteras constructed in 1981 and operated by the Duke/UNC Oceanographic Consortium.

The facilities of the Institute are made available to faculty and students of the University with research interests in marine biology, physical, chemical or geological oceanography, and related fields. The Institute staff contributes to graduate education programs in the University through lectures, seminars, formal coursework, and in providing laboratory facilities for visiting classes or resident graduate students. A limited number of housing units and research appointments are available for graduate students in residence. The direction of graduate research and instruction of summer courses in marine science are provided by staff members of the Institute on the recommendation of the University departments and with approval of the Administrative Board of the Graduate School. For additional information, see the statement of offerings of the Curriculum in Marine Sciences.

Institute for Environmental Studies

The Institute for Environmental Studies of The University of North Carolina at Chapel Hill is the successor to the Institute for Environmental Health Studies which was organized on the Chapel Hill campus in 1966.

The general purposes of the Institute are to foster and coordinate research, teaching, and service on environmental concerns among the various elements of The University of North Carolina at Chapel Hill, and to maintain liaison and cooperate on environmental matters with agencies outside the Chapel Hill campus. To accomplish these purposes it undertakes, on an interdisciplinary basis, to identify and articulate important problems and opportunities related to environmental health, science, and policy; to foster discussions and joint examinations of environmental problems among faculty members from various disciplines; to stimulate new research, teaching, and service programs involving the cooperation of persons from various disciplines; and to encourage and assist in cooperative efforts on environmental matters between elements of the Chapel Hill campus and other campuses of The University of North Carolina, with other colleges and universities, and with other governmental and private agencies. The Institute is administratively located within the Department of Environmental Sciences and Engineering, School of Public Health.

Institute of Statistics

The Institute of Statistics was established in 1945. It provides a framework for informal cooperation among the Departments of Biostatistics and Statistics on the Chapel Hill campus, and the Department of Statistics of North Carolina State University. Research work from the three departments is published in the Institute of Statistics Mimeo Series, which now includes over 1,700 titles.

Water Resources Research Institute

The Water Resources Research Institute of The University of North Carolina was established in 1964 to strengthen research and graduate education in water resources. Created under the provisions of the Water Resources Research Act of 1964, as amended, the Institute program is supported with State appropriations, funds from the U.S. Department of the Interior, and grants from industries and other agencies. While the Institute office is located at North Carolina State University at Raleigh, The University of North Carolina at Chapel Hill shares responsibility for its administration and fully participates in all of its programs. Dr. David Moreau, Professor in the Departments of City and Regional Planning and Environmental Sciences and Engineering at Chapel Hill, currently serves as Director of the Institute.

The Institute encourages, coordinates, and supports multidisciplinary research in response to the state and regional water resources problems. It coordinates University programs in water resources with other universities, private industry, and the state and federal water resources agencies;

sponsors seminars, short courses, and symposia; and furthers the University graduate program in water resources.

The Institute is governed by a Board of Directors representing The University of North Carolina at Chapel Hill and North Carolina State University. A Technical Committee, composed of faculty members from the University System works with a full-time director and associate director in carrying out the Institute program. An Advisory Committee consisting of senior water resources managers and interest group representatives helps shape the Institute response to state water problems.

Child Development Institute

The University of North Carolina Child Development Institute was established in 1968 as one of the twelve national Mental Retardation Research Centers sponsored, in part, by the National Institute of Child Health and Human Development. The Child Development Institute provides the program opportunity for scientists from many disciplines to engage in research and research training in the area of child development and mental retardation. Included as relevant and highly important are such factors as the retarding effects of cultural deprivation and emotional disturbance.

The Institute consists of two separate, but coordinated, research centers, each representing an interdisciplinary approach to research with retarded, developmentally disabled, and normal children. A third unit, the Clinical Center for the Study of Development and Learning, has recently been established. It is devoted primarily to training and clinical service and works closely with the research centers.

The Frank Porter Graham Child Development Center is concerned primarily with the social, psychological, and educational aspects of child development. As part of a comprehensive child development program, Frank Porter Graham Center conducts a demonstration day care program involving children aged six weeks to five years. The Frank Porter Graham Research Building provides practicum settings for students from a number of departments who are interested in the fields of child development and family policy. Through the Bush Institute for Child and Family Policy, a multidisciplinary training program for doctoral and postdoctoral students, the Center attempts to apply academic knowledge to public policy issues. The Center also is engaged in programs designed to speed the flow of knowledge into practice. It supports technical assistance programs that work with agencies in every state and territory.

The Biological Sciences Research Center emphasizes the biological and medical aspects of development through research and research training concerned with the development and maturation of the central nervous system and the biomedical factors affecting its proper functioning. Basic research on infrahuman populations and clinical research on the biology of the

developing and/or retarded central nervous system are included. Ongoing research includes studies of the effects of lead and other environmental pollutants on the developing nervous system, and studies of the pharmacokinetics of commonly used psychotropic drugs in relation to their clinical efficacy in children. The Center's Division for Disorders of Development and Learning is devoted to training medical, scientific, and paramedical personnel in the diagnosis and management of children with development deficits. The retarding effects of emotional disturbance are under study by the Division of Child Psychiatry Research.

The L. L. Thurstone Psychometric Laboratory

The Psychometric Laboratory was founded by L. L. Thurstone in 1952. In 1967, its name was changed to honor its founder. The Laboratory is located on the third floor of Davie Hall in the Department of Psychology. Laboratory staff, who also are faculty members in the Department, engage in a variety of research activities that have in common the use of quantitative methods in psychological research. Prominent continuing areas of research include the study of individual differences in cognitive and linguistic abilities, experimental analysis of decision making, applications to psychology of statistical procedures and techniques, and the development and application of methods for multidimensional scaling. The laboratory also is the location of the doctoral specialty, "quantitative/cognitive psychology," within the Department of Psychology.

Research Laboratories of Anthropology

The Research Laboratories of Anthropology were established in 1939 to conduct studies in archaeology and related fields such as ethnography, physical anthropology, and ethnohistory. Today, the Research Laboratories' interdepartmental program pursues research in such areas as North American prehistory and history (with a focus on the Native American Cultures of North Carolina), Latin American prehistory, ethnobotany, and zooarchaeology. Rigorous field and laboratory training is provided for both graduate and undergraduate students. The Research Laboratories also curates one of the nation's finest collections of Southeastern archaeological materials, including over 2,000,000 artifacts and ethnographic specimens. The offices and processing laboratories are located in Alumni Building (main office, 108 Alumni), together with exhibits on the archaeology of North Carolina.

Triangle Universities Nuclear Laboratory

The Triangle Universities Nuclear Laboratory (TUNL) is a cooperative research laboratory located on the Duke University campus and supported by Duke University, North Carolina State University, and The University

of North Carolina at Chapel Hill. Currently about 60 faculty and graduate students from the three universities use the facilities. TUNL is the largest university-based nuclear physics laboratory in the Southeast, and one of the largest such laboratories in the U.S.A. The major research interests of TUNL are fundamental studies of nuclear interactions at low to medium energies in the 1 to 30 Million-electron-Volt range.

Among the facilities at TUNL are four nuclear accelerators, sources for spin-polarized particles, and for both light and heavy ions, systems for the production of short-lived radio-isotopes, and detectors for charged particles, gamma rays and neutrons. A dilution refrigerator and superconducting magnet system produces polarized targets. There are several mini-computers for data acquisition, display and analysis, including DEC VAX-11/780 and VAX-11/750.

Further information about TUNL can be obtained from the Department of Physics and Astronomy at The University of North Carolina at Chapel Hill.

The University of North Carolina Highway Safety Research Center

The University of North Carolina Highway Safety Research Center was created by an act of the 1965 North Carolina General Assembly. Its purpose: to provide research, teaching, and public service in a coordinated effort with other state and university agencies to counter deaths on the state's highways.

Established as a multidisciplinary agency, it is staffed by professionals trained in psychology, transportation engineering, biostatistics, epidemiology, computer systems, mathematics, and community mental health. This core staff, in cooperation with other university departments is charged with identifying highway safety problems, conducting research, recommending possible solutions, and making this information available to decision makers, both at the state and national levels. An equally important function of the Center is to evaluate objectively the state's various operational highway safety programs.

Among research projects undertaken since the Center was established are studies on motorcycles, seat belts, driver licensing and driver improvement, motor vehicle inspection, police traffic services, driver and safety education, drinking and driving, and various accident analyses, including the relationship of make and model of car to injuries sustained by drivers in crashes. The Center conducts workshops around the state, across the nation, and outside the U.S., and conducts teaching on campus through joint faculty appointments in other departments.

Occupational Safety and Health Educational Resource Center

The Occupational Safety and Health Education Resource Center was established in 1977 by a grant from the National Institute for Occupational Safety and Health. It is one of 14 regional centers in the nation designed to encourage and support professional and interdisciplinary education in fields relevant to occupational health such as Industrial Hygiene, Industrial Medicine, Industrial Nursing and Industrial Safety. These programs are currently being supported in the Departments of Environmental Sciences and Engineering, the Department of Medicine of the UNC School of Medicine, the Department of Community and Environmental Medicine of the Duke Medical Center, the Department of Public Health Nursing and the Department of Industrial Engineering at N.C. State University.

In addition, the Center sponsors a very active program of continuing education for practitioners in the field, including one week Summer and Winter Institutes, each of which offers a selection of fourteen intensive short courses in related subjects such as Industrial Hygiene, Safety, Ergonomics, Toxicology, Statistics, Epidemiology, Ventilation Design, Nursing, Law and Computer Applications.

The Carolina Population Center

The Carolina Population Center, established in 1966, provides coordination of the University-wide, interdisciplinary program in population research and research training. Its efforts span the social, behavioral and health sciences. It assists in building population research and teaching throughout the University and developing interdisciplinary projects by providing both faculty and students involved in the population field with a wide range of services.

The Center maintains a library with a computerized data base of over 70,000 citations and a programming and data analysis staff. It provides research services for faculty involved in population research in the U.S. and abroad. CPC staff works collaboratively with faculty members in the generation of population research projects, administers graduate and postdoctoral research training and research assistantship programs in population, and assists population faculty and departments in their research and teaching programs.

Center for Urban and Regional Studies

Established in 1957, the Center for Urban and Regional Studies serves as a focal point for urban research and public service at The University of North Carolina at Chapel Hill. From its inception, the Center has fostered research on the processes of urbanization by providing a means of communication among faculty who have an interest in urban affairs and a forum at Chapel Hill for dialogue on urban issues.

In addition to serving as a catalyst for interdisciplinary urban research programs, the Center's staff, associated faculty members, and students have worked with federal and state government agencies and with regional bodies and local governments to find solutions to problems of center city revitalization, energy use and conservation, housing, public service delivery, transportation, urban and regional growth, water resources, and environmental management and protection, among others.

An ongoing focus of the Center's research program has been its continuing concern for urban growth policy and environmental management. Beginning with the Piedmont Crescent Studies in 1957, the Center's research has sought to improve understanding of basic urban growth processes and to formulate effective urban growth policies. Over the past thirty years the Center has received national attention and recognition for its research on new community development, housing market dynamics, urban activity systems, urban growth models, residential mobility and locational preferences, coastal zone management, and water-related land development. Recently, researchers in the Center have focussed special attention on planning for natural hazards, including hurricanes, floods, and tornadoes. The Center maintains a data library and provides assistance to students and faculty in the use of the research materials that have been assembled.

The Center for Urban and Regional Studies is organized as a unit in the Division of Academic Affairs on the Chapel Hill campus. It is one of four units which constitute the Program in Urban Studies of The University of North Carolina. The Program, which includes urban affairs units at North Carolina State University in Raleigh, The University of North Carolina at Charlotte, and The University of North Carolina at Chapel Hill, is coordinated through the Office of the Vice President for Research and Public Service Programs and the University's Council on Urban Studies.

Research and service activities of the Center are carried out by a core professional and clerical staff and by faculty, research associates, and graduate students supported at least in part by research grants and contracts. Faculty membership in the Center varies from year to year, but has included faculty from anthropology, biostatistics, city and regional planning, economics, epidemiology, marine sciences, political science, psychology, social work, and sociology. The Center's research program has been supported by grants and contracts from various state, federal, and private agencies.

The Center for Alcohol Studies

The Center for Alcohol Studies was established in 1970 with State support and the mandate to coordinate and perform studies related to alcohol and alcoholism. Alcoholism is viewed as a biopsychosocial disease and thus requires a multidisciplinary approach. Furthermore, the complex nature

of alcoholism research requires interdisciplinary, as well as intradisciplinary, coordination and exchange. At the present time, about twenty-five faculty members are members of the Center. Alcohol-related research involves workers from the disciplines of anatomy, anthropology, anesthesiology, biochemistry, biostatistics, child psychiatry, health administration, pharmacology, psychiatry, psychology, sociology and veterinary medicine. The Center is developing into a multidisciplinary research program, the mission for which is: (1) to conduct research on the causes of alcohol abuse and alcoholism, (2) to study the effects of the acute and chronic administration of alcohol on mammalian systems, and (3) to develop strategies for the prevention of alcohol abuse and alcoholism. The long-term objective of the Center's research efforts is the integration of clinical and basic investigational studies by the close collaboration between clinical and basic science investigators.

The Cancer Research Center

The Lineberger Cancer Research Center of the University of North Carolina at Chapel Hill was established in 1975 in the School of Medicine and moved to the new Lineberger building in 1984. The activities of the Cancer Research Center are interdisciplinary with participation from both basic science and clinical departments of the School of Medicine as well as the Schools of Dentistry, Pharmacy, Public Health, and the College of Arts and Sciences, from which its members come. The Center has affiliate members from neighboring institutions including Burroughs Wellcome Company, the National Institute of Environmental Health Sciences, and the U.S. Environmental Protection Agency.

Administratively, the Center provides staff support for cancer-related activities in program planning, budget management, facilities, and faculty and staff recruitment. The Center acts as the organizational base for cancer-related activities of the Health Sciences complex.

The Center has basic science and clinical divisions. The basic science programs of the Center are Cancer Cell Biology, Cancer Epidemiology, Chemical Carcinogenesis, Drug Development, Immunology, and Tumor Virology.

Clinical research activities are broad, with emphasis on immunology and endocrinology of surgical and gynecologic malignancies, leukemias, and on the pharmacology of anticancer drugs. New clinical efforts are under way in inpatient and outpatient interdisciplinary oncology research programs.

The clinical division also includes a computerized Cancer Data Base in the North Carolina Memorial Hospital designed to provide detailed information on approximately 30,000 cancer patients to researchers, physicians, and students.

The Center's Cancer Control program promotes research in the areas of technology transfer, health education, and epidemiology within the state of North Carolina. Members in the Health Promotion/Disease Prevention program conduct research and develop programs to improve individual health practices with the aim of preventing cancer.

The Center maintains a number of core facilities including: the Electron Microscope Facility, the Flow Cytometry Facility, the Drug Screening Facility, and the Tissue Culture and Media Making Facility.

Curricular goals of the Lineberger Cancer Research Center are implemented through academic departments. The Center has an organized program for postdoctoral training of basic cancer researchers.

The Lineberger Cancer Research Center sponsors a weekly basic science seminar series as well as an interdisciplinary series with invited guest scientists of national and international reputation, an annual Postdoctoral Faculty-Fellow Training conference each fall, and a two-day cancer research symposium each spring. Clinical symposia, workshops, and special guest lectures are held throughout the year.

Dental Research Center

The Dental Research Center was established and funded in 1967 as one of five such regional institutes by the National Institute of Dental Research (NIDR) of the National Institute of Health (NIH). For a number of years the Center program was under the administrative aegis of the Vice Chancellor for Health Affairs, but has become the administrative responsibility of the Dean of the School of Dentistry. The Institute's research activities are conducted primarily in the School's Dental Research Center building and are carried out in close collaboration with other research programs sponsored by the School.

The major program objective of the Center, is "to broaden and strengthen the scientific base which underlies the national capability to improve oral health." It enlists the collaboration of all appropriate elements of the University, builds on and extends existing institutional research strengths, provides for multi-disciplinary efforts, and facilitates the collaboration of a wide range of scientists for studying specific oral health problems. Advanced education at the graduate and postdoctoral fellow levels as well as an active visiting scientist program are key elements of the Center's operation. Members of the Center have appointments in appropriate departments in the Dental School and throughout the University. In addition to its major funding from the NIDR, investigators associated with the Center receive substantial support from the University, and from funds obtained through NIH and other Federal, state, and private agencies.

The Center houses and maintains essential core research facilities including: research animal facilities, central histology service, electron microscopy laboratory, tissue culture room, and various research instrumentation. The

Center operates a biweekly seminar program that invites distinguished scientific speakers of national and international reputation. A clinical research unit within the Center conducts many studies that complement the Center's basic science investigations.

Health Services Research Center

The Health Services Research Center is a multidisciplinary, University-wide center, originally established with the mandate to explore and evaluate alternative ways to provide optimum health services to people at the community level. The Center has supported in whole or in part a number of research and demonstration projects, and it functions as a coordinating and facilitating agency, seeking to assist others in the identification of opportunities for relevant research and demonstrations in the delivery of health services, particularly in the areas of primary care practice, rural health services research, and health promotion/disease prevention.

GRADUATE DEGREE REQUIREMENTS

Degrees Offered

- Anthropology—*M.A., Ph.D.*
Art—*M.F.A., M.A., Ph.D. (Art History)*
Biochemistry and Nutrition—*M.S., Ph.D.*
Biology—*M.A., M.S., Ph.D.*
Biomedical Engineering and Mathematics—*M.S., Ph.D.*
Business Administration—*M.B.A., Master of Accounting, Ph.D.*
Cell Biology and Anatomy—*M.S., Ph.D.*
Chemistry—*M.A., M.S., Ph.D.*
City and Regional Planning—*Master of Regional Planning, Ph.D.*
Classics—*M.A., Ph.D.*
Comparative Literature—*M.A., Ph.D.*
Computer Science—*M.S., Ph.D.*
Dental Auxiliary Teacher Education—*M.S.*
Dentistry—*M.S.*
Dramatic Art—*M.F.A.*
Ecology—*M.A., M.S., Ph.D.*
Economics—*M.S., Ph.D.*
Education—*M.A., M.A.T., M.Ed., Ed.D., Ph.D.*
English—*M.A., Ph.D.*
Folklore—*M.A.*
Genetics—*M.S., Ph.D.*
Geography—*M.A., Ph.D.*
Geology—*M.A., M.S., Ph.D.*
Germanic Languages—*M.A., Ph.D.*
History—*M.A., Ph.D.*
Journalism—*M.A., Ph.D. (Mass Communication Research)*
Leisure Studies and Recreation Administration—*M.S. in Recreation Administration*
Library Science—*M.S. in Library Science, Ph.D.*
Linguistics—*M.A., Ph.D.*
Marine Sciences—*M.S., Ph.D.*
Mathematics—*M.A., M.S., Ph.D.*
Microbiology and Immunology—*M.S., Ph.D.*
Music—*M.M., M.A., Ph.D.*
Neurobiology—*Ph.D.*
Nursing—*M.S. in Nursing*
Occupational Therapy—*M.S.*
Operations Research—*M.S., Ph.D.*
Pathology—*M.S., Ph.D.*
Pharmacology—*M.S., Ph.D.*
Pharmacy—*M.S., Ph.D.*

- Philosophy—*M.A., Ph.D.*
 Physical Education—*M.A.*
 Physical Therapy—*M.S.*
 Physics and Astronomy—*M.S., Ph.D.*
 Physiology—*M.S., Ph.D.*
 Political Science—*Master of Public Administration, M.A., Ph.D.*
 Psychology—*M.A., Ph.D.*
 Public Health—*M.P.H. (offered in each field, below)*
 Biostatistics—*M.S., M.S.P.H., Dr.P.H., Ph.D.*
 Environmental Sciences and Engineering—*M.S., M.S.E.E.,
 M.S.P.H., Ph.D.*
 Epidemiology—*M.S.P.H., Dr.P.H., Ph.D.*
 Health Education—*M.S.P.H., Dr.P.H., Ph.D.*
 Health Policy and Administration—*M.S.P.H., Dr.P.H., Ph.D.*
 Maternal and Child Health—*M.S.P.H., Dr.P.H.*
 Nutrition—*Dr.P.H.*
 Parasitology and Laboratory Practice—*M.S.P.H., Dr.P.H., Ph.D.*
 Public Health Nursing—*M.S.*
 Radio, Television and Motion Pictures—*M.A.*
 Rehabilitation Counseling—*M.S.*
 Religious Studies—*M.A., Ph.D.*
 Romance Languages—*M.A., Ph.D.*
 Slavic Languages—*M.A., Ph.D.*
 Social Work—*Master of Social Work*
 Sociology—*M.A., Ph.D.*
 Speech and Hearing Sciences—*M.S.*
 Speech Communication—*M.A.*
 Statistics—*M.S., Ph.D.*
 Toxicology—*M.S., Ph.D.*

Academic Regulations

The Administrative Board of the Graduate School has adopted regulations for the guidance of the graduate faculty and students. The Graduate School publishes a *Graduate School Handbook*, and the student is urged to become familiar with the major regulations contained therein. Certain of these regulations follow:

1. Students are required to register in accordance with procedures in force at the time. Effective July 1, 1986, all new students and returning students who have been out of the University for two calendar years (four semesters) or more, must have a Report of Medical History form approved by the Director of Student Health Service before enrolling for graduate study.

Effective July 1, 1986 all new students who were not enrolled in a North Carolina college or university immediately prior to enrolling at UNC are required to provide a one-time certificate of immunization (part of the

Report of Medical History form) before registration may be effected.

2. Final-semester seniors in this institution who need less than fifteen semester hours to complete requirements for the bachelor's degree may take one or two courses for the purpose of later obtaining graduate credit, provided that they are not enrolled for more than fifteen semester hours for any purpose and provided that approval is obtained in advance from the student's undergraduate dean and from the Graduate School. Applications for such approval may be obtained in the Graduate School.

Undergraduate students from other institutions who have taken graduate course work under similar arrangements may not transfer such work here.

Apart from credit earned according to the plan described above, graduate credit may be received only for courses taken after then student has been duly admitted to the Graduate School or for courses that were taken before formal admission which are approved for transfer credit.

3. If, in the judgment of the Administrative Board of the Graduate School, a student is failing to make satisfactory progress towards the completion of the degree or to demonstrate sufficient promise in the discipline, regardless of grades, the student shall not be allowed to continue in the Graduate School.

4. Grades used in the evaluation of the performance of graduate students are as follows:

H—Clear excellence

P—Entirely satisfactory

L—Low passing

F—Failed

No mark falling below the standard represented by the grade of *L* is counted for graduate credit. A doctoral student who receives a grade of *F*, or nine or more semester hours of *L* is ineligible for continued graduate study. A master's student becomes ineligible upon receiving more than 0 hours of *F* or fifteen hours or more of *L*. Further, such a student becomes ineligible if both of the following hold: *L* hours received are greater than 7 and are greater than 25 percent of hours taken. The computation of hours taken will include only courses for which the student has received a grade of *H*, *P*, *L*, or *F*. Further, it may include 3 hours of *S* in course 393 (the first 3 hours taken) and courses taken through inter-institutional registration where other permanent letter grades may be assigned.

5. A permanent grade may be changed upon the initiative of the instructor only in cases of arithmetic or clerical error, and then only with approval of the instructor's chairman or dean and of the Dean of the Graduate School. Such a change may be made no later than the last day of exams of the next succeeding regular semester.

6. The Administrative Board of the Graduate School has endorsed specific procedures to be followed whenever a student wishes formally to protest the assignment of a permanent course grade. Before filing any protest of a course grade, the student shall first address his or her concerns

to the instructor who assigned the grade. Should the instructor detect an arithmetic or clerical error that influenced the grade assignment to the student's detriment, the instructor shall initiate a change of grade form for the approval of the instructor's chairman or dean *and* the approval of the Dean of the Graduate School. *An instructor may not initiate a change of a course grade as a result of a reevaluation of the quality of the student's performance nor as a result of additional work performed by the student.*

For a protest of a course grade to be considered, it must be based upon one or more of the following grounds and upon allegation that the ground or grounds cited influenced the grade assignment to the student's detriment: (1) arithmetic or clerical error; (2) arbitrariness, possibly including discrimination based upon race, sex, religion or national origin of the student; (3) personal malice; and (4) student conduct cognizable under the *Instrument of Student Judicial Governance*.

A protest of a course grade shall be lodged by the student in writing with an instructor's chairman or dean, with a copy to be provided by the student to the instructor, and shall cite the evidence by which the student judges (a) that an impermissible element existed in the instructor's evaluation of the student's course work and (b) that it influenced the grade assignment to the detriment of the student. *No appeal may be made after the last day of classes of the next succeeding regular semester.*

When a protest of a course grade has been properly lodged with a chairman or dean, the chairman or dean shall determine whether the evidence cited warrants further investigation of the charges. The burden of proof shall fall upon the student. The determination by the chairman or dean shall be made only after providing the instructor with the opportunity to reply to the charges as cited in writing by the student.

If, in the judgment of the chairman or dean, the evidence cited by the student is *insufficient* to warrant further investigation of the charges, the protest shall be denied by the chairman or dean. In this case, the student shall have the right to appeal the ruling in writing to the Administrative Board of the Graduate School.

On the other hand, if in the judgment of the chairman or dean, or the Administrative Board (if the ruling has been appealed to that body), the evidence cited is *sufficient* to warrant further investigation, the chairman or dean of the school, department, or curriculum in which the course was offered will appoint a committee of no less than three members of the graduate faculty to investigate the charges and to render a written set of findings and recommendations. The recommendations shall be transmitted to the student by the chairman or dean, with a copy to the Dean of the Graduate School. Should a change of permanent course grade be recommended, the Dean of the Graduate School shall present that recommendation for action by the Administrative Board of the Graduate School. Should there be recommended no change of grade, the student retains the right to appeal in writing to the Administrative Board of the Graduate School.

To effect a change of grade following these procedures for protest of grade requires a vote of not less than two thirds of those Administrative Board members who are present and voting.

7. Students in the Graduate School are permitted to enroll for a maximum of sixteen semester hours in any one semester. A full semester of residence credit may be earned for the successful completion of a registration for nine or more semester hours of work offered for graduate credit. (Courses approved for undergraduate credit only may not become a part of the graduate degree program. Although a graduate student may take one or more of these on the recommendation of the faculty adviser, no residence credit is assigned for the completion of an undergraduate course.)

A graduate student who is *required by his or her program* to take undergraduate courses, whether as a requisite for admission or for other reasons, must make grades of at least B—on all such courses numbered below 100 in order to maintain eligibility as a graduate student. A graduate student *voluntarily electing* to register for undergraduate courses (those numbered below 100) may make any grade above *F* without jeopardy to his or her graduate standing.

8. On the recommendation of the major department and the approval of the Graduate School, a maximum of six semester hours of graduate course credit may be transferred from another graduate institution or from the University Extension Division (before formal admission), in partial satisfaction of the thirty-hour minimum requirement for a master's degree. More than six hours may be approved for transfer to a master's program requiring over 30 semester hours. Such transfers do not reduce the minimum residence period of one academic year or its equivalent.

A doctoral student also may transfer credit from another graduate institution, but to do so he or she must submit the course work for examination at the time of the doctoral oral examination. In this way, all work, whether taken at the University or elsewhere, is held in the same regard, and the examining committee is able to base its appraisal of the knowledge of subject matter on the student's own performance. The committee may then recommend the transfer of both course and residence credit in its report to the Graduate School, which has the final responsibility for approving the transfer. Transferred credit will not relieve the student of the requirement to earn at least one academic year of credit in continuous full-time study, or the equivalent, at The University of North Carolina at Chapel Hill.

No credit beyond that earned in a master's program may be transferred from an institution that gives the master's as its most advanced degree.

9. A graduate student working for a master's degree has five calendar years from the date of first registration to complete all requirements for the degree. A graduate student working on a doctorate has eight calendar years from the date of first registration to complete all requirements for the degree.

When special circumstances warrant, extension of time may be granted upon petition by the student to the Dean.

10. A graduate student may request a leave of absence from graduate study for a definite, stated time within the five or eight year limit, a graduate student in good academic standing and with no temporary grade of IN or AB on his/her transcript may request a leave of absence from graduate study. In advance of (or near the beginning of) the leave period, the graduate student should present to the Dean of the Graduate School a written request which explains the reasons why he or she wishes to take a leave. This request must be accompanied by a written approval from the chairman or director of graduate studies of the student's department. If the Graduate School approves the leave of absence, the time of that leave shall not count against the total time allowed for the degree for which the student is studying. Readmission to the Graduate School following a formal leave of absence is a formality.

11. A student who has *not* been registered during the preceding semester should apply for readmission to the Graduate School at least sixty days before the date on which the student plans to return.

12. Each student holding an appointment, service or nonservice, in the regular academic year must be registered in order to hold the position. Unless the award requires the student to be at another campus or at a research center, this registration must be as a student "in residence."

13. The following policies pertain to faculty members who wish to work toward graduate degrees in this Institution.

Members of the General Faculty may not pursue a graduate degree at this Institution except under the following conditions:

- 1) The course of study and the conditions of employment are approved by the Dean of the Graduate School following yearly certification by the employing Department Chairperson(s) that the degree to be pursued is of demonstrable value to the Institution.
- 2) Such certification is approved by the appropriate Dean and by the Provost or by the Vice Chancellor for Health Sciences.
- 3) The degree may not be taken in any School or in any Division of the College of Arts and Sciences in which the individual holds a General Faculty appointment.

Inter-Institutional Registration

Students registered for at least three credit hours on this campus may take graduate courses at North Carolina State University, the University of North Carolina at Charlotte, North Carolina Central University, and Duke University with approval by the student's adviser. The student must obtain a special form, Request for Inter-Institutional Registration, from the Graduate School. This form, certifying that the course(s) is appropriate for the student's degree program and that an equivalent course is not

available on this campus, must be signed by the student's adviser. If the request is approved by the Graduate School, the student will be given a letter of authorization to be presented to the Registration Office in Hanes Hall. The Registration Office will prepare an Inter-Institutional Form, a copy of which the student carries to the Registration Office of the school being visited. Tuition for a course under inter-institutional registration will be charged as if the registration were for a course offered on this campus. Courses taken by inter-institutional registration are given residence credit as if they were courses on this campus. During a summer session, a student taking all of his or her courses at one institution should register at that school and pay tuition and fees accordingly.

Admission to Candidacy

A student in a master's degree program applies for admission to candidacy at the time of application for the degree. To be eligible for graduation at the next commencement, *the student must make an application by the deadline shown in the Calendar of Events*. The candidate should be certain that he or she has removed any conditions attached to his or her admission or any conditions imposed at a later time. A doctoral candidate should apply for admission to candidacy after he or she has passed both the doctoral oral and written examinations, has completed all course work required by the department of the major and minor(s), has completed any foreign language or language-substitute requirements, and has submitted an acceptable dissertation prospectus.

Application for a Degree

Each student must make an application for a graduate degree for a specific commencement. In order to graduate at that commencement, *the student must make application by the deadline shown in the Calendar of Events*. The Graduate School cannot make exceptions to this rule. Application cards are available in the Graduate School. Candidates for master's degrees make applications for degree and candidacy at the same time. If a student (master's or doctoral) has already applied for candidacy and for the degree but has failed to meet the deadline for a particular commencement, he or she must again make an application for the degree.

Master of Arts and Master of Science

To be allowed to enter a program of study leading to the degree of Master of Arts or Master of Science, the student must qualify for admission to the Graduate School. In the event that admission is provisional, all special conditions must be removed before a student may be admitted to candidacy for the degree.

Both degrees, the Master of Arts and the Master of Science, require the satisfactory completion of no less than thirty semester hours of graduate work. At least twenty-four semester hours of this credit must be earned in courses and at least three semester hours in the completion of a thesis. Both a thesis and final oral defense are required of all candidates for the M.A. degree. For the M.S. degree in certain departments, the Graduate School has approved a substitute for the thesis requirement.

Typically, the master's program will be constituted of distinct major and minor components. The major consists of from eighteen to twenty-one semester hours of course and research credit, and the minor consists of a minimum of nine semester hours. The thesis is required to be on a subject related to the major. In some cases, the minor may be split between two subjects, provided that each is represented by two courses. The minor program must be approved in advance by both the major and the minor departments. In some departments a minor is optional.

The master's program, which must be shown fully in the application for admission to candidacy, is planned by the student and a departmental advisory committee that is usually represented by the director or adviser of the student's thesis research. All courses must be chosen from those offered for graduate credit.

Before receiving the degree of Master of Arts or Master of Science, the student must earn at least one academic year, i.e., two semesters of residence credit. A semester of residence credit may be earned through the satisfactory completion of a registration of at least nine semester hours of graduate course work. Satisfactory completion of six through eight semester hours of work in a given semester yields one-half a semester of residence credit; completion of three through five semester hours yields one-fourth of a semester of residence credit. The required academic year of residence credit may be earned either through continuous enrollment for two semesters or through part-time study sufficient in amount to permit the earning of thirty semester hours of course and research credit. It should be observed that the required residence credit is not necessarily related to the length of the period of time used by the student in completing the degree program.

In some master's programs, the student* must demonstrate a reading knowledge of one modern foreign language. Usually reading knowledge of French, German, Spanish, and Russian is tested through the Graduate School Foreign Language Testing Program of the Educational Testing Service. Information regarding the scheduling of these examinations may be obtained by writing to the Educational Testing Service, Princeton, New Jersey, or Berkeley, California, or in the testing office on most campuses. Prospective students are urged to take the E.T.S. examination at or near the end of their undergraduate programs. It will be to the student's advantage to arrive on campus with the language requirement completed.

Also, in some departments, the language requirement in French, German, Spanish, Italian, Latin and Russian may be fulfilled by the successful com-

pletion of the second semester of a special two-semester course series numbered 101X and 102X. For languages other than these, reading knowledge is tested usually by a special examination given by the language department concerned. Foreign students whose native language is not English may not offer their native tongue in satisfaction of this requirement, but they may be permitted to stand examination in English.

Every master's candidate must pass either a written comprehensive examination covering his or her field of study, or an oral comprehensive examination covering all course work required for the degree, or both, according to the decision of the department. Neither examination may be taken until the course work is completed or until the final courses are in progress. The examinations must be scheduled in conformance with the appropriate deadline date shown in the Calendar of Events. The student must have removed any conditions attached to admission prior to the examinations.

Every student required to write a master's thesis must register for master's thesis with a minimum of three credit hours. The master's thesis may carry three or more semester hours of credit. However, only six credit hours of thesis may be counted toward the minimum credits required for a master's degree. It is expected that the thesis will represent the conclusion by the student of an independent research project, and will show command of the bibliography and research methodology of his or her specialty. The thesis is to be written in English and in conformity with accepted standards of form used in research writing. In exceptional cases languages other than English may be used; the substitution is not permitted as a matter of the student's convenience, but may be allowed when the student has demonstrated sufficient skill in English composition and has a thesis topic that is, in the judgment of the adviser, especially suited to treatment in the second language. The Dean's approval of the use of a language other than English must be obtained in advance.

A committee of three members of the graduate faculty, two of whom must be full members, evaluates the student's work for the master's degree, approves the thesis and administers any oral examination that may be given. If the student has a minor field of study, at least one member of the committee typically represents the department of the minor. In case of a joint minor, involving two departments, one faculty representative on the committee is sufficient, provided that both minor departments agree that the faculty member can adequately represent the entire minor course of study. A student who fails either examination may take it a second time after a lapse of three months. A student who fails either examination twice becomes ineligible to continue graduate study.

The final oral shall be held only after all members of the committee have had adequate opportunity to review a draft of the thesis which the candidate is prepared to submit for final typing. The thesis adviser is responsible to the members of the thesis committee for determining that

the draft is in an appropriate form for their evaluation. The committee may, at the time of the final oral but not later, require alterations and corrections. The thesis adviser is responsible for verifying that the changes required by the committee have been made, and may delegate this responsibility to the committee member(s) who imposed the requirements. When these requirements have been met, the Report of the Final Oral Examination is submitted, and the thesis, in final typed form designed to meet the standards as defined in *A Guide to the Preparation and Submission of Theses and Dissertations*, is registered with the Graduate School.

Three copies of the thesis should be prepared and submitted by the appropriate deadline date as shown in the Calendar of Events to the Graduate School for binding and storage in the library and in the candidate's major department. All copies must be on paper of prescribed size and quality and in proper form. A copy of *A Guide to the Preparation and Submission of Theses and Dissertations* is available free from the Graduate School. An abstract must be submitted with the thesis. A binding fee of \$25.00 must be collected by the Graduate School when the thesis is submitted.

Receipt of an approved thesis in the Graduate School is tantamount to publication, and the thesis will be available to the public in the University library and available for inter-library loan.

Doctor of Philosophy

The degree of Doctor of Philosophy is conferred only upon those who have completed, with high distinction, a period of intensive study and investigation in an established field of learning. Candidates must have gained control of the materials in the chosen field, mastered the methods of advanced study, and illustrated these methods through a dissertation, the results of independent research, which adds to the sum of human knowledge or presents results that have enduring value. Neither the accumulation of facts, however great in amount, nor the completion of advanced courses, however numerous, can be substituted for this power of independent investigation and the proof of its possession. It is possible for a well-prepared student of good ability to secure the degree upon the completion of three years of graduate study.

Every doctoral student must register for doctoral dissertation with a minimum of three credit hours. Otherwise, the Graduate School has no course requirement as such in the major field, nor does it require a minor. However, the department may require a minor, or the student may elect one. When the student offers a minor, he or she must present at least fifteen credit hours. All courses to count towards the minor must be listed (or cross-listed) in departments other than the student's major. A minor may consist of a set of related courses, some of which are listed by one department and some by another. If so, the student must take at least six credit hours in each department. The minor should be planned in advance, and

both the major and minor departments must give the Graduate School written approval for the program.

Normally the study will be expected by his or her departmental faculty to spend two years or more in formal course work and directed research. Many schools and departments have certain courses required of all prospective doctoral candidates, and some have special requirements. Such requirements are outlined in the appropriate school or department section of this catalogue.

Foreign language requirements vary from department to department. In certain departments a student may be required to offer a research skill (for example, mathematics, statistics, computer science, biostatistics, or symbolic logic) in lieu of or in addition to a foreign language.

If a student wishes to offer French, German, Spanish, or Russian, the foreign language requirement may in most departments be met by passing the examination administered by the Educational Testing Service, Princeton, New Jersey or Berkeley, California. When possible, the student should take these examinations prior to commencement of work in Chapel Hill.

Also, in some departments, the language requirement in French, German, Spanish, Italian, Latin and Russian may be fulfilled by the successful completion of the second semester of a special two-semester course series numbered 101X and 102X. For languages other than these, reading knowledge is tested usually by a special examination given by the language department concerned. Foreign students whose native language is not English may not offer their native tongue in satisfaction of this requirement, but they may be permitted to stand examination in English.

To obtain a doctoral degree, a student must earn four semesters of residence credit. At least two of these must be earned at this University by continuous registration for no fewer than six semester hours per regular semester or summer session, although registration during summer session is not required for continuity. The other two required semesters of residence credit may be obtained by registration at this University and/or by transfer of credit as described in the following paragraph. Residence credit is computed as follows: Nine semester hours of credit is considered a full-time loan and earns a full semester of residence credit. Satisfactory completion of six through eight semester hours of work in a given semester yields one-half semester of residence credit; completion of three through five semester hours yields one-fourth semester of residence credit.

Each doctoral student is required to take a written and an oral examination, which together constitute a comprehensive examination of the student's command of his or her field. The doctoral comprehensive examinations should cover all work in major and minor subjects. Moreover, if the student proposes the transfer of credit from another recognized graduate school, the work for which he or she seeks transfer credit also must be covered by this examination and the transfer must be recommended by the examining committee before the Graduate School will credit the work in the stu-

dent's degree program here. While there is no limit on the number of hours of credit that may be transferred in the doctoral program, the student may not receive the degree of Doctor of Philosophy unless he or she has earned at least two semesters of residence credit in continuous residence study at The University of North Carolina at Chapel Hill, as described in the previous paragraph.

The doctoral oral examination committee must consist of at least five members, all of whom are members of the graduate faculty. Ordinarily, the chairman of the committee is the student's dissertation adviser. Both major and minor subjects are to be represented in the committee membership, and it is expected that, among its purposes, the committee will strive to evaluate the student's fitness to be recommended for continued study in the Graduate School and for admission to candidacy for the highest degree offered by the institution. It is within the committee's authority to require that additional course work be taken if the members feel that the student shows weaknesses that could be corrected by further instruction.

In addition to the doctoral oral examination, each doctoral student will be given a written comprehensive examination on material to be determined by the faculty of the school, department, or curriculum in which the student is enrolled. A student who fails either examination may not take the examination a second time until at least three months have elapsed. A student who fails either examination twice becomes ineligible to continue graduate study.

Departments and schools determine the order of doctoral oral and written examinations, but before the student can take the second one (be it written or oral) he or she must obtain a permit from the Graduate School. The student must be in the final stages of course work before such a permit is authorized. No permit will be issued unless the candidate has removed any conditions attached to admission. In the departments where cumulative written examinations are used, and where those writtens constitute the second part of the doctoral examinations, the permit must be obtained prior to the last section of the examination. The examination as a whole may not be considered complete until such a permit has been issued.

Before being admitted to candidacy for the degree of Doctor of Philosophy, the student must have completed all major and minor required courses, passed the doctoral written and doctoral oral examinations, satisfied the foreign language requirement if there is one, and developed a dissertation research problem or project that has been approved by the student's dissertation committee. In general, it is desirable that only a short interval separate the two examinations.

The dissertation committee shall consist of no fewer than five persons, at least one of whom shall be named the dissertation adviser, nominated by the Director of Graduate Studies at the time of a dissertation proposal, and appointed by the Dean of the Graduate School. At least three members of each committee shall be full members of the Graduate Faculty. The com-

mittee examines the prospectus, either as part of the first doctoral oral, in which case the dissertation committee also in the doctoral oral examination committee, or subsequent to it, consults with the student throughout the progress of the research, and participates in the final oral examination. Each doctoral student is expected to consult with members of the dissertation committee at frequent intervals throughout the progress of his or her research, and is required to submit a progress report to each member of the committee at least once a year.

The dissertation is expected to be of such scope, independence, and skillful presentation as to indicate that the candidate has acquired a command of the subject, has the demonstrated ability to contribute fresh knowledge or a fresh outlook to the subject, and has mastered the research methodology of the discipline. The dissertation is to be written in English and in conformity with accepted standards of form used in research writing. In exceptional cases languages other than English may be used; the substitution is *not* permitted as a matter of the student's convenience, but may be allowed when the student has demonstrated sufficient skill in English composition and has a thesis topic that is, in the judgement of the adviser, especially suited to treatment in the second language. The Dean's approval of the use of a language other than English must be obtained in advance. It is further expected that the dissertation will be an independent work approved expressly as partially fulfilling requirements for the degree of Doctor of Philosophy at this institution, but prior publication of parts of the work is not forbidden.

At the end of the student's course of study, the candidate will stand for a final oral examination. No fewer than five persons shall constitute the committee for the final oral. A majority of the members of the dissertation committee and a majority of the persons signing the dissertation must be full members of the Graduate Faculty. Other members may be limited members of the Graduate Faculty or "special appointees." The final oral examination should be primarily a true defense of the dissertation. It may be either open to the public, or limited in attendance to the candidate and the committee, or a combination of the two. Questions which relate the dissertation to the field are appropriate. Members of the committee are invited to submit individual written comments on the examination and/or the dissertation to the program chairman and/or the Dean of the Graduate School, if they so desire.

The final oral shall be held only after all members of the committee have had adequate opportunity to review a draft of the dissertation which the candidate is prepared to submit for final typing. The dissertation adviser is responsible to the members of the dissertation committee for determining that the draft is in an appropriate form for their evaluation. The committee may, at the time of the final oral but not later, require alterations and corrections. The dissertation adviser is responsible for verifying that the changes required by the committee have been made, and may delegate this responsi-

bility to the committee member(s) who imposed the requirements. When these requirements have been met, the Report of the Final Oral Examination is submitted, and the dissertation, in final typed form designed to meet the standards as defined in *A Guide to the Preparation and Submission of Theses and Dissertations*, is registered with the Graduate School.

The dissertation must be submitted to the Graduate School in accordance with the deadlines appearing in the Calendar of Events. It must be typewritten on paper of prescribed size and quality, and its form must be in accordance with approved methods of scholarly writing. *A Guide to the Preparation and Submission of Theses and Dissertations* may be obtained free from the Graduate School. Two copies of the dissertation, including an abstract, are required by the Graduate School for binding and storage. An additional two copies of the abstract also must be submitted.

Publication of the dissertation by means of microfilming is required by the Graduate School. To provide for this, the University has entered into an agreement with University Microfilms, Ann Arbor, Michigan. This firm will in all cases publish an abstract of each dissertation in *Dissertation Abstracts*. The fee for binding and microfilming the dissertation is \$62.00.

Receipt of an approved dissertation in the Graduate School is tantamount to publication, and the dissertation will be available to the public in the University library and available for inter-library loan.

If a student desires to copyright the dissertation, he or she may obtain a copyright for \$20.00 through the Graduate School Office.

A more concise summary of requirements for graduate degrees may be found in *The Graduate School Handbook*, available from the Graduate School Office.

Professional Degree Programs

Requirements for professional graduate degrees, under the supervision of the graduate faculty, are described elsewhere in this catalogue and in some special catalogues of schools and departments concerned. Since these requirements differ in some respects from those summarized above, those sources should be consulted for the following: School of Business Administration, Department of City and Regional Planning, School of Dentistry, School of Education, School of Library Science, School of Nursing, Department of Political Science, School of Public Health, School of Social Work, and Department of Radio, Television, and Motion Pictures.

Commencements

Master's and doctoral degrees are awarded at the end of each semester and the second summer session. Formal commencement exercises are held only in May.

DEPARTMENTAL LISTINGS OF GRADUATE FACULTY AND COURSES OF INSTRUCTION

Graduate Faculty

Graduate faculty members whose appointments are current as of the publication date of this *Record* are listed by academic rank in the department(s) in which they serve. Following the faculty member's name is a section number, which students should use when registering for independent studies, readings, research, and thesis and dissertation courses with that particular professor. As many as three areas of specialization are listed for each faculty member following the section number.

Course Numbers and Credit

Courses numbered from 100 through 199 are for advanced undergraduates *and* graduates, from 200 through 299 for graduates only. Those numbered 300 through 399 are seminar and research courses and also are limited to graduate student enrollment.

The unit of measurement in meeting degree requirements is the semester hour, by which is meant, as a rule, one hour of lecture or at least two hours of laboratory or field work a week for a semester. The valuation of each course is stated in parentheses following the course title.

DEPARTMENT OF ANTHROPOLOGY

GEORGE R. HOLCOMB, *Chairman*

Professors

DONALD L. BROCKINGTON	(1)	Archaeology, Latin America, Middle America
JULIA G. CRANE	(3)	Field Methods, Social Organization, Caribbean
TERENCE M.S. EVENS	(5)	Social Anthropology, Social Theory, Utopian and Communal Societies
KAJA FINKLER	(32)	Medical Anthropology, Political and Economic Anthropology, Latin America
GEORGE R. HOLCOMB	(8)	Physical Anthropology, Functional Anatomy, Morphogenesis
DOROTHY C. HOLLAND	(16)	Anthropology and Education, Cognitive Anthropology, Quantitative Methods
JAMES L. PEACOCK	(11)	Culture Change, Symbolic Systems, Southeast Asia
RICHARD A. YARNELL	(15)	Ecology, Evolution, Ethnobotany

Associate Professors

CAROLE L. CRUMLEY	(22)	Archaeology, Complex Societies, Europe
ROBERT E. DANIELS	(4)	Social Anthropology, Culture and Personality, Africa
NORRIS B. JOHNSON	(25)	Cultural Anthropology, Art and Literature Cultural Transmission
BRUCE P. WINTERHALDER	(27)	Evolutionary Ecology and Human Adaptation, Subarctic (Canada), Andes
VINCAS P. STEPONAITIS	(2)	Archaeology N. America

Assistant Professors

JANE BACHNIK	(30)	Kinship and Social Organization, Japan
JUDITH B. FARQUHAR	(33)	Medical Anthropology, Critical Theory, Chinese Societies
DONALD M. NONINI	(34)	Critical Anthropology, Economic Anthropology, Southeast Asia

Adjunct Assistant Professor

SUE E. ESTROFF	(31)	Medical, Psychiatric Anthropology
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Research Assistant Professor

LAURIE C. STEPONAITIS	(35)	Archaeology
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Professors Emeriti

JOFFRE L. COE		Archaeology, North American Indians, U.S. Southeast
JOHN GULICK	(6)	Gender Roles and Population, Urban Cultures, Modern Middle Eastern Cultures

The Department offers advanced work leading to the Master of Arts and Doctor of Philosophy degrees. Students admitted into the graduate program are admitted for the Ph.D. degree. A master's degree may be taken as part of the program leading to the Ph.D. degree; however, a master's degree is not an essential part of the doctoral program.

Incoming students are required to complete two semester core course sequences in (1) Sociocultural Theory and Ethnography and (2) Evolution and Ecology. Remaining courses will be selected from a list of concentration courses, field research courses and professional preparation courses. Students are expected to take at least three courses from within their chosen area of concentration, or from a set of courses designated by the Program in Medical Anthropology or the Program in Archaeology.

The Ph.D. degree requires specialization in a defined area of study, and the completion of an acceptable dissertation treating some problem within this defined area. The Ph.D. program is quite flexible; any area and problem can be selected for study — providing they meet the approval of the

advisor, Ph.D. committee, and the faculty. It is highly desirable that part of the training of a professional anthropologist be a research experience undertaken within a culture significantly different from the candidate's own culture. It is expected that such experience normally will be the context in which data for dissertations in sociocultural anthropology are gathered.

Graduate students may, in accordance with the regulations of the Graduate School, take courses in other departments and in neighboring universities. Courses in anatomy, biology, ecology, epidemiology, folklore, genetics, geography, linguistics, philosophy, psychology, or sociology are often particularly appropriate. Departmental policy is to help the individual student select such courses which supplement and strengthen his or her specialization in anthropology.

The Department of Anthropology works closely with the Institute for Research in Social Science, the Carolina Population Center, and the Research Laboratories of Anthropology, and it has various active training and research interests in conjunction with other departments and schools of the University.

Courses for Graduates and Advanced Undergraduates

- 100 OLD WORLD PREHISTORY (3). A course designed to provide anthropology majors and other students of comparable behavioral science sophistication with a basic background in the development of man and culture in the Old World. *Fall*. Crumley.
- 101 PREHISTORY OF THE FAR EAST (3). A course designed to acquaint anthropology majors and upperclassmen from other fields with a general view of the prehistory of Siberia, China, Japan, and southeast Asia and Oceania. *Spring*. Brockington.
- 105 ANTHROPOLOGY OF THE SOUTH (3). Anthropological materials and insights bearing on modernization and other current trends in southern culture; research problems in the South. *Fall*. (*Alternate years*.) Peacock.
- 110 PRINCIPLES OF ARCHAEOLOGY (3). An examination of archaeology as a set of techniques and a sub-field of anthropology, including history of archaeology, survey and excavation techniques, laboratory treatment of remains, archaeological analysis, historical and processual inference. *Spring*. Brockington.
- 112 HUMAN ORIGINS (Anatomy 112) (3). An introductory survey of physical anthropology, including the place of man among the primates, human evolution, and human diversity. Consideration is also given to osteology and the interrelationship of cultural and biological factors. *Fall*. Holcomb.
- 114 HUMAN OSTEOLOGY (3). Lectures and laboratory sessions will be devoted to an intensive examination of the human skeleton. Emphasis will be on analysis of skeletal material in the field and in the laboratory. *Spring*. Holcomb.
- 115 HUMAN GENETICS AND EVOLUTION (Anatomy 115) (Genetics 115) (3). Fundamental principles of genetics; population genetics; factors of evolution; race and species formation; evolution of primates and man. The interaction of genetics and culture in human behavior, society, and evolution. *Spring*. Pollitzer.
- 116 PRIMATE SOCIAL BEHAVIOR (3). Social behavior and ecology of prosimians, monkeys and apes and the evolution of human behavior. *Fall or spring*. Staff.
- 117 EVOLUTIONARY PERSPECTIVES ON HUMAN ADAPTATION AND BEHAVIOR (3). Critical, partially historical discussion of evolutionary theories, including Darwinism, Neo-Darwinism, ethology and sociobiology, and their social science analogs. Relevance and limitations of these theories for anthropologists will be focal. *Fall*. Winterhalder.

- 120 CULTURE CHANGE AND UNDERDEVELOPED AREAS (3). Theories and case studies of cultural change will be discussed. Problems of culture change in less developed areas of Asia, Africa, and Latin America will receive particular attention. *Fall*. Staff.
- 121 CULTURE AND PERSONALITY (3). Broad survey of methods and problems connected with studying personality features characteristic of tribes and modern nations, child training and personality, and the relationship of culture to mental illness. *Spring*. Daniels.
- 122 CULTURAL ANTHROPOLOGY (Folklore 122) (3). Not recommended for students who have had Anthropology 41. Recommended for advanced undergraduates and graduate students who have little or no background in anthropology. A survey of anthropological approaches to the study of human cultural and social behavior, with some emphasis on the relation of anthropology to other social sciences. *Fall*. Staff.
- 123 MAGIC, RITUAL, AND BELIEF (3). An examination of the rationality of "magic and religious thought" in traditional societies. Some attention to scientific thought is included. *Spring*. Evens.
- 124 LAW, CULTURE, AND SOCIETY (3). Law and legal mechanisms in their cultural and social contexts. Historical and contemporary problems of "law and development" will be analyzed. *Spring*. (Alternate years.) Staff.
- 126 AFRICA: PEOPLES AND CULTURE (Folklore 126) (3). Prerequisite, Anthropology 26 or 41 or 122 or permission of the instructor. Advanced ethnographic survey of cultures of sub-Saharan Africa; some emphasis on the historical development of major African sociocultural systems; application of anthropological theories to Africa and uses of African data in the development of such theories. *Spring*. Staff.
- 127 ABORIGINAL CULTURES OF MEXICO AND CENTRAL AMERICA (Folklore 127) (3). The development of Indian cultures of Middle America; culminating in such civilization as the Aztec and Maya; archaeological and ethnohistorical data synthesized. *Spring*. Brockington.
- 128 AFRICAN/AFRO-AMERICAN CULTURAL HERITAGE (African and Afro-American Studies 170) (3). (See African and Afro-American Studies 170 for description.) On demand. Staff.
- 129 SOUTHEAST ASIA: PEOPLES AND CULTURES (Folklore 129) (3). A survey of cultures in Indonesia, the Philippines, and mainland Southeast Asia. Traditional influences and the impact of major contemporary changes on societies of the area will be discussed. *Spring*. Peacock.
- 130 INDIANS OF NORTH AMERICA (Folklore 130) (3). A descriptive study of culture areas of North America at the time of European contact, with emphasis on the Southeast. *Spring*. Staff.
- 131 ARCHAEOLOGY OF SOUTH AMERICA (3). The development of native South American cultures according to archaeological and early ethnohistorical records. *Fall*. Brockington.
- 132 LATIN AMERICAN CULTURES (Folklore 132) (3). Processes in contemporary societies, including peasant life and its transformation in urban centers, class, ethnicity, family life, gender roles, health care, and the relationship between Third World and industrialized societies. *Fall*. Finkler.
- 133 THE PEOPLE OF THE CARIBBEAN (3). A survey of Caribbean cultural development. Particular attention will be given to human ecology, population segments, metropolitan influences, and culture change. *Fall*. Crane.
- 134 ART AND ANTHROPOLOGY (Art 174) (Folklore 134) (3). Visual study of the form, function, and meaning of the traditional painting, drawing, and sculpture from primarily non-Euro Western selected prehistoric and cultures. *Spring*. Johnson.
- 135 CONSCIOUSNESS AND SYMBOLS (Folklore 135) (3). Symbolizing as exemplified in the arts, religions, languages, and world-views of various cultures. Emphasis is on the relation of symbolizing to social process, as analyzed by theorists such as Durkheim, Weber and Levi-Strauss. *Fall*. Peacock.

- 136 KINSHIP AND SOCIAL ORGANIZATION (3). Prerequisite, permission of the instructor. Intensive study of kinship and marriage systems through Australian, African, and Asian cases. Historical, functionalist, structuralist approaches, descent and alliance theories, and the relation of kinship to social organization and social structure. *Fall*. Staff.
- 137 MODERN CULTURES OF THE MIDDLE EAST (3). Desert-oasis ecological adaptations and communities; the peril-refuge dialectic within political structures, religions, kin groups, and the self; directly observed present-day behavior patterns, from Morocco to Afghanistan, are emphasized. *Fall*. Staff.
- 139 ENVIRONMENTAL ANTHROPOLOGY (3). The general nature of interrelationships between people and environment; biological vs. cultural adaptation, archaeological evidence of ecological relationships, adaptation in the ethnographic present, and environmental alteration will be examined. *Fall*. Yarnell.
- 140 SEX ROLES: CROSS-CULTURAL PERSPECTIVES (3). A comparative and evolutionary perspective on social roles as determined by sex in both traditional and modern societies. Sociobiological, Psychoanalytic, Materialist and Marxist interpretations will be explored. *Spring*. Staff.
- 141 THE ANTHROPOLOGY OF GENDER, HEALTH AND ILLNESS (3). This course will explore the social and cultural patterns and practices that differentially influence health and illness among women and men. *Spring*. Finkler and staff.
- 142 RELIGION AND ANTHROPOLOGY (Folklore 142, Religious Studies 142) (3). Religion, studied anthropologically, as a cultural, social, psychological phenomenon in the works of classical and contemporary social thought. *Spring*. Peacock, Tyson.
- 143 FIELD TRAINING IN ANTHROPOLOGY (3). Supervised, on-site data collection and analysis. Students develop background knowledge and select research topic before leaving campus. Instructor's permission required. Staff.
- 145 CULTURE AND LITERARY IMAGINATION (3). A study of selected Western/Nonwestern oral and written literature as cultural products. Critical comparison and interpretation of Anthropological and literary accounts of several contemporary, prehistoric, and fictional societies. *Fall*. Johnson.
- 146 INTRODUCTION TO FOLKLORE (Folklore 146) (3). (See Folklore 146 for description.) *Spring*. Staff.
- 147 SELF AND SOCIETY IN JAPAN (3). Prerequisite, one course on Japan; one upper-level course in Anthropology (sociocultural); or instructors permission. An introduction to contemporary Japanese society focusing on organization of self and relationship of self to social community. Course proceeds through case examination of small-group contexts in different social strata. *Fall*. Bachnik.
- 148 CONTEMPORARY JAPANESE SOCIETY (3). Prerequisite, Anth 147, or 1 upper-level course in sociocultural anthropology, or 1 course on Japan. Introduction to postwar Japanese social organization focusing on large and small enterprise organization; international enterprises, education, enterprise and family; medicine and healing practices; postwar social and economic restructuring. *Spring*. Bachnik.
- 149 ANTHROPOLOGY AND MARXISM (3). Examination of major writings within the Marxist critical tradition which have illuminated central problems within anthropology as theoretical discourse and discipline, and introduction to recent important research in Marxist anthropology. *Fall, spring*. Nonini.
- 150 ARCHAEOLOGY OF NORTH AMERICA (3). A study of the growth of American Indian cultures north of the Rio Grande as interpreted by archaeological research. Special emphasis on the prehistory of North Carolina and eastern woodlands. *Fall*. Staff.
- 151 FIELD SCHOOL IN ARCHAEOLOGY (6). Intensive training in archaeological field methods and techniques. Students participate in excavation, recovery, and interpretation of Archaeological remains; transit mapping, photography, flotation recovery and other research procedures. *Summer*. Staff.

- 155 METHOD AND THEORY IN ETHNOHISTORIC RESEARCH (Folklore 155) (3). Integration of data from ethnographic and archaeological research with pertinent historic information. Familiarization with a wide range of sources of ethnohistoric data and practice in obtaining and evaluating information. Pertinent theoretical concepts will be explored. *Fall*. (Alternate years.) Crumley.
- 163 PSYCHOLOGICAL ASPECTS OF MODERNIZATION (3). Exploration of patterns of psychological development experienced by persons undergoing modernization. Students will cooperate in comparing and analyzing life histories collected in non-Western as well as local settings. *Spring*. Peacock.
- 164 FOUNDATIONS OF SOCIAL ANTHROPOLOGY (3). Intensive study of theory in social anthropology, through use of standard ethnographic monographs on traditional societies, with emphasis on political dimension. Special attention given to the nature and problems of structural-functionalist explanation. *Spring*. Evens.
- 165 ECONOMIC ANTHROPOLOGY (3). An intensive survey of theoretical and empirical concerns of the sub-field of economic anthropology. Cross-cultural analysis of tribal, peasant and modern economic formations. *Fall*. Staff.
- 166 INTENTIONAL CULTURE CHANGE (3). Study of social and cultural elements involved in deliberate reformulation of the way of life of communities. Problems of community development and human resources in anthropological perspective. *Spring*. Staff.
- 167 URBAN ANTHROPOLOGY (3). Emphasis on the social systems and modernization processes of contemporary cities in the Third World. Also considered: problems and opportunities of American anthropologists studying American industrial cities. *Spring*. Staff.
- 168 EMERGENCE OF THE STATE (3). Prerequisite, permission of instructor. Integration of ethnohistoric, ethnographic and archaeological data on the topic of state formation. Definitions of the state are analyzed and the determining factors relative to increasing cultural complexity discussed. *Fall*. (Alternate years.) Crumley.
- 170 MEDICINE AND ANTHROPOLOGY (Folklore 171) (3). An introduction to social and cultural aspects of illness and healing in a wide range of societies. Examines alternative healing systems in the U.S. Especially relevant to pre-medical students. *Fall*. Finkler.
- 171 SOCIOLINGUISTICS (Linguistics 170) (3). Prerequisite, 30, 100, or permission of instructor. This topics course in Sociolinguistics treats the microsociologistics of everyday interactions, dialect differences, language and sex, language and power, minority rights, and the politics of pornography. *Fall*. Staff.
- 172 CULTURAL FACTORS IN POPULATION PLANNING (3). Prerequisite, permission of the instructor. Cultural factors bearing on the need, ethics, design, and implementation of programs attempting to deal with population growth. *Spring*. Staff.
- 173 ANTHROPOLOGY OF THE BODY AND THE SUBJECT (3). Prerequisite, Anthropology 170 or permission of the instructor. Anthropological and historical studies of variation in cultural constructions of bodily experience and personal subjectivity are reviewed, with special emphasis on the genesis of the modern individual and cultural approaches to gender and sexuality. *Spring*. Farquhar.
- 174 CHINESE WORLD VIEWS (Religious Studies 174) (3). An approach to Chinese history, literature, science, and society through an exploration of a few pervasive cultural themes. Chinese sources in translation and western anthropological and philosophical sources are used. *Fall*. Farquhar.
- 175 ETHNOGRAPHIC METHOD (3). Intensive study of and practice in many of the most commonly used anthropological data-collection techniques. *Spring*. Crane.
- 176 SELF AND OTHER IN ETHNOGRAPHIC RESEARCH (3). An examination of ethnography as an interactional research approach. The course examines the process of ethnographic research and learning through practice. *Fall*. Bachnik.
- 179 INTRODUCTION TO GENERAL LINGUISTICS (Linguistics 100) (3). (See Linguistics 100 for description.) *Fall and spring*.

- 180 LINGUISTIC PHONETICS (Linguistics 120) (3). (See Linguistics 120 for description.) *Fall*.
- 181 INTRODUCTION TO COMPARATIVE AND HISTORICAL LINGUISTICS (Linguistics 101) (3). (See Linguistics 101 for description.) *Spring*. Tsiapera.
- 183 PHONOLOGY I (Linguistics 123) (3). (See Linguistics 123 for description.) *Spring*.
- 184 LANGUAGE AND CULTURE (Linguistics 184) (3). The relationship of language to other aspects of culture for the analysis and description of cognitive and affective features of the semantic component of languages. *Spring*. Holland.
- 185 CULTURE AND COGNITION (3). Examination of competing views of the influence of culture on thinking. Includes conceptual and methodological issues in the cross-cultural study of cognitive processes, social cognition, and inferences from brain lateralization research. *Fall*. Holland.
- 186 THE ANTHROPOLOGY OF KNOWLEDGE AND LEARNING (3). Examines the social and cultural content and context of learning and education in contemporary settings and cross-cultural perspective. Introduction to theories of cultural reproduction. *Spring*. Holland, Johnson.
- 188 OBSERVATION AND INTERPRETATION OF RELIGIOUS ACTION (Folklore 188, Religious Studies 188) (3). Prerequisite, permission of instructor. Exercises (including field work) in learning to read the primary modes of public action in religious traditions: sermons, testimonies, rituals, prayers, etc. Primary focus on construction and interpretation of text from field observation. *Spring*. Peacock.
- 190 INTRODUCTION TO GRAMMAR: I (Linguistics 130) (3). (See Linguistics 130 for description.) *Fall*. Staff.
- 193 INTRODUCTION TO GRAMMAR: II (Linguistics 133) (3). (See Linguistics 133 for description.) *Spring*. Staff.
- 194 ADVANCED STUDIES IN ART AND CULTURE (3). Prerequisite, Anthropology 134 (Art 174/Folk 134) or permission of the instructor. Intensive study of selected topics and issues in the analysis and interpretation of prehistoric and cross-cultural art, architecture, and other aesthetic forms. *Fall*. Johnson.
- 199 SPECIAL TOPICS (3). Examines selected topics from an anthropological perspective. Course description for a particular semester is available in the departmental office. *Fall and spring*. Staff.

Courses for Graduates

- 201 SOCIOCULTURAL THEORY AND ETHNOGRAPHY (3). Prerequisite, permission of instructor. Development of a critical understanding of the anthropological study of society and culture through discussion of problems and issues expressed in classic theoretical and ethnographic literature. *Fall*. Staff.
- 202 SOCIOCULTURAL THEORY AND ETHNOGRAPHY (3). Prerequisite, Anthropology 201 or permission of instructor. *Spring*. Staff.
- 203 EVOLUTION AND ECOLOGY (3). Prerequisite, permission of instructor. Development of a critical understanding of anthropological approaches to evolution and ecology in paleontological, archaeological, and present-day cross-cultural contexts through the historical and comparative study of theory, method, and content. *Fall*. Staff.
- 204 EVOLUTION AND ECOLOGY (3). Prerequisite, Anthropology 203 or permission of instructor. *Spring*. Staff.
- 210 WRITING AND PUBLISHING IN ANTHROPOLOGY (3). A seminar on the peer review and analysis of student writing. Training in writing for academic publication. *Spring*. (Alternative years). Johnson.
- 222 RESEARCH METHODS IN ARCHAEOLOGY (3). A study of the basic principles underlying archaeological study of prehistoric sites. Field trips and laboratory work. *Spring*. Staff.

- 223 SEMINAR IN ANTHROPOLOGICAL LINGUISTICS (Linguistics 223) (3). Selected topics from general linguistics and sociolinguistics, special emphasis on methods and problems involved in analysis and description of semantic structure of language and its relation to the rest of culture. *Spring*. Holland.
- 224 SEMINAR IN ANTHROPOLOGY AND CYBERNETICS (3). Examination of systems theory, or cybernetics, evaluation of previous applications of cybernetic models in anthropology, and original analysis, by students, of anthropological data in these terms. *Spring*. Daniels.
- 225 QUANTITATIVE METHODS IN ANTHROPOLOGY (3). Survey of standardized data-gathering techniques, problems in research design, and methods of quantitative analysis encountered in anthropological research. *Fall*. Holland.
- 233 ADVANCED SEMINAR IN CARIBBEAN STUDIES (3). Prerequisite, Anthropology 133 or permission of instructor. Survey of Caribbean cultural development for students having some knowledge or experience in the area. Particular attention will be given to current problems and recent theoretical issues. *Spring*. Crane.
- 250 SEMINAR IN MEDICAL ANTHROPOLOGY (3). Specially designed for, but not restricted to, students who are specializing in medical anthropology. Medicine as part of culture; medicine and social structure viewed cross-culturally; medicine in the perspective of anthropological theory; research methods. A special purpose is to help students plan their own research projects, theses, and dissertations. *Spring*. Finkler.
- 252 TRANSCULTURAL PSYCHIATRY (3). Prerequisite, Anthropology 121 or 170 or permission of instructor. Considers cross-cultural variations in the perception/definition of, reaction to, course and treatment of deviant behavior—especially mental disorders. *Fall*. Estroff.
- 254 PHENOMENOLOGICAL ANTHROPOLOGY (3). Prerequisite, permission of the instructor. The course aims to apply the theories and methods of phenomenology to the practice of anthropology. *Fall*. Evens.
- 255 SEMINAR IN CULTURAL ECOLOGY AND POPULATION (3). Mutual relationships of environment, social structure, mortality and natality, reviewed in an evolutionary framework. Detailed consideration of a few school cultures; e.g., Bushmen, Tikopia, Ashanti, Japan, and Vicos (Peru). *Spring*. Staff.
- 256 THE EVOLUTION OF HUMAN COGNITION (3). Prerequisite, permission of the instructor. A critical exploration of contemporary evidence on the evolution of human cognition and consciousness, including phylogenetic, comparative (interspecific), ontogenetic and cross-cultural perspectives. *Spring*. (alternative years.) Holland and Winterhalder.
- 260 SEMINAR IN HUMAN EVOLUTIONARY ECOLOGY (3). Permission of instructor for undergraduates. Examination of evolutionary ecology concepts with existing or potential uses in human adaptation research, including: adaptation and optimization, effective environmental properties, foraging strategies, niche, competitive exclusion, life history tactics, and biogeography. *Spring 1983 and alternate years thereafter*. Winterhalder.
- 265 SEMINAR IN THE ANTHROPOLOGY OF LAW (3). Prerequisite, permission of the instructor. Drawing upon recent work of social anthropologists, this course will analyze the nature of law and conceptions of authority in various Asian, African and American preliterate societies. Law will be related to the economy, social organization, religious ideology, and political instruments of each society. Underlying theories of social cohesion and process will be examined in detail. *Fall*. Staff.
- 266 SEMINAR IN ETHNOBOTANY (3). Prerequisite, permission of instructor. The focus is on economic plants and primitive technology, ecological relationships between man and plants, and analysis and interpretation of archaeological plant remains. Some laboratory work is expected. *Spring*. Yarnell.
- 290 LINGUISTIC GEOGRAPHY (Linguistics 250) (3). (See Linguistics 250 for description.) *Spring*. Staff.

- 293 LINGUISTIC FIELD WORK I (Linguistics 293) (3). (See Linguistics 293 for description.) *Fall*. Staff.
- 294 LINGUISTIC FIELD WORK II (Linguistics 294) (3). (See Linguistics 294 for description.) *Spring*. Staff.
- 301 READING AND RESEARCH (1 to 4). Registration with permission of professor. *Fall*. Staff.
- 302 READING AND RESEARCH (1 to 4). Registration with permission of professor. *Spring*. Staff.
- 310 SEMINAR IN THE ANTHROPOLOGY OF MEANING (3). Ongoing seminar for students and faculty participating in the Anthropology of Meaning Concentration. Evenings, twice a month, dates TBA.
- 315 READING AND RESEARCH IN METHODOLOGY (1 to 4). Registration with permission of professor. *Fall*. Staff.
- 316 READING AND RESEARCH IN METHODOLOGY (1 to 4). Registration with permission of professor. *Spring*. Staff.
- 317 THE CONCEPT OF TEACHING OF GENERAL ANTHROPOLOGY (3). Prerequisite, permission of Associate Chair. Directed course preparation and review of teaching techniques, films, and other aids. *Fall*. Brockington.
- 318 TRAINING IN THE TEACHING OF ANTHROPOLOGY (3). Prerequisites, Anthropology 317 and permission of Associate Chairperson. The trainee teaches a small class in general anthropology under supervision. *Fall and spring*. Staff.
- 321 FIELD RESEARCH (3 each). Registration with permission of the professor. *Fall and spring*. Staff.
- 322
- 327 SEMINAR IN SELECTED TOPICS (1 to 4). *Fall*. Staff.
- 328 SEMINAR IN SELECTED TOPICS (1 to 4). *Spring*. Staff.
- 393 MASTER'S THESIS (3 or more). Individual research in a special field under the direction of a member of the Department. *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). Individual research in a special field under the direction of a member of the Department. *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF ART

ARTHUR MARKS, *Chairman*

RICHARD SHIFF, *Assistant Chairman for Art History*

RICHARD KINNAIRD, *Assistant Chairman for Studio Art*

Professors

C. EDSON ARMI	(30)	Medieval Art, Architecture, Design
ROBERT J. BARNARD	(9)	Art Education, Painting
JAROSLAV FOLDA, III	(10)	Medieval
FRANCES HUEMER	(7)	Baroque
J. RICHARD JUDSON	(20)	16th & 17th Century Dutch & Flemish
RICHARD KINNAIRD	(11)	Painting, Drawing
ARTHUR S. MARKS	(21)	American & British
JERRY NOE	(13)	Sculpture
MARVIN SALTZMAN	(6)	Painting, Printmaking, Drawing
RICHARD SHIFF	(32)	Modern Art, Criticism
MARY STURGEON	(31)	Ancient Art, Archaeology
DENNIS ZABOROWSKI	(15)	Painting, Drawing

Associate Professor

JAMES GADSON	(19)	Painting, Printmaking, Drawing
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Assistant Professors

STELLA E. GRABOWSKI	(68)	Printmaking, Painting
MARY PARDO	(67)	Renaissance
MARY SHERIFF	(56)	19th & 20th Century
XAVIER TOUBES	(58)	Ceramic Sculpture

Instructor

KATHERINE SCHWAB	(73)	Ancient Art
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Visiting Lecturers

JOHN OBUCK	(76)	Mixed Media
ROCHELLE SHICOFF	(77)	Painting

Adjunct Professors

SHERMAN LEE	(61)	Oriental
CHARLES MILLARD	(72)	19th and 20th Century Sculpture

Adjunct Assistant Professors

TIMOTHY RIGGS	(65)	16th, 19th, 20th Century Prints
DEAN C. WALKER	(47)	16th, 17th, 18th Century Painting and Sculpture

Professors Emeriti

JOHN V. ALLCOTT
 JOHN W. DIXON, JR.
 ROBERT HOWARD
 SARA A. IMMERWAHR
 KENNETH NESS
 JOSEPH C. SLOANE

Modern Art & Architecture
 Religion & Art, Criticism
 Sculpture
 Greek Art, Archaeology
 Painting
 Nineteenth Century Art

For those considering professional careers as critics or art historians (teaching and research), graduate work is offered leading to the degrees of Master of Arts and Doctor of Philosophy. Those desiring professional careers in painting, sculpture, or printmaking should take the degree of Master of Fine Arts.

The Hanes Art Center provides exhibition galleries, departmental library, slide and photograph collection, offices, study areas, classrooms and studios. Additional studios and shops are located in the Art Laboratory building on Airport Road, two miles from campus.

The Library holds about 65,000 volumes in the field of art history and classical archaeology, of which 40,000 are housed in the art library in the Hanes Art Center.

One feature of the Department is its access to the Ackland Art Museum in the adjacent building. (NB. The Ackland will be closed for renovations starting in the fall of 1987.) A growing collection of works of art in all media offers the opportunity for students to work on research problems using actual objects. Frequent exhibitions give further opportunities for study.

Admission

In addition to completing an application to the Graduate School, the candidate for admission to the Master of Fine Arts program in studio art must submit directly to the Department of Art a portfolio of representative examples of creative work. Good photographs or slides, adequately identified and labeled, are required. *Do not send original works.* If you wish your slides or photographs returned, a self-addressed, stamped envelope must be enclosed. No application will be considered until the slide portfolio has been submitted. There are no spring semester admissions.

In addition to completing an application to the Graduate School (which must include up-to-date GRE scores), the candidate for admission to the programs in art history must submit directly to the Department of Art the departmental self-interview form, available from the Department upon request. All applicants for graduate study in art history are admitted to the program as candidates for the Master of Arts degree, unless they already have received or expect to receive this degree in art history from another institution. An undergraduate major in art history is not required, but the

minimum standard for admission is twelve semester hours of good work in art history, archaeology, cultural anthropology, or aesthetics, and a reading knowledge at entrance of French or German. There are no spring semester admissions.

Degree Requirements for Studio Art

The M.F.A. program of the Art Department at the University of North Carolina at Chapel Hill places great importance on selectivity and offers a professional ambience demanding a commitment by a student to the humanities. The M.F.A. degree is offered in painting, sculpture, and print-making. The usual course of study is two years. Forty hours of coursework are required, normally consisting of 9 hours of independent study and critique, and 1 hour of graduate seminar, per semester. A student enrolled for as many as 9 hours in a given semester can add, at no extra tuition cost, art history courses and elective courses within the department or the University to develop a 60-hour M.F.A. Periodic reviews by the faculty are conducted during the first year. During the second year, the student works with a thesis committee and completes the program with a thesis exhibition, written thesis report, and oral examination. A strong resident faculty is complemented by a Visiting Artist program (one full-time visitor each semester, directing a seminar and critique class with graduate students).

For further information about the program, the applicant should write to the Director of Graduate Studies for Studio Art.

Applications must be completed by March 1, and these applicants will be notified in writing as soon as possible. Applications received after March 1 and completed by April 1 may be considered if space is available. In all cases, applications not completed by April 1 will not be considered. All offers of admission to the program are for the academic year beginning the next fall semester; there are no spring nor summer admissions, and offers of admissions will not be deferred.

Financial Aid for Studio Art Students

All applicants for admission to the M.F.A. program whose applications are complete by March 1 are automatically considered by the Department for nomination in the University fellowship competition. Applicants and students in residence are eligible for Teaching Assistantships and Graduate Assistantships; these have frequently been awarded on a semester basis. Additional fellowships are available from privately endowed Department trust funds. The Office of Student Aid, CB# 2300, Vance Hall, Chapel Hill, N.C. 27599-2300, has information about work-study jobs and loans; that office should be consulted as early as possible by those desiring such help.

Degree Requirements for Art History

The Master of Arts degree in general follows the requirements of the Graduate School as described on pages 95-104. A student admitted to graduate study in art history who has had adequate preparation in art history and foreign languages will normally take a minimum of ten three-hour one-semester courses for the M.A. including one three-hour course registration for Thesis. The student normally will thus take no fewer than four 300-level seminars, five other courses at the 100 and 200 levels, and Art 393, Thesis registration. At least one course or seminar must be taken in each of the four major periods of art history: Ancient, Medieval, Renaissance-Baroque, and Modern. Two of the three-hour one-semester courses are considered electives. These may be additional art history courses or courses in any area relevant to the student's study (with the permission of the Director of Graduate Studies). If a student elects to do an external minor, the two elective courses will be considered part of the minor. One additional elective will then be necessary, making a total of eleven three-hour courses for the M.A.: eight in the history of art and a minimum of three in the external minor. An external minor is available e.g. in Medieval Studies (see the end of the Classics entry).

Students must pass the reading knowledge examination in French or German before completing twelve hours of graduate course work. In the semester after which the student completes twenty-seven hours of graduate credit, the M.A. written examination will be taken. The student then will prepare an M.A. thesis. If the student wishes to continue into the Ph.D. program, the Department should be notified of intention at the time of the M.A. examination, in order that a full evaluation of the student's graduate work can be conducted by the Art History Graduate Committee. A student may not continue in the Art History Graduate program for more than one semester beyond thirty hours of graduate credit unless approval has been granted by the Graduate Committee for entrance into the Ph.D. program.

The degree of Doctor of Philosophy in general follows the requirements of the Graduate School as described on pages 98-108. Students who have the M.A. in art history from another institution are admitted directly to this program, but must take four general field examinations in Ancient, Medieval, Renaissance-Baroque, and Modern Art. In addition to the courses completed for the M.A., doctoral students normally will take at least four 300-level seminars in at least two fields of study, two additional courses in art history, two electives in art history or an outside discipline and Art 394, Dissertation Registration. A studio field or an external minor may be offered, but either choice will require the completion of more courses. The candidate must pass the reading examinations in two foreign languages, generally French and German; the student may be required to pass other foreign language examinations for study in special fields. The

doctoral written examinations cover three fields: a major field, a minor related to the major field, and an unrelated minor, all normally chosen from the following: Greek, Roman, Early Christian and Byzantine, Western Medieval, Renaissance, Baroque, Modern, and Criticism.

For further information inquire of the Director of Graduate Studies in Art History.

Financial Aid for Art History Students

All applicants for admission who have completed their applications by February 1 are automatically considered by the Department for nomination in the University Fellowship competition. Applicants and students in residence are also eligible for Teaching Assistantships and Graduate Assistantships which are awarded by the Department with University funds. Furthermore, the Department has certain discretionary funds of its own from which it annually makes both service and nonservice awards. A limited amount of hourly work is available to graduate students in the art library and slide library. The Office of Student Aid, CB# 2300, 300 Vance Hall, Chapel Hill, N.C. 27599-2300, has information about work-study jobs and loans. Applicants and resident students desiring such help should contact that office as early as possible.

ART HISTORY

Courses for Graduates and Advanced Undergraduates

- 110 TOPICS IN THE HISTORY OF ANCIENT ART (3). Sturgeon.
- 111 TOPICS IN THE HISTORY OF EARLY MEDIEVAL ART (3). Armi, Folda.
- 112 TOPICS IN MEDIEVAL ART: A.D. 1000-1453 (3). Armi, Folda.
- 113 TOPICS IN RENAISSANCE ART (3). Huemer, Judson, Pardo.
- 114 TOPICS IN BAROQUE ART (3). Huemer, Judson.
- 115 TOPICS IN MODERN ART (3). Marks, Sheriff, Shiff.
- 116 TOPICS IN MODERN DESIGN (3). Armi.
- 117 TOPICS IN THE HISTORY OF ARCHITECTURE (3). Armi, Huemer, Marks.
- 118 TOPICS IN RELIGION AND ART (3). Dixon.
- 119 TOPICS IN AMERICAN ART (3). Marks.
- 124 TOPICS IN FAR EASTERN ART (3). Lee.
- 150 ROMANESQUE ARCHITECTURE (3). Armi.
- 152 GOTHIC ARCHITECTURE AND SCULPTURE (3). Armi.
- 153 HISTORY OF ILLUMINATED MANUSCRIPTS (3). Folda.
- 154 NORTHERN EUROPEAN ART: A.D. 1300-1500 (3). Folda.
- 160 RENAISSANCE ART IN VENICE (3). Pardo.
- 162 SIXTEENTH CENTURY ITALIAN PAINTING (3). Huemer.
- 163 SIXTEENTH CENTURY VENETIAN PAINTING (3). Pardo.
- 164 ART OF FLORENCE (Religion 182) (3). Dixon.
- 165 SIXTEENTH CENTURY DUTCH AND FLEMISH ART (3). Judson.
- 170 HISTORY OF SEVENTEENTH CENTURY DUTCH AND FLEMISH ART (3). Judson.
- 171 ITALIAN BAROQUE PAINTING (3). Huemer.

- 172 SEVENTEENTH CENTURY FRENCH AND FLEMISH ART (3). Huemer.
 173 EIGHTEENTH CENTURY FRENCH PAINTING (3). Sheriff.
 174 ANTHROPOLOGY OF ART AND ARCHITECTURE (Anthropology 134) (3).
 Johnson.
 180 THEORIES OF MODERN ART (3). Shiff.
 181 MODERN ART AND CRITICISM (3). Shiff.
 184 MUSEUM STUDIES (3).
 185 THE LITERATURE OF ART (3). Staff.
 186 TOPICS IN THE HISTORY OF ART (3).
 187 STUDIES IN THE HISTORY OF GRAPHIC ART (3). Riggs.
 189 STUDIES IN NEAR EASTERN ARCHAEOLOGY (Clar. 189) (3).
 190 GREEK ARCHITECTURE (Clar. 190) (3).
 191 ARCHITECTURE OF ETRURIA AND ROME (Clar. 191) (3).
 193 GREEK PAINTING (Clar. 193) (3). Sturgeon.
 194 ARCHAIC GREEK SCULPTURE (Clar. 194) (3). Sturgeon.
 195 CLASSICAL GREEK SCULPTURE (Clar. 195) (3). Sturgeon.
 196 HELLENISTIC GREEK SCULPTURE (Clar. 196) (3). Sturgeon.
 198 AEGEAN CIVILIZATION AND NEAR EASTERN BACKGROUNDS (Clar. 198)
 (3).
 199 READINGS IN ART HISTORY (3). Staff.

The content of these courses will vary slightly from year to year in accordance with the needs of the students and the special competence of the instructor.

(Additional courses offered in the Department of Classics may be taken by qualified students in Art History. Consult the Department of Classics listings.)

Courses for Graduates

In the seminars listed, the topics for study change from year to year depending on the professor conducting the course. Architecture, sculpture, painting or a combination of these may be the subject. Consult the Department schedule for detail on specific courses in any given semester.

- 276 ADVANCED READINGS TOPICS IN THE HISTORY OF ART (3).
 277 ROMANESQUE ARCHITECTURE (3). Armi.
 294 GREEK TOPOGRAPHY (Clar. 294) (3).
 296 ROMAN SCULPTURE (Clar. 296) (3).
 297 ROMAN PAINTING (Clar. 297) (3).
 298 ROMAN TOPOGRAPHY (Clar. 298) (3).
 299 ETRUSCAN ART (Clar. 299) (3).
 301 PROBLEMS IN ART HISTORY (3). By permission of instructor.
 350 SEMINAR IN MEDIEVAL ART (3). Folda.
 351 SEMINAR IN MEDIEVAL ART (3). Armi.
 352 SEMINAR IN RENAISSANCE ART (3).
 353 SEMINAR IN RENAISSANCE ART (3). Pardo
 354 SEMINAR IN BAROQUE ART (3). Huemer.
 355 SEMINAR IN NINETEENTH CENTURY ART (3). Sheriff.
 356 SEMINAR IN AMERICAN ART (3). Marks.
 357 SEMINAR IN MODERN ART (3). Shiff.

- 358 SEMINAR IN ANCIENT ART (Clar. 358) (3). Schwab.
- 359 LOW COUNTRIES SEMINAR (3). Judson.
- 378 SEMINAR IN MUSEUM STUDIES (3).
- 393 MASTER'S THESIS (3 or more).
- 394 DOCTORAL DISSERTATION (3 or more).
- 400 GENERAL REGISTRATION (0).

STUDIO ART

Courses for Graduates

- 230 GRADUATE STUDIO ART SEMINAR (1).
- 240 GRADUATE PAINTING (Var.)
- 241A GRADUATE SCULPTURE (Var.)
- 241B GRADUATE CERAMIC SCULPTURE (Var.)
- 242A GRADUATE INTAGLIO & RELIEF PRINTMAKING (Var.)
- 242B GRADUATE LITHOGRAPHY PRINTMAKING (Var.)
- 242C GRADUATE SCREEN PRINTMAKING (Var.)
- 250 GRADUATE CRITIQUE (3).
- 393 MASTER'S THESIS (3 or more).
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF BIOCHEMISTRY AND NUTRITION

MARY ELLEN JONES, *Chair*

Professors

MICHAEL CAPLOW	(16)	Chemistry of the Cytoskeleton
CHI-BOM CHAE	(22)	Regulation of Histone Genes during Spermatogenesis; Role of pre-mRNA-protein Complexes in RNA Splicing; Role of Thyroid Stimulating Hormone in Gene Regulation
DONALD T. FORMAN	(38)	Clinical Biochemistry; Tumor Markers; Alcohol Metabolism
EDWARD B. GLASSMAN	(40)	Genetics and Alcohol Metabolism in Mammals
JACK GRIFFITH	(41)	Molecular Structure of Recombination Complexes; Electron Microscopy of DNA-protein Complexes
JAN HERMANS	(46)	Theoretical Approaches to Structure and Function of Proteins: Computer Modeling, Molecular Dynamics, and Molecular Graphics
MARY ELLEN JONES	(54)	Regulation of Enzyme Activity; Multifunctional Proteins; Site-Specific Mutagenesis
MORRIS LIPTON	(64)	Neuropharmacology, Neuroendocrinology; Nutrition and Behavior
ROGER L. LUNDBLAD	(67)	Protein-Protein Interactions; Characterization of Salivary Proteins; Isolation and Mechanism of Action of Blood-Clotting Proteins; Oral Microbiology
GERALD L. MECHANIC	(76)	Connective Tissue Biochemistry and Structure of Collagen
GERHARD W. MEISSNER	(79)	Ion Channels; Excitation-Contraction Coupling in Muscle
PIERRE MORELL	(85)	Neurochemistry; Metabolism of Myelin; Axonal Transport; Neurotoxicology
SHIHAADEH N. NAYFEH	(88)	Mechanism of Action of Hormones in Normal and Neoplastic Cells
RALPH PENNIALL	(97)	Studies of Polyphosphate Metabolism and Function in Living Systems
CLAUDE PIANTADOSI	(100)	Studies of PAF and ALP Analogues; Synthesis Oriented Medicinal Chemistry
GEORGE K. SUMMER	(121)	Biochemical Regulation; Human Biochemical Genetics; Analytical Biochemistry
JOHN E. WILSON	(136)	Neurochemistry; Metabolic Correlates of Experience or Behavior
RICHARD V. WOLFENDEN	(139)	Enzyme Mechanisms; Water Affinities of Biological Compounds

Associate Professors

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|------------------------|-------|--|
| FRED E BELL | (4) | Protein Biosynthesis; Mechanism of Enzyme Action |
| KEITH W. BURRIDGE | (14) | Cell Movement; Biochemistry of the Actin Cytoskeleton; Attachment of Microfilaments to the Plasma Membrane |
| CHARLES W. CARTER, JR. | (19) | Structural Molecular Biology; X-Ray Crystallography of Proteins, including Aminoacyl tRNA Synthetases; Electron Transfer Proteins; Phasing Methods |
| STEPHEN G. CHANEY | (25) | Molecular Biology; Action Mechanism of Cancer Chemotherapeutic Agents |
| DAVID J. HOLBROOK, JR. | (49) | Nucleic Acid and Protein Metabolism; Biochemical Effects of Toxic Agents |
| BARRY R. LENTZ | (62) | Biomembrane Structure and its Relationship to Function; Platelet Membranes in Blood Coagulation; Membrane Fusion; Liposomes |
| PATRICIA F. MANESS | (68) | RNA Tumor Viruses; Role of Oncogenes in Neural Development and Cell Transformation |
| AZIZ SANCAR | (105) | Molecular Biology; Structure and Function of DNA Repair Enzymes; Action Mechanism of Anticancer Drugs |
| MICHAEL D. TOPAL | (126) | Molecular Biology of Chemical Mutagenesis; Oncogene Activation |
| THOMAS W. TRAUT | (128) | Enzyme Structure and Regulation; Nucleotide Metabolism |
| ELIZABETH M. WILSON | (134) | Androgen Regulation of Gene Transcription; Growth Factors in the Male Reproductive System |

Assistant Professors

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|---------------------|-------|--|
| ANN H. ERICKSON | (33) | Cell Biology; Lysosomal Enzyme Biosynthesis; cDNA Cloning and in Vitro Mutagenesis |
| HOWARD M. FRIED | (39) | Yeast Genetics and Molecular Biology; Regulation of Ribosomal Protein Genes; Mechanisms of Nuclear Transport |
| LAURA J. KALFAYAN | (51) | The Regulation of Eucaryotic Gene Expression during Development; <i>Drosophila</i> Development; Oogenesis |
| GWENDOLYN B. SANCAR | (104) | DNA Repair Genes and Proteins in <i>Escherichia coli</i> and Yeast |
| RONALD I. SWANSTROM | (123) | Interaction of Retroviruses with the Host Genome; Replication of Human Retroviruses |

Research Professors

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|---------------------|------|---|
| ARISTOTLE J. DOMNAS | (35) | Sterol and Lipoprotein Metabolism; Role of Sterols in Morphogenesis; Enzymology of Carbohydrates |
| DAVID G. KAUFMAN | (53) | The Role of the Cell Cycle and DNA Replication; Chemical Carcinogenesis; Transformation of Human Endometrial Cells in Culture |

Research Associate Professors

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|-----------------------|-------|---|
| PI-WAN CHENG | (26) | Glycoprotein Chemistry and Biosynthesis; Pulmonary Biochemistry |
| JOHN A. CIDLOWSKI | (27) | Molecular Endocrinology and Regulation of Gene Expression by Steroid Hormones |
| ROBERT E. CROSS | (31) | Clinical Biochemistry |
| JOHN E. HAMMOND | (42) | Medical Informatics in the Solution of Problems in Clinical Chemistry and Laboratory Medicine |
| LAWRENCE M. SILVERMAN | (113) | Tumor Markers; Clinical Enzymology; Clinical Applications of DNA Probes |
| ARREL D. TOEWS | (125) | Neurochemistry; Neurotoxicology; Axonal Transport; Myelin; Nervous System Membrane Metabolism |

Adjunct Professors

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|------------------|------|---|
| STEVEN S.-L. LI | (65) | Protein Chemistry; Molecular Biology |
| GEORGE W. LUCIER | (66) | Molecular Epidemiology and Application of Biochemical Approaches to Estimating Human Risks to Environmental Chemicals |

Adjunct Associate Professors

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|-----------------|-------|--|
| TERRI DAMSTRA | (34) | Behavioral and Neurotoxicology; Evaluation of Health Effects of Chemicals Found in Waste Dumps; Identification of Early Clinical Indicators of Chemical Toxicity |
| BOYD R. SWITZER | (124) | Nutritional Biochemistry Assessment; Nutrition and Alcohol; Vitamin A and Cancer |

Clinical Assistant Professor

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|-------------------|------|--|
| DIANNE M. FRAZIER | (37) | Nutrition, Inborn Errors of Metabolism and Immunochemistry |
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Professors Emeriti

MICHAEL K. BERKUT
WILLIAM HENRY PEARLMAN
HOWARD A. SCHNEIDER
ROBERT H. WAGNER
JAMES R. WHITE

A biochemist studies biological systems essential for life, and uses chemical, physical and molecular biological techniques. The Department of Biochemistry and Nutrition at this university is an administrative division of the Medical School and a member of the Graduate School. In addition, it serves all undergraduate students who are interested in biochemistry, particularly students seeking a health-related career. It offers special instruction to students taking a premedical, pre dental, nursing, dental hygiene, pharmacy or public health curricula. At the graduate student level it offers instruction and research opportunities leading to the Ph.D. and M.S. degrees.

The department has excellent research facilities in a modern building that is shared with the Departments of Microbiology and Pharmacology. The Cancer Research Center is in an adjacent building; the Medical School, the Health Sciences Library and North Carolina Memorial Hospital are across the street. All types of modern equipment are available to the students and faculty.

The faculty research interests are broad and are listed above. We are proud to have strong research in molecular biology and chromatin structure; in the biochemistry of genetics of bacteria, yeast and mammals; in membrane structure and function; in neurochemistry; in physical biochemistry and blood clotting; in hormones and their receptors; in tubulin assembly; in cell sorting of proteins essential for subcellular structures; in enzyme mechanisms and protein structure, in the biochemical action of toxic agents; and in cancer research and RNA tumor viruses. Although we teach nutrition, we do not have an active research program in this area. More detailed information concerning the research publications of our faculty is available in the American Chemical Society's *Directory of Graduate Research* or can be obtained by writing the Director of Graduate Studies of this Department.

Funds available from the University, the department and individual research grants provide stipends for students. All applicants are considered for fellowships and teaching or research assistantships; however, not all new students admitted can be offered such support. There are approximately 50 graduate students registered. In 1987 students received a stipend of \$9,050 (for the 12 months); the stipend usually increases yearly. Nonresidents with predoctoral fellowships or assistantships are recommended for special tuition rates.

Applications are considered from prospective graduate students who present evidence of superior scholarship and who have had courses in general,

analytical and organic chemistry and physics. Although not absolutely required for admission, it is recommended that students prepare themselves by taking a general biochemistry course, biology, physics, calculus and physical chemistry (2 semesters are recommended). We anticipate that students who have not had these courses will take them, as appropriate, after their arrival.

Students admitted to the Graduate Program must take a laboratory rotation course, Biochemistry 207, and a special seminar course, Biochemistry 205 in their first year of graduate study. Six other courses are required of all students: Biochemistry 104, 105, 106, 108, 134 and 143 or 144. Usually these six core courses are taken over the first one and one-half year period. In addition, 4 hours of seminar courses are required for the Ph.D. degree. Although there is no language requirement and no courses outside of those offered in the Department are required, we encourage students to take courses in other science departments.

A committee for entering students advises students about course selection until the student chooses a research sponsor. A research guidance committee then reviews the student's progress yearly until a dissertation committee is formed to review the student's dissertation grant application proposal. The examinations required for admission to candidacy for the M.S. and Ph.D. degree are administered as written research grant requests with a site visit to allow the student to defend her/his grant proposal. The Ph.D. candidate will write two such grants; one on his/her chosen research project and a second in an area removed from her/his thesis. A candidate for the M.S. degree will complete a single grant request. The most important requirement for both the M.S. and Ph.D. degrees is a dissertation of original research carried out independently by the candidate.

Courses for Graduates and Advanced Undergraduates

- 100 BIOCHEMISTRY FOR STUDENTS OF BIOLOGY AND CHEMISTRY (Neurobiology 100) (Biology 107) (3). Prerequisites, Chemistry 61 and one course in biology; corequisite, Chemistry 62. Lectures on the mechanism and regulation of reactions in living organisms, with emphasis on general principles. Protein structure and enzyme function; central pathways in intermediary metabolism; metabolic control; expression of genetic information; active transports; molecular disease. *Fall*. Wolfenden, Erickson, Fried.
- 100L BIOCHEMISTRY LABORATORY (2). Prerequisite or corequisite, Biochemistry 100. Emphasizes modern research techniques in biochemistry, including subcellular fractionation, isolation, separation, and quantitation of biological macromolecules, enzymology, metabolic studies using radioactive precursors, clinical chemistry assays, and molecular biological techniques. Four laboratory hours a week. *Fall*. Toews.
- 102 UNDERGRADUATE RESEARCH IN BIOCHEMISTRY (1-3). Prerequisites, an overall 3.0 G.P.A. and permission of course director. For juniors and seniors who wish to carry out an independent, mutually arranged research project in the laboratory of a biochemistry faculty sponsor. Restricted to on-campus work. Minimum three hours per week for each unit of credit per semester. May be repeated. May not substitute for honors, advanced elective, or other course requirements of another Department. A written report is required in each term. *Fall and Spring*. Fried; Staff.

- 103 BIOCHEMISTRY FOR DENTAL STUDENTS (5). Prerequisite, Chemistry 62, or equivalent. This course may be taken by qualified students who are not majoring in biochemistry. *Fall*. Bell; staff.
- 104 METABOLISM: MECHANISMS AND REGULATION (3). Prerequisite, Biochemistry 100 or equivalent. Selected metabolic pathways will illustrate enzyme mechanisms, the hierarchy of regulatory processes, and important variations in different tissues. *Spring*. Traut, Wilson, Wolfenden, Jones.
- 105 MOLECULAR BIOLOGY (3). Prerequisite, Biochemistry 100 or equivalent. Mechanisms of replication, transcription, and translation of genetic material in prokaryotic and eukaryotic systems, gene sequence and organization, biochemical genetics, and regulatory mechanisms. *Fall*. Chae, Fried, Sancar, Swanstrom.
- 106 ENZYME KINETICS (1). Prerequisite, Biochemistry 100 or equivalent. An analysis of enzyme-catalyzed multiple substrate reactions, and the kinetic characteristics of allosteric enzymes. *Spring*. Jones.
- 108 LIPID AND MEMBRANE BIOCHEMISTRY (3). Prerequisite, Biochemistry 100 or equivalent. Chemistry and structure of complex lipids and lipoproteins; cellular fractionation, membrane structure, transport and assembly; cell surface mediated processes. *Fall*. Meissner, Lentz.
- 125 PLANT PHYSIOLOGY AND BIOCHEMISTRY (Biology 125) (3). Prerequisites: Biology 11 and Biology 41 or 52. An advanced course covering growth of plants including photosynthesis, nitrogen fixation, and biosynthesis of cellular components; developmental processes; hormonal regulation and responses to stress. *Spring*. Staff. (Biology).
- 134 CASE STUDIES IN STRUCTURAL MOLECULAR BIOLOGY (3). Prerequisite, Biochemistry 100 or equivalent. Principles of macromolecular structure and function with emphasis on proteins, molecular assemblies, and ATP enzymology. *Fall*. Carter.
- 139 HORMONES AND EVOLUTION (Biology 139) (2). Prerequisites, Biochemistry 100 or Biology 52 or Biology 53 or equivalent. An introduction to the chemistry of hormones and the biochemical mechanisms underlying their biological actions in evolutionary perspective with emphasis on unifying concepts. *Spring*. Pearlman.
- 140 INTRODUCTION TO CHEMICAL PATHOLOGY (Chem Path 140) (3). Prerequisite or corequisite, Biochemistry 100 or equivalent. Permission of the instructor. Introduction to chemical pathology including the biochemical basis, methods of analysis, and clinical application of selected biochemical tests. Topics may include enzymology, endocrinology, clinical toxicology/pharmacology, immunochemistry or other related areas. *Three lecture hours per week, spring. (1989 and alternate years.)* Chapman, Silverman, Cross, Hammond, Forman.
- 142 BIOCHEMICAL TOXICOLOGY (Toxicology 142) (3). Prerequisites, Biochemistry 100, and one additional biochemistry course (or permission of Course Director). Biochemical actions of toxicants, and assessment of cellular damage by biochemical measurements. Course intended primarily for graduate students. *Spring*. Holbrook (Course Director).
- 143 PHYSICAL BIOCHEMISTRY (2). Prerequisites, Biochemistry 100 and two semesters of physical chemistry. Theory and methods applicable to the study of macromolecules. Topics will include: spectroscopy, applications of random-walk theory, scattering of light and x-rays, frictional properties and fast kinetic measurements. Two lecture hours per week; plus occasional practical demonstrations. *Spring. (1989 and alternate years.)* Hermans, Lentz.
- 144 PHYSICAL BIOCHEMISTRY (2). Prerequisites, Biochemistry 100 and two semesters of physical chemistry. Theory and methods applicable to the study of macromolecules. Topics will include: conformational analysis, multiple equilibria and magnetic resonance spectroscopy. Two lecture hours per week; plus occasional practical demonstrations. *Spring. (1990 and alternate years.)* Hermans, Lentz.

- 180 DNA AND CELL PATHOLOGY (Genetics 180) (Pathology 180) (3). Prerequisites, Biochemistry 100 and permission of the instructor. The basic chemistry of DNA and its associated structural and replicative proteins as it relates to mechanisms of mutagenesis and carcinogenesis. *Three lecture hours a week, Spring.* (1989) Topal.

Courses for Graduates

- 205 RESEARCH TOPICS IN BIOCHEMISTRY (3). Prerequisites, Biochemistry 100 or equivalent and permission of the Coordinator. Seminar and Critical Study of Modern Research topics in Biochemistry under the supervision of individual Biochemistry Faculty. *Spring.* Nayfeh; staff.
- 206 EXPERIMENTAL APPROACHES TO BIOCHEMICAL RESEARCH (1). A survey of biochemical techniques in a lecture/demonstration format. *Fall.* Swanstrom.
- 207 ADVANCED BIOCHEMISTRY LABORATORY (2 or 4). Prerequisite, Biochemistry 100 or equivalent. Permission of the Department required except for departmental majors. Designed to introduce the student to research methods. Minor investigative problems are conducted with advice and guidance of the staff. May be repeated for credit two or more semesters. Hours and credit to be arranged, any semester. Staff.
- 211 APPLICATION OF DIGITAL COMPUTERS IN BIOCHEMICAL RESEARCH (2). Prerequisite, permission of instructor. Use of computers for analysis of experimental results, for evaluation of theoretical models and for molecular graphics. In alternate years, course will be offered at different level; it may be repeated once for credit. Maximum number of students admitted will be determined by availability of equipment. *Spring.* Hermans.
- 220 BIOCHEMICAL ENDOCRINOLOGY (2). Prerequisite, Biochemistry 100 or equivalent. Review of endocrine systems and their clinical expression in disease; molecular mechanisms of hormone action; biochemical basis of growth factors and second messengers; recombinant DNA-cloning methods. *Spring.* Wilson, Nayfeh, Cidlowksi.
- 227 NEUROCHEMISTRY (Neurobiology 227) (3). Prerequisites, two semesters of Biochemistry. An introductory course in the biochemistry of the nervous system. Topics include aspects of energy metabolism, ion movements, neurotransmitters, intermediary metabolism and the metabolism of macromolecules in the nervous system. *Fall.* (1988 and alternate years.) Wilson, Morell.
- 228 ADVANCED TOPICS IN PROTEIN CHEMISTRY (Pathology 228) (3). Prerequisite, Biochemistry 100 or equivalent. A discussion of the chemical approaches to the elucidation of the structure of simple and complex proteins. Special topics will include comparisons of the crystal structure of proteins with functional group reactivity and susceptibility to limited proteolysis. *Spring.* (1989 and alternate years.) Lundblad.

The following Seminar Courses are designed for students who are majoring or minoring in Biochemistry and who wish to further their knowledge in particular areas. Unless otherwise stated, two semesters of Biochemistry are prerequisites for Seminar Courses. Most of these courses are given in alternate years by interested staff members. Unless otherwise stated, these seminars may not be repeated for credit. Seminar courses provide teaching experience which is required for a graduate degree in Biochemistry and Nutrition in addition to experience in giving a critical review of the current literature.

- 230 SEMINAR IN MEMBRANE STRUCTURE AND FUNCTION (2). Prerequisites, Biochemistry 108 and permission of the instructor. Students organize and present in depth seminars in selected areas of modern membrane research. *Spring*. (1989 and alternate years.) Lentz, Meissner.
- 232 SEMINAR IN STRUCTURE AND FUNCTION OF CHROMATIN AND GENES (2). Prerequisite, Biochemistry 105 or equivalent. Covers the structural organization of chromatin and eukaryotic genes as well as regulation of gene transcription. *Fall*. (1988 and alternate years.) Chae; staff.
- 233 SEMINAR IN PROTEIN STRUCTURE AND FUNCTION (2). Students will read and discuss 4-6 papers per week related to protein regulation, evolution, size, isozymes, etc. *Spring*. (1990 and alternate years.) Traut.
- 234 SEMINAR IN PROTEIN BIOSYNTHESIS (2). Prerequisite, Biochemistry 105 or equivalent. *Spring*. (1989 and alternate years.) Bell, Chaney, Fried.
- 235 SEMINAR IN CHEMICAL NEUROBIOLOGY (Neurobiology 235) (2). Prerequisites, two semesters of biochemistry. *Fall*. (1989 and alternate years.) Wilson, Morell.
- 236 SEMINAR ON PROTEIN INTERACTIONS (2). Prerequisite, two semesters of biochemistry. *Fall*. (1989 and alternate years.) Hermans.
- 239 SEMINAR IN BIOCHEMICAL RESPONSE AND PROTECTIVE ACTIONS TO TOXIC SUBSTANCES (2). Prerequisite, two semesters of biochemistry. Discussions of current biomedical literature of the biochemical responses and protective actions to toxic substances by mammalian systems. *Fall*. (1988 and alternate years.) Holbrook.
- 240 SEMINAR ON METABOLISM OF GLIAL CELLS AND OF MYELIN (2). Prerequisite, any graduate course or medical school course in biochemistry. *Spring*. (1990 and alternate years.) Morell.
- 241 SEMINAR ON SPECIAL TOPICS IN BIOCHEMICAL RESEARCH (2). Prerequisites, two semesters of biochemistry. Covers areas of biochemical research that are currently active and productive. Specific subjects will be announced. May be repeated for credit. (Either semester as announced.) Staff.
- 242 SEMINAR IN CLINICAL BIOCHEMISTRY (2). Prerequisite, permission of instructor. Current topics in Clinical Biochemistry including analytical methodologies and clinical interpretation. *Summer*. Silverman.
- 244 SEMINAR IN USE OF MAXIMUM ENTROPY METHODS (2). Prerequisite, permission of instructor. Image formation is treated from a quite general point of view, drawing from Fourier transform methods used in X-ray crystallography. Conceptual unities will be stressed. *Two hour seminar a week. Spring*. (1990 and alternate years.) Carter.
- 245 SEMINAR ON ONCOGENES (2). Prerequisite, two semesters of biochemistry. Role of oncogenes in cell transformation and development. *Spring* (1989 and alternate years.) Maness, Swanstrom.
- 246 SEMINAR IN BIOCHEMICAL MECHANISMS OF ANTICANCER AGENTS (2). Prerequisite, one semester of biochemistry. *Spring*. (1990 and alternate years.) Chaney.
- 247 SEMINAR IN GLYCOPROTEIN BIOSYNTHESIS AND DEGRADATION (2). Prerequisite, two semesters of biochemistry. *Spring*. (1990 and alternate years.) Cheng.
- 249 SEMINAR ON ENZYME REGULATION (2). Prerequisite, two semesters of biochemistry. *Two hour seminar a week. Spring*. (1990 and alternate years.) Jones.
- 250 SEMINAR IN BIOCHEMISTRY OF THE CYTOSKELETON (2). Prerequisite, two semesters of biochemistry. *Two hour seminar a week. Spring*. (1990 and alternate years.) Caplow.
- 251 SEMINAR IN DNA-PROTEIN INTERACTIONS (2). Prerequisite, two semesters of biochemistry. Review of current literature on kinetic and structural aspects of binding to DNA of proteins involved in replication, regulation, recombination and repair. *Spring*. (1989 and alternate years.) Sancar.
- 252 SEMINAR ON CURRENT TOPICS IN CLINICAL NUTRITION (2). Prerequisite, one semester of biochemistry. Topics of current interest with respect to the role of

- nutrition in the prevention and/or treatment of disease with a strong emphasis towards understanding the underlying biochemical principles. *Spring*. (1989 and alternate years.) Chaney, Frazier.
- 253 SEMINAR ON ARCHITECTURE AND MECHANISM OF ACTION OF ENZYME ACTIVE SITES (2). Prerequisite, two semesters of biochemistry. Techniques for investigating the 3-dimensional configuration of binding and catalytic centers experimentally; strategies involved in transition state stabilization by enzymes of different classes; design of mechanism-based metabolic inhibitors. *Spring*. (1989 and alternate years.) Wolfenden.
- 254 SEMINAR IN INTERACTION OF ORGANIC AND BIOMOLECULES WITH SOLVENT WATER (2). Prerequisite, two semesters of biochemistry. Strengths and directional preferences of solute-solvent interactions; their influence on structures of macromolecules and their assemblies, on metabolic free energies, on enzyme catalysis, and on membrane transport processes. *Spring*. (1990 and alternate years.) Wolfenden.
- 255 SEMINAR ON HUMAN NUTRITIONAL REQUIREMENTS (2). Prerequisite, one semester of biochemistry. Current research into the biochemical role of nutrients in the body and determination of nutritional requirements. *Spring*. (1990 and alternate years.) Chaney, Frazier.
- 256 SEMINARS ON CURRENT TOPICS IN MOLECULAR DEVELOPMENT (Genetics 256) (2). Prerequisite, Biochemistry 105 or equivalent. Current papers in eukaryotic molecular development will be discussed in detail to explore the relations of gene structure, function and regulation during development. *Spring*. (1989 and alternate years.) Kalfayan.
- 275 GENETICS SYSTEMS (Microbiology 275, Genetics 275, Biology 275, Pathology 275, Zoology 275) (3). An advanced course in genetics emphasizing the genetics and molecular biology of viruses, bacteria, fungi, insects and mammals based upon the personal research of the staff. Required of all candidates for the degree in Genetics. *Fall*. (1988 and alternate years.) Staff.
- 301 RESEARCH IN BIOCHEMISTRY (3 or more). Prerequisite, permission of the department. *Six or more hours a week, throughout both semesters, when requested*. Staff.
- 302 RESEARCH IN NEUROBIOLOGY (Neurobiology 310, Pathology 310, Pharmacology 310, Physiology 310, Biology 310, Psychology 310) (3-12). Prerequisite, permission of the Graduate Student Advisor, Curriculum in Neurobiology. Research in various aspects of neurobiology. *Six to twenty-four hours a week, fall and spring*. Faculty of the Neurobiology Program.
- 393 MASTER'S THESIS (3 or more). Staff.
- 394 DOCTORAL DISSERTATION (3 or more). Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF BIOLOGY¹

LAWRENCE I. GILBERT, *Chairman*

Professors

EDWARD G. BARRY	(40)	Genetics
WILLIAM C. DICKISON	(43)	Plant Morphology and Anatomy
ARISTOTLE J. DOMNAS	(44)	Plant Biochemistry
J. ALAN FEDUCCIA	(3)	Avian Evolution and Paleontology
LAWRENCE I. GILBERT	(37)	Developmental Insect Physiology and Neuroendocrinology
NELSON G. HAIRSTON	(30)	Population and Community Ecology
ALBERT K. HARRIS	(5)	Morphogenesis and Embryology
JOHN H. HARRISON		Protein and Enzyme Chemistry
MAX H. HOMMERSAND	(47)	Phycology and Physiology
CHARLES E. JENNER	(7)	Invertebrate Zoology and Ecology
H. EUGENE LEHMAN	(8)	Embryology and Larval Development
JOHN C. LUCCHESI	(10)	Molecular Genetics of <i>Drosophila</i>
HELMUT C. MUELLER	(13)	Behavioral Ecology
JOHN D. O'CONNOR	(73)	Mode of Action of Steroid Hormones, Hormonal Regulations of Arthropod Growth, Hormonal Regulation of Gene Expression
CHARLES H. PETERSON		Marine Ecology
EDWARD D. SALMON	(34)	Cell Biology
TOM K. SCOTT	(60)	Plant Physiology
DARREL W. STAFFORD	(17)	Developmental Biochemistry
ALAN E. STIVEN	(18)	Population and Community Ecology
R. HAVEN WILEY	(20)	Animal Behavior
JUDSON VAN WYK	(75)	Hormones, and Growth Factors

Associate Professors

KERRY S. BLOOM	(39)	Molecular Genetics
W. E. BOLLENBACHER	(38)	Invertebrate Neuroendocrinology
PATRICIA G. GENSEL	(45)	Paleobotany and Morphology
JOHN K. KOEPPE	(32)	Invertebrate Endocrinology
ANN G. MATTHYSSE	(52)	Molecular Biology and Plant Pathology
GUSTAVO P. MARONI	(33)	Molecular Genetics of <i>Drosophila</i>
DONALD W. MISCH	(12)	Cell Biology and Electron Microscopy
CLIFFORD R. PARKS	(56)	Plant Systematics and Genetics
ROBERT K. PEET	(57)	Plant Ecology
PATRICIA J. PUKKILA	(35)	Molecular Cytogenetics
SETH R. REICE	(14)	Community Ecology, Stream Ecology
PETER S. WHITE	(72)	Plant Ecology

¹With recommendation of the Department and the approval of the Administrative Board of the Graduate School, special courses and the direction of graduate studies are offered by staff of the Institute of Marine Sciences, Morehead City, N.C.

Assistant Professors

PATRICIA A. BEDINGER	(74)	Plant Molecular Biology
ALAN M. JONES	(71)	Plant Cell Biology
BRIAN K. KAY	(65)	Molecular Embryology
WILLIAM M. KIER	(67)	Functional Morphology of Invertebrates
STEVEN W. MATSON	(63)	Molecular Biology and Biochemistry
LILLIE L. SEARLES	(68)	Molecular Biology
VAL H. SMITH	(66)	Ecology of Phytoplankton

Associated Faculty

C. RITCHIE BELL	(41)	Plant Systematics and Evolution
MARK E. HAY	(70)	Marine Community Ecology
BURKE H. JUDD	(36)	Cytogenetics and Regulation
PAUL C. MANGELSDORF	(50)	Plant Genetics
JIMMY R. MASSEY	(51)	Plant Systematics

Professors Emeriti

DOUGLAS G. HUMM	(6)	Cell Physiology
CLAIBORNE S. JONES		Physiology
WILLIAM J. KOCH	(48)	Mycology
ELIZABETH A. MCMAHAN	(11)	Termite Biology and Behavior
LINDSEY S. OLIVE	(55)	Mycology
ALBERT E. RADFORD	(58)	Plant Systematics
MAURICE WHITTINGHILL		Genetics

The Department of Biology offers programs of study leading to degrees of Master of Arts, Master of Science, and Doctor of Philosophy in Biology, and Master of Arts, Master of Science, and Doctor of Philosophy in Botany. The curricula are designed primarily for students who plan to continue for the doctoral degree. A master's degree may be taken as part of the program leading to the Ph.D.; however, a master's degree is not an essential part of doctoral programs. Special departmental rules and guidelines for advanced degrees are available upon request.

Graduate Programs and Facilities

The Department of Biology is housed in two modern buildings and is equipped with modern instrumentation for research and research training in the biological disciplines represented by faculty areas for research. These include:

Genetics and Molecular Biology, including (1) Biochemistry and Molecular Biology (with emphasis on development, protein synthesis, enzyme mechanisms and control, and aspects of plant systems); (2) Developmental and Molecular Genetics.

Cell Biology, Development and Physiology, including (1) Cytology and Cell Biology (with emphasis on mitotic mechanisms, histochemistry and ultrastructure); (2) Developmental Biology (with emphasis on vertebrate

and invertebrate development, larval stages, metamorphosis, experimental morphogenesis, morphogenetic movements, tissue culture, hormones and plant development); (3) Physiology (with emphasis on comparative endocrinology of higher invertebrates and developmental and membrane functions in plant systems).

Systematic and Evolutionary Biology, including neontological and paleontological studies on invertebrates, vertebrates, algae, and angiosperms anatomy, morphology, paleontology, and systematics.

Ecology and Behavior, including (1) Ecology and Population Biology (life histories, population, community and ecosystems phenomena in terrestrial, freshwater and marine ecosystems); (2) Behavior (with emphasis on social and mating systems of vertebrates, communication, ecology and ontogeny of behavior, and predator-prey interactions); (3) Marine Biology (with emphasis on marine ecology, oceanography, and the biology of interstitial fauna); and (4) Vertebrate and Invertebrate Zoology (with emphasis on development, ecology, systematics, evolution, and paleontology).

Botany and Plant Sciences, including (1) Phycology; (2) Physiology; (3) Plant Cell Biology and Ultrastructure; (4) Molecular Biology of plant systems; (5) Genetics; (6) Systematics; (7) Anatomy and Morphology; (8) Plant Ecology; (9) Plant Biochemistry; (10) Paleobotany; and (11) Plant Pathology.

Students in Marine Biology, after completing required course work in the department, have access to the research facilities of the Institute of Marine Sciences, Morehead City, N.C. Additional opportunities for marine studies are provided by the facilities of the Wrightsville Biomedical Marine Laboratory. By cooperative arrangements, deep water research can be carried out through the use of the research vessel of the Duke Marine Laboratory.

Interdepartmental degree programs in Genetics, Ecology, Neurobiology, and Marine Science offer unusual opportunities for special training through participation of staff from the Department of Biology and many other departments in Arts and Sciences and Health Affairs.

The two departmental libraries, Zoology and John N. Couch (Botany), have together 70,000 volumes and receive over 1200 American and foreign serials related to fields of research in the department. They have large working collections of treatises, monographs, symposium volumes, reprints, and standard and classical works of research and historical importance. The nearby medical library contains additional biological references.

A major research asset is the central location of the University in the state which makes the varied flora and fauna of the Appalachian Mountains, Piedmont Plateau, Coastal Plain and Atlantic Coast all accessible for research and instruction. The department operates a small field station a few miles from the Chapel Hill campus in the Mason Farm Biological Reserve, which includes several hundred acres of upland and floodplain habitats.

The Coker Arboretum and the North Carolina Botanical Garden are of value to students in the study of special problems. The Herbarium, containing more than 600,000 specimens, is especially rich in collections of the vascular plants and fungi of the Carolinas and the Southeastern United States.

The Highlands Biological Station, administered for the University system by Western Carolina University, is located in the biologically rich mountains at Highlands, North Carolina. Graduate courses offered cover various parts of the mountain biota. Credit may be obtained through UNC-CH or Western Carolina University. A limited amount of research support is available on a competitive basis (see the annual announcement of the Highlands Biological Station).

The University is a member of the Organization for Tropical Studies. Financial support is available for students attending the O.T.S. courses in Tropical Ecology in Costa Rica.

Fellowships and Assistantships

Application for admission and graduate appointments, accompanied by credentials and Graduate Record Examination scores, including the Advanced Biology score, should be submitted for receipt no later than January 15.

All outstanding prospective graduate students who apply for admission will automatically be considered for University Fellowships.

More than 45 teaching assistantships are open to graduate students. Duties of assistants include preparation for, and supervision of laboratory and recitation sections of undergraduate courses. Duties usually require from 12 to 15 hours per week including 6 contact hours in classes and 6 to 9 hours of preparation or other services associated with instruction.

Research assistantships are available with the salaries and duties variable as determined by the research needs of faculty supervising the work. Applications for these appointments must be made personally to faculty members directing grant supported research.

The following awards are specifically for graduate students in the Biology Department.

The William Chambers Coker Fellowship is awarded annually to a student in the last year of work toward the degree of Doctor of Philosophy in Botany. This is a nonservice award which carries with it an additional supplement for tuition and fees.

The Mrs. W. C. Coker Fellowship is awarded annually to an outstanding first-year graduate student in Botany. This is also a nonservice award which carries with it an additional supplement for tuition and fees.

The H. V. Wilson Marine Scholarship is awarded annually for summer work at a marine laboratory. It is a nonservice award.

Courses for Graduates and Advanced Undergraduates

The stated prerequisites should be interpreted to read "or equivalent" and may be waived by the course instructor for students who are adequately prepared.

- 103 INTRODUCTION TO PLANT TAXONOMY (4). Prerequisite, Biology 11, 11L. Introduction to the taxonomy of vascular plants. Principles of classification, identification, nomenclature, and description. Laboratory and field emphasis on phytography, families, description, identification, and classification of vascular plant species. *Three lecture and three laboratory hours a week. Fall.* Massey, staff.
- 104 VERTEBRATE EMBRYOLOGY (3). Prerequisites, Biology 45 or 52. Principles of development with special emphasis on gametogenesis, fertilization, cleavage, germ layer formation, organogenesis, and mechanisms with experimental analysis of developmental processes. *Three lecture hours a week. Fall or spring.* Harris, Lehman.
- 104L VERTEBRATE EMBRYOLOGY LABORATORY (2). Prerequisite or corequisite, Biology 104. Descriptive and some experimental aspects of vertebrate development. *Four to six laboratory hours a week. Fall or spring.* Harris, Lehman.
- 105 INTRODUCTION TO THE INVERTEBRATES (4). Prerequisites, Biology 11, 11L and one additional course in Biology. The biology of animals in the major invertebrate phyla including structure, function, classification and ecology. *Three lecture and three laboratory hours a week. Fall.* Jenner.
- 106 ADVANCED INVERTEBRATE ZOOLOGY (4). Prerequisites, Biology 11, 11L, and 105. The biology of animals in the minor invertebrate phyla with emphasis on interrelationships of all phyla. *Three lecture and three laboratory hours a week. Spring.* Jenner.
- 107 BIOCHEMISTRY FOR STUDENTS OF BIOLOGY AND CHEMISTRY (Biochemistry 100) (3). Prerequisites, Biology 11, 11L, or one course in biological science, and Chemistry 61. The mechanisms and regulation of reactions in living organisms with emphasis on general principles, protein structure, enzyme function, intermediary metabolism, metabolic controls, genetic expression, active transport and molecular disease. *Three lecture hours a week. Fall and spring.* Staff (Biochemistry).
- 107L BIOCHEMISTRY LABORATORY (Biochemistry 100L) (2). Prerequisite, or corequisite, Biology 107. Emphasizes modern research techniques in biochemistry, including subcellular fractionation, isolation, separation, and quantitation of biological macromolecules, enzymology, metabolic studies using radioactive precursors, clinical chemistry assays, and molecular biological techniques. *Four laboratory hours a week. Fall.* Staff (Biochemistry).
- 109 INTRODUCTION TO HYDROBIOLOGY (4). Prerequisite, Biology 54 or 105. A study of the biology of aquatic organisms with emphasis on freshwater communities. *Two lecture and six laboratory and field hours a week. Spring.* (Alternate years.) Jenner.
- 110 GENERAL PARASITOLOGY (4). Prerequisites, Biology 11, 11L and 105 or one additional course in Zoology. A comparative study of structure, life cycles and classification of parasites of invertebrates and vertebrates with laboratory methods for the collection, culture, and microscope preparation of parasitological materials. *Two lecture and four laboratory hours a week. Spring.* (Alternate years.) Staff (Parasitology, School of Public Health).
- 111 ALGAE (Marine Sciences 111) (4). Prerequisites, Biology 11, 11L. An introduction to the identification, biology, ecology, and evolution of algae. *Two lecture and four laboratory hours a week. Spring.* Hommersand.
- 112 PLANT PHYSIOLOGY (4). Prerequisites, Biology 11-11L. A general introductory study of the life processes of plants including photosynthesis, energy relations, biosynthesis and biochemical regulation, movement of materials, growth and differentiation. *Three lecture and three laboratory hours a week. Spring.* Scott, Matthyse.

- 114 AVIAN BIOLOGY (3). Prerequisites, Biology 11, 11L and one additional course in Biology. A study of avian evolution, zoogeography, migration patterns behavior, food and feeding habits, and a survey of the families of birds of the world with emphasis on North Carolina avifauna. *Three lecture hours a week. Fall. (Alternate years, or on demand.)* Feduccia.
- 114L AVIAN BIOLOGY LABORATORY (1). Prerequisite or corequisite, Biology 114. Avian anatomy, field biology, and a study of the birds of North Carolina. *Three laboratory hours a week. Fall. (Alternate years, or on demand.)* Feduccia.
- 115 FUNGI (3). Prerequisites, Biology 11, 11L. Fungi are introduced in three areas: diversity and classification, ecology (including plant pathology, medical mycology, uses of fungi by people), and control of development (physiology, biochemistry, genetics, and cell biology). *Fall.* McGinnis.
- 115L FUNGI LABORATORY (1). Prerequisite, Biology 11, 11L. Laboratory for Biology 115. *Three laboratory hours a week. Fall.* Staff.
- 116 POPULATION BIOLOGY (3). Prerequisite, Biology 54. Introduction to the ecological and genetic structure of population, the evolution of populations, and interactions with other species. *Three lecture hours a week. Fall or spring.* Staff.
- 117 PTERIDOPHYTES (5). Prerequisite, Biology 51. The morphology, systematics, and ecology of ferns or fern allies. *Two lecture and six laboratory hours a week. Summer.* Staff or Visiting Staff.
- 118 COMPARATIVE ANIMAL HISTOLOGY (4). Prerequisites, Biology 52 and 1 Biology with laboratory. Study of cells, tissues, and organ systems from selected examples of vertebrates and invertebrates to reveal unity and diversity of structure and function. Comparative structure and physiology will be emphasized. *Two lecture and six laboratory hours a week. Spring.* Misc.
- 119 BRYOPHYTES (5). Prerequisite, Biology 51. The morphology, systematics and ecology of mosses, liverworts and hornworts. *Two lecture and six laboratory hours a week. Spring. (Alternate years.)* Staff.
- 120 COMPARATIVE PHYSIOLOGY (3). Prerequisites, Biology 52. One course in physiology is recommended. An examination of the physiology of animals using a comparative approach. Both invertebrate and vertebrate physiology will be included with an emphasis on "whole-animal" physiology. *Spring.* Kier.
- 120L COMPARATIVE PHYSIOLOGY LABORATORY (1 to 3). Corequisite, Biology 120, and permission of the instructor. Instrumentation and techniques in comparative physiology. *Hours and credits by prior agreement (with two to three laboratory hours a week per unit credit).* Fall. Staff.
- 121 INTRODUCTION TO NEUROPHYSIOLOGY (3). Prerequisite, Biology 52, or permission of the instructor. The neurophysiological basis of behavior with emphasis on structure and function of membranes, neurons, synapses, and complex functional units of nervous system. *Three lecture hours a week. (On occasion).* Staff.
- 122 HUMAN GENETICS (3). Prerequisite, Biology 53. Applications of traditional and contemporary methods of genetic analysis to matters of human concern; pedigree analysis, population genetics, tissue transplants, immunogenetics, somatic cell genetics and recombinant DNA in medical applications. *Three lecture hours a week. Spring. (Alternate years.)* Maroni.
- 124 PLANT BIOCHEMISTRY (3). Prerequisite, Chemistry 61. Study of carbohydrates, lipids, N fixation, NO₂, and NO₃ reduction, pigments, photosynthesis and respiration in plants. *Spring (on Demand.)* Domnas.
- 125 PLANT PHYSIOLOGY AND BIOCHEMISTRY (Biochemistry 125) (3). Prerequisites, Biology 11 and 41 or 52. An advanced course covering growth of plants including photosynthesis, nitrogen fixation, and biosynthesis of cellular components; developmental processes; hormonal regulation; and responses to stress. *Spring.* Staff.
- 126 OCEANOGRAPHY (Marine Sciences 101; Environmental Science 127) (3). Prerequisites, Biology 11, Chemistry 21 and Physics 25. An interdisciplinary study of the sea

- and the interrelationships of marine processes. *Three lecture hours a week. Fall.* Neumann, *Spring*, Frankenberg. (Marine Sciences).
- 128 TOPICS IN MEMBRANE BIOLOGY (3). Prerequisites, Biology 52 and Chemistry 62, or permission of the instructor. The structure and function of various biological membranes. *Three lecture and discussion hours a week. Fall. (Alternate years.)* Misch.
- 129 LABORATORY IN CELL BIOLOGY (4). Prerequisites, Biology 11 and 52. Application of modern techniques to the study of cell biology, use of spectrophotometers, electrophoresis and other laboratory instruments as applied to real systems. *One lecture and three laboratory hours a week. Fall.* Domnas.
- 130 INTRODUCTION TO BIOLOGICAL CHEMISTRY (Chemistry 130) (3). Prerequisites, Chemistry 62, 62L, Biology 11. The study of cellular processes including catalysis, metabolism, bioenergetics, and biochemical genetics. The structure and function of biological macromolecules involved in these processes will be emphasized. *Spring.* Staff (Chemistry).
- 131 COMPARATIVE VERTEBRATE ENDOCRINOLOGY (3). Prerequisite Biology 52 or 62. Principles of systems endocrinology with consideration of the developmental anatomy and physiology of glands of internal secretion with special emphasis on hormone chemistry and gland relationships. *Three lecture hours a week. Spring.* Bollenbacher.
- 132 EVOLUTIONARY MECHANISMS (3). Prerequisite, Biology 11, 11L. A broad survey of the biological interactions and mechanisms of organic evolution with special emphasis on the evolutionary effect of environmental changes, and genetic variations contributing to evolution. *Spring.* Bell.
- 133 FLORISTICS (4). Prerequisite, Biology 103 or equivalent. Primarily field and laboratory identification of special groups; aquatic and marsh plants, trees and shrubs, grasses and sedges, composites, ferns and fern allies, seasonal flora. *One lecture and six laboratory hours a week. Fall.* Staff.
- 134 INVERTEBRATE DEVELOPMENT AND EVOLUTION (Marine Sciences 134) (3). Prerequisites, Biology 11, 11L. A survey of diversity in animal development and life cycles with emphasis on free-living marine invertebrates. *Three lecture hours a week. Fall. (Alternate years.)* Lehman.
- 134L INVERTEBRATE DEVELOPMENT LABORATORY (Marine Sciences 134L) (1 or 2). Prerequisite or corequisite, Biology 134. Laboratory experience in obtaining, culturing, and identifying embryonic, larval and planktonic materials, with emphasis on free-living marine forms. *Three scheduled laboratory hours a week; or, with special permission, three or more additional hours a week on an independent project for one additional unit of credit.* Lehman.
- 135 TAXONOMY OF SPECIAL GROUPS OF NONVASCULAR PLANTS (2-6). Prerequisite, Biology 51. Field and laboratory identification and classification of special groups of nonvascular plants; 135a Aquatic Phycmycetes; 135b Marine fungi; 135c Fleshy fungi; 135d Mycetozoans; 135e Marine algae; 135f Freshwater algae. *Nine laboratory hours a week. Fall and summer.* Staff.
- 137 FIELD TRAINING IN NATURAL DIVERSITY (6). Prerequisites, Botany 43, 54, and Geology 11. An interdisciplinary course in field analysis of habitat, inventory of ecological diversity, and determination of site-species relationships. *Three lecture and six field and laboratory hours a week. Fall. (Alternate years.)* Staff.
- 139 HORMONES AND EVOLUTION (Biochemistry 139) (2). Prerequisite, Biochemistry 100 or Biology 52 or 53 or equivalent. An introduction to the chemistry of hormones and the biochemical mechanisms underlying their biological actions in an evolutionary perspective with emphasis on unifying concepts. *Spring.* Pearlman.
- 140 BIOLOGICAL OCEANOGRAPHY (Marine Sciences 104; Environmental Sciences 136) (4). Prerequisites, Biology 54 or 105. Physical, chemical, and biological factors characterizing estuarine and marine environments emphasizing factors controlling animal and plant populations including methods of analysis, sampling and identifica-

- tion. *Five lecture and two laboratory hours a week. Summer.* Staff. (Marine Sciences).
- 141S SPECIAL PROBLEMS IN MARINE BIOLOGY (Marine Sciences 141S) (3 to 6). Prerequisite, Biology 140 and/or permission of instructor. Comprehensive survey of problems and laboratory methods in any of the following areas: Mollusca (Chestnut), Vertebrate (Fahy, Schwartz), Fungi (Kohlmeyer), Ecology (Peterson). *Hours and credits by prior agreement (with five or more laboratory and conference hours a week per unit credit), first or second summer terms (offered on demand at Morehead City, N.C.).* Staff of Institute of Marine Sciences.
- 142 PLANT ECOLOGY (4). Prerequisite, Biology 54. Terrestrial, vascular plant ecology including environmental physiology, population dynamics, and community structure. Laboratory stresses collection and interpretation of field data. *Three lecture and two laboratory hours a week. Fall. (Alternate years.)* Peet.
- 143 ECOLOGICAL PLANT GEOGRAPHY (Geography 143) (3). Prerequisite, Biology 11 or Geography 38. Major vegetation types of the world including their distribution, structure, and dynamics. The principle causes for the distribution of plant species and communities, such as climate, soils, and history will be discussed. *(Alternate years.)* Peet.
- 144 DEVELOPMENTAL BIOLOGY (3). Prerequisites, Biology 52 and Chemistry 61. An experimental approach to an understanding of the action of chemical mediators in controlling cell growth and cell differentiation. *Three lecture hours a week. Spring. (Alternate years.)* Gilbert, Harris.
- 145 HYPOTHESIS TESTING IN ECOLOGY (3). Prerequisites, Biology 54 and permission of the instructor. A discussion of how ecological theories are constructed and how they should be constructed and tested. The nature of hypotheses, the promulgation of null hypotheses, and the use of specific experiments will be covered. *Three lecture hours a week. Spring. (Alternate years.)* Hairston.
- 146 MARINE ECOLOGY (Marine Sciences 146) (3). Prerequisites, Biology 54 or 105. An introductory study of oceanography as it pertains to the ecology of marine organisms. *Three lecture hours a week. Spring. (1988 and alternate years.)* Peterson.
- 147 FIELD ECOLOGY (4). Prerequisites, Biology 54 and one additional course in Biology. Applications of ecological theory to terrestrial and/or freshwater systems. Lectures will acquaint students with these systems and emphasize quantitative properties of interacting populations and communities within them. The required laboratory will teach techniques and methodology applicable for analysis of these systems. Individual and group projects will emphasize experimental testing of ecological theory in the field. *Two lecture and two lab hours a week. Fall or spring on alternate years.* Reice.
- 148 FRESHWATER ECOLOGY (3). Prerequisite, Biology 54. Physical, chemical, and biological factors influencing the structure and function of biological communities in lakes and reservoirs. *Three lecture hours per week. Fall. (Alternate years.)* Smith.
- 148L FRESHWATER ECOLOGY LABORATORY (1). Prerequisite or Corequisite, Biology 148, and permission of the instructor. Laboratory and field methods in freshwater ecology, including water chemistry, photosynthesis and respiration measurements, and sampling and identification of freshwater biota. *Three laboratory hours a week. Fall. (Alternate years.)* Smith.
- 149 ECOSYSTEM STRUCTURE AND FUNCTION (3). Prerequisite, Biology 54 or a course in limnology or geochemistry. Pattern and process in natural ecosystems, with stress on comparative approaches to ecosystems analysis. Topics include primary and secondary productivity, nutrient cycling, and the biogeochemistry of aquatic and terrestrial ecosystems. *Three lecture hours a week. Fall.* Smith.
- 149L ECOSYSTEM STRUCTURE AND FUNCTION LABORATORY (1). Corequisite, Biology 149 and permission of the instructor. Use of data to generate empirical models of ecosystem patterns or processes. Field trips to terrestrial and/or aquatic systems. Individual research projects. *Three laboratory hours a week. Fall.* Smith.

- 150 ANIMAL SOCIETIES AND COMMUNICATION (3). Prerequisite or corequisite, Biology 73. Comparative review of animal societies; diversity of social structure, social dynamics, communication, ecology, and evolution of social organization. *Three lecture hours a week. Spring. (Alternate years.) Wiley.*
- 150L ANIMAL SOCIETIES AND COMMUNICATION LABORATORY (3). Prerequisite or corequisite, Biology 150 and permission of the instructor. Techniques for analysis of animal social behavior and communication. *Six laboratory hours a week. Spring. (Alternate years.) Wiley.*
- 151 BEHAVIORAL ECOLOGY (3). Prerequisites, Biology 54 or 73. Behavior as an adaptation to the environment. Evolution of behavioral strategies for survival and reproduction. Optimality, competition and "games that animals play." *Three lecture hours a week. Fall. (Alternate years.) Mueller.*
- 152 PLANT ANATOMY (5). Prerequisite, Biology 51. Introduction to the development and comparative anatomy of vascular plants. Practice in methods of anatomical microtechnique. *Three lecture and four laboratory hours a week. Fall. Dickison.*
- 153 COMPARATIVE MORPHOLOGY OF VASCULAR PLANTS (5). Prerequisite, Biology 51. Comparative morphology and evolutionary relationships of the Tracheophyta. Both living and fossil forms will be considered. *Three lecture and four laboratory hours a week. Spring. Dickison, Gensel.*
- 154 COMPARATIVE INVERTEBRATE ENDOCRINOLOGY (3). Prerequisites, Biology 52 and Chemistry 61, and permission of the instructor. An experimental analysis of the means by which invertebrates regulate growth, development and reproduction, with emphasis on the chemistry and mode of action of hormones in arthropods. *Three lecture hours per week. Spring. (Alternate years.) Gilbert.*
- 155 COMPARATIVE BIOMECHANICS (3). Prerequisites, Biology 52, Physics 24 and 25 recommended. Principles of fluid and solid mechanics applied to a variety of biological systems. Both invertebrates and vertebrates will be included. *Fall. Kier.*
- 156 MARINE INVERTEBRATE FIELD ZOOLOGY (4). Prerequisites, Biology 105 or 134, and permission of the instructor. Biological aspects of selected groups of marine invertebrates (especially of the North Carolina coast) with assistance from visiting specialists. Content will change with each offering and the course may be repeated with credit. *Three lecture and three laboratory hours a week, with two weekend field trips to the North Carolina coast, one three-day cruise on the research vessel, Cape Hatteras, and one field trip to the Florida Keys during spring recess. Spring. (Alternate years.) Jenner.*
- 157 PROBLEMS IN VERTEBRATE EVOLUTION (3). Prerequisite, Biology 63 or permission of instructor. A study of the major transitions in vertebrate evolution and associated problems in evolutionary biology, structural change, paleoecology, biogeography and earth history, physiology and behavior. *Three lecture hours a week. Fall. Feduccia.*
- 158 EVOLUTIONARY PATTERNS (3). Prerequisites, Biology 54 and permission of the instructor. Discussion of current problems and recent advances in our understanding of evolution, including the relationship between ecological processes and the predictability of evolution. *Three lecture hours a week. Spring (Alternate years.) Hairston.*
- 159 MARINE MEIOBENTHOLOGY (4). Prerequisite, Biology 105, and permission of the instructor. A detailed survey of meiobenthic invertebrates; environments considered include sandy beaches, mudflats, *Spartina* marshes and mangrove swamps, with field trips to the North Carolina coast, and (on occasion) to Georgia and/or Florida Keys. *Two lecture and three laboratory hours a week. Fall (On demand.) Staff.*
- 160 ADVANCED GENETICS (3). Prerequisite, Biology 53. The genetic control and molecular basis for gene expression during development. *Three lecture hours a week. Spring (1989 and alternate years). Bloom, Lucchesi, Pukkila.*
- 163 LABORATORY EXPERIMENTS IN GENETICS (4). Prerequisite, Biology 53. Experiments using a range of organisms from bacteria to *Drosophila*, higher plants and man

- to sample organismal and molecular genetics. *One lecture hour and four laboratory hours a week. Spring.* Parks and Staff.
- 164 MOLECULAR BIOLOGY (3). Prerequisite or corequisite, Chemistry 61. The nature, production, and replication of biological compounds and their relation to structure and function in development. *Three lecture hours a week. (On occasion.)* Matson, Stafford.
- 165 PLANT MOLECULAR BIOLOGY (3). Prerequisite, Chemistry 61. Molecular aspects of plant growth and development. Emphasis on embryogenesis, light regulated genes, developmentally regulated multi-gene families, transposable elements, organellar genomes, nitrogen fixation, genetic engineering, viruses, and viroids. *No prior knowledge of plants required. Three lecture hours a week. Fall.* Staff.
- 166 UNSOLVED PROBLEMS IN CELLULAR BIOLOGY (3). Prerequisite, Biology 52 or 53. A survey of areas of current interest in cytology, embryology, and genetics with concentration on problems which remain unsolved, but which appear to be near solution. *Three lecture and discussion hours a week. Fall. (Alternate years.)* Harris.
- 167 ADVANCED CELL BIOLOGY (3). Prerequisite Biology 52, 53, and Chemistry 130. An advanced course in cell biology with emphasis on the biochemistry and molecular biology of cell structure and function. *Three lecture hours a week. Spring.* Kay, Matson.
- 168 BIOPHYSICAL CYTOLOGY (3). Prerequisite, Biology 52. Emphasis on theory and application of analytical and quantitative methods in light and electromicroscopy; molecular and structural probes of dynamic changes in organization in living cells. *Three lecture and demonstration hours a week. Spring. Alternate years.* Salmon.
- 168L BIOPHYSICAL CYTOLOGY LABORATORY (3). Prerequisite or corequisite, Biology 168 and permission of the instructor. Laboratory experience in quantitative polarization, interference and fluorescence microscopy; photometry; video recording techniques and methods in micromanipulation and microinjection. Each student will develop an individual research project. *Six laboratory hours a week. Fall or spring.* Salmon.
- 169 METHODS IN CELL BIOLOGY (3). Prerequisites, Biology 52 and Chemistry 62, and permission of the instructor. Survey of the theory and biochemical analysis of biologically important molecules, including chromatographic, electrophoretic and radioimmunological methods and radio-tracer methodology. *Three hours a week. Fall.* Bollenbacher.
- 170S ELECTRON MICROSCOPY (4). Permission of the instructor. Introduction to ultrastructure and optical bases of microscopy with basic methods for the preparation of biological materials for ultrastructural studies. *Four and one-half lecture fifteen laboratory hours a week. Summer. (On occasion.)* Misch.
- 172 CYTOGENETICS (Genetics 172) (3). Prerequisite, Biology 53. Critical study of research papers concerned with the behavior and organization of chromosomes. *Spring. (1986 and alternate years.)* Barry.
- 173 PLANT GENETICS AND SPECIATION (3). Prerequisite Biology 53. Mendelian and molecular genetics of vascular plants, with emphasis on genetic phenomena characteristic of vascular plants and the role of heredity in biosystematics. *Fall. (Alternate years.)* Parks and Matthesse.
- 174 ADVANCED PHYSIOLOGY (3). Prerequisites, Biology 62 or 120. Lectures in selected areas of Physiology. Exact topics will vary from year to year. May be repeated with credit. *Three lecture hours a week. Fall or spring. (Alternate years.)* Koeppel.
- 175 SPECIAL TOPICS (3). Prerequisite, permission of the instructor. Lectures by visiting faculty, usually on the exchange program with the University of Vienna. Topics will change with each offering; may be repeated for credit. *Three lecture and discussion hours a week. Fall or spring (On occasion).* Visiting Staff.
- 176 CELL PHYSIOLOGY (3). Prerequisites, Biology 11, 52, and Chemistry 61. Bioenergetics, enzymes, membranes, transport and diffusion, mitochondria, chloroplasts, macromolecules, bioelectricity, endocytobiology, photoreceptors, molecular aspects of vision, taste, and smell. *Three lecture hours a week. Spring.* Domnas.

- 176L CELL PHYSIOLOGY LABORATORY (1). Pre- or corequisite, Biology 176. The laboratory portion will stress the approach by studies of selected problems in a *quasi* independent manner. *Three laboratory hours a week. Spring.* Domnas.
- 177 CELL MOTILITY (3). Prerequisites, Biology 52, Chemistry 62. An experimental approach to understanding the biochemistry, structure, and physiology of cytoskeletal components, including actin-myosin, microtubules, and intermediate filaments in cell motility, morphogenesis, and cell division. *Three lecture hours a week. Fall.* Salmon.
- 181 PALEOBOTANY (Geology 197) (4). Prerequisites, Biology 11-11L and permission of the instructor. An introduction to the morphology, stratigraphic occurrence, and evolutionary relationships of fossil plants. Both macrofossils and microfossils will be considered. *Three lecture and three laboratory hours a week. Fall. (Alternate years.)* Gensel.
- 184 CONSERVATION BIOLOGY (3). Prerequisite, Biology 54. The application of biological science to the conservation of populations, communities, and ecosystems, including rare species management, exotic species invasions, management of natural disturbance, research strategies, and preserve design principles. *Three lecture hours a week. Spring.* White.
- 185 POPULATION ECOLOGY (3). Prerequisite, Biology 54. An advanced treatment of topics in animal population and community ecology, stressing analytical and interpretation approaches. Topics will vary from year to year and the course may be repeated with credit. *Three lecture and discussion hours a week. Fall or spring. (Alternate years.)* Stiven.
- 185L LABORATORY IN POPULATION ECOLOGY (2). Corequisite, Biology 185 and permission of instructor. Methodology in the analysis and interpretation of population and community phenomena. *Six laboratory and field hours a week, Fall or spring. (Alternate years.)* Stiven.
- 186 COMMUNITY AND SYSTEMS ECOLOGY (3). Prerequisite, Biology 54. A wholistic approach to ecology. State-space modeling of ecological processes. Other topics will vary but may include: spatial and temporal heterogeneity in communities and ecosystems; disturbance theory; decomposition; community structure and function; freshwater ecology. *Fall or spring.* Reice.
- 186L COMMUNITY AND SYSTEMS ECOLOGY LABORATORY (1). Prerequisite or corequisite, Biology 186. Community and/or ecosystem modeling and computer simulation. Experimental analyses and validation in the field. Individual and group projects. *Three laboratory and field hours a week. Fall or spring.* Reice.
- 189 NUCLEIC ACID TECHNIQUES (Microbiology 189) (4). Prerequisites, a basic course in molecular biology. An intensive laboratory course on recombinant DNA technology, Oligonucleotide synthesis, DNA sequencing, vector preparation, cloning, gel analysis, Southern, nick translations, and many other techniques will be employed. *Seven laboratory hours a week. Spring.* Bloom and Newbold.
- 192 MEDICAL MYCOLOGY (Bacteriology 192; Parasitology and Laboratory Practice 192) (4). Prerequisites, General Microbiology or Botany. Isolation, identification, epidemiology, mycoserology, and clinical importance of medically significant fungi. Identification of hyphomycetes and yeasts will be stressed. *Two lecture and four laboratory hours a week. Spring.* McGinnis.
- 199 SENIOR SEMINAR (2). Prerequisite or corequisite, Biology 98 or 99, or a B average in previous Biology courses, and permission of the instructor. Presentation and discussion of research papers of current interest. May not be counted to satisfy a major course requirement for the BA or BS in Biology. *Two hours a week. Fall or spring.* Staff.

With approval of the instructor and the Graduate School, Biology majors with at least a B average in Biology courses, who need fewer than fifteen hours to complete the bachelor's degree, may take one or two courses at the 200-level for the purpose of later receiving graduate credit.

Courses for Graduates

- 207 INTRODUCTION TO NEUROBIOLOGY (Neurobiology 107) (3). Prerequisites, one course in biological science and permission of the Director of the Neurobiology Program. Topics to be considered are: Organization of the nervous system, neurochemistry; neurophysiology; neuropharmacology; neurogenetics; computers. *Three lecture hours a week. Fall. (Alternate years.)* Staff, Neurobiology Curriculum.
- 210 ASCOMYCETES AND BASIDIOMYCETES (3). Prerequisite, Biology 115. Taxonomy, life, cycles, and genetics of the Ascomycetes and Basidiomycetes. *Three lecture hours a week. Fall. (Alternate years.)* Staff.
- 210L ASCOMYCETES AND BASIDIOMYCETES (2). Pre- or corequisite, Biology 210. Taxonomy, life cycles, and genetics of the Ascomycetes and Basidiomycetes. *Four laboratory hours a week.* Staff.
- 211 LOWER FUNGI (5). Prerequisite, Biology 115. Collection, identification, culture, development, and biology of the lower fungi. *Two lecture and six laboratory hours a week. Spring. (Alternate years.)* Staff.
- 213 ADVANCED MARINE ECOLOGY (3). Prerequisites, Biology 109 or 146, and special permission of the instructor. A study of the organisms of coastal waters in relation to their physical, chemical, and biotic environments. *Six lecture, seminar, or laboratory hours a week, and one of more field trips to the coast. Spring.* Jenner, Rieger, and Staff of the Institute of Marine Sciences.
- 215 MARINE MYCOLOGY (MASC 215) (6). Prerequisite, Biology 115. Structure, development, systematics and ecology of marine fungi. *Seven and one-half lecture and fifteen laboratory or field hours a week. Summers, given on demand at the Institute of Marine Sciences, Morehead City.* Kohlmeier.
- 216 MARINE PHYCOLOGY (MASC 216) (5). Structure, reproduction, systematics and ecology of marine algae. The laboratory will include field studies and culture techniques. *Three lecture and six laboratory hours a week. Fall. (Alternate years.)* Hommersand.
- 218 EXPERIMENTAL ENDOCRINOLOGY (Neurobiology 218) (2). Prerequisites, permission of the instructor. A survey of hormonal and neural mechanisms in vertebrates and invertebrates; the comparative anatomy and physiology of neurons and functional units of nervous systems; endocrine structure, function, and mode of hormone action. *Six laboratory hours a week. Spring. (Alternate years.)* Staff, Neurobiology Curriculum.
- 220 ADVANCED CELLULAR PHYSIOLOGY (3). Prerequisites, Biology 120 and permission of the instructor. The physicochemical aspects of protoplasm, including permeability, surface tension, pH, cellular metabolism and other measurable properties of living cells. *Three lecture and discussion hours a week. Fall. (On occasion or demand).* Staff.
- 220L EXPERIMENTAL METHODS IN CELLULAR PHYSIOLOGY (2). Prerequisites or corequisites, Biology 120 or 220 and permission of the instructor. Laboratory techniques in micro-respiration, spectrophotometry, chromatography, and identification and metabolism of subcellular fractions. *Six or more laboratory hours a week. Fall. (On occasion or demand).* Staff.
- 222 PATHOGENIC AND SYMBIOTIC INTERACTIONS OF PLANTS WITH MICRO-ORGANISMS (3). Prerequisite, consent of the instructor. Pathogenic and symbiotic interactions of viruses, bacteria, and fungi with plants. Emphasis will be on molecular aspects. *Fall, 1984 and alternate years.* Matthyse.
- 223 PLANT GROWTH AND DEVELOPMENT (3). Prerequisite, Biology 112. Dynamics of plant growth, plant growth substances, influences of environment on growth, germination and dormancy, plant movements. *Three lecture or report hours per week. Fall. (Alternate years.)* Scott.
- 224 CHARACTERIZATION OF BIOLOGICAL MACROMOLECULES (3). Prerequisite or corequisite, Biology 164. Isolation and characterization of cellular extracts, chromatography, and use of radioactive tracers including autoradiography. *Six or more laboratory hours a week. (On occasion.)* Stafford.

- 225 EXPERIMENTAL NEUROPHYSIOLOGY (Neurobiology 225) (3). Prerequisite, permission of the instructor. *Six or more laboratory hours a week. (On occasion.)* Staff (Neurobiology).
- 227 SPECIAL TOPICS IN PHYSIOLOGY (3). Prerequisites, Biology 120 and/or permission of the instructor. Lecture and seminar consideration of selected advanced aspects of physiology. Topics will vary from year to year, may be repeated with credit. *Two lecture and one seminar hour a week. Spring.* Koeppel.
- 231 PRINCIPLES OF ANGIOSPERM SYSTEMATICS AND PHYLOGENY (3). Prerequisite, Biology 103. A survey of the history, literature and basic principles of systematics including revisionary studies and the phylogeny and classification of flowering plants. *Spring. (Alternate years.)* Dickison, Massey.
- 231L PRINCIPLES OF ANGIOSPERM SYSTEMATICS AND PHYLOGENY LABORATORY (2). Prerequisite, Biology 103. Application of various types of evidence relating to the description, classification, and nomenclature of selected groups of phylogenetic significance. Individual and group term projects required. *Spring. (Alternate years.)* Dickison, Massey.
- 232 VARIATION AND EVOLUTION PLANTS (5). Prerequisite, Biology 132. Analysis of variation in specific plant species in relation to their reproductive biology and evolutionary potentials. Field and laboratory study supplemented by reading and discussion. *Three lecture and four laboratory hours a week. Fall. (Alternate years.)* Bell.
- 233 PHYLOGENY AND CLASSIFICATION OF FLOWERING PLANTS (3). Prerequisite, Biology 112. Comparative study of modern systems of classification based upon morphological and phylogenetic considerations. *Three lecture or report hours a week. Spring. (1982 and alternate years.)* Dickison.
- 234 CHEMOTAXONOMY (4). Prerequisites, Biology 103, Chemistry 41, 61 or equivalent. Survey of chemical-systematic studies. Laboratories will involve methods of analysis of plant extracts. *Two lecture and six laboratory hours a week. Spring. (Alternate years.)* Parks.
- 235 PLANT ECOSYSTEMATICS (4 or 6). Prerequisites, Biology 102 and 142. The systematics of ecological diversity—includes the classification, identification, nomenclature, description of components and elements of ecological diversity; the study of the relationships between biotic and abiotic diversity; and the determination of the significance of those relationships. The major emphasis of the course is plant population and community—abiotic diversity relationships. *Two lecture and eight laboratory hours a week. Fall.* Staff.
- 236 SPECIES BIOLOGY, METHODS & TECHNIQUES (3). Prerequisite, permission of the instructor. Three week summer short course of intensive field study and analysis of selected population and their habitat support systems with emphasis on rare, endangered and threatened species. *One hour lecture and six laboratory hours a week.* Staff.
- 240S ICHTHYOLOGY (5). Prerequisites, Biology 63 and permission of the instructor. A course in anatomy, embryology distribution, ecology, taxonomy, and evolution of marine and freshwater fishes. *Five lecture and five laboratory hours a week. Second Summer Session. (On demand at the Institute of Marine Sciences.)* Schwartz.
- 241S TECHNIQUES FOR SAMPLING MARINE FISHES (1). Corequisite, Biology 240S and permission of the instructor. Design, history, theory, and practice of equipment used in sampling marine organisms; a variety of devices will be used in field exercises. *Six laboratory hours a week. Second Summer Session. (On demand.)* Schwartz (at the Institute of Marine Sciences).
- 243 POPULATION AND COMMUNITY ECOLOGY (3). Prerequisite, Biology 54. An in-depth study of research approaches to, and literature of plant population and community ecology. *(On demand.)* Peet.
- 244 FIELD INSECT ECOLOGY (3). Prerequisites, Biology 54, 80, and permission of the instructor. Theory and methodology of insect populations and communities. *Three lecture hours a week. Spring. (Alternate years.)* Staff.

- 245 ECOLOGY OF PHYTOPLANKTON (4). (Environmental Sciences & Engineering 235). Prerequisites, ESE 127 or 132, 135, and permission of the instructor. Relationships of planktonic algae to the aquatic environment, emphasizing nutrition, reproductivity, distributions, and impacts on water quality. *Three lecture and one seminar hour a week. Spring.* Kuenzler.
- 247 FIELD PLANT GEOGRAPHY (2). Prerequisites, Biology 142 or 143 and permission of instructor. Intensive literature and field study of the plant geography and ecology of a selected region. Weekly seminar-style discussion followed by approximately 9 days field experience. *May be repeated for credit. One seminar and two laboratory hours a week. Spring.* Peet.
- 250 SPECIAL SEMINAR (2). Prerequisite, permission of the instructor. Consideration of special topics in Biology. *May be repeated with credit. Fall or spring. (As occasion demands).* Staff.
- 251 SEMINAR IN MOLECULAR, CELLULAR, DEVELOPMENTAL BIOLOGY, GENETICS AND PHYSIOLOGY (2). Prerequisite, graduate standing or permission of instructor. Current topics in molecular, cellular and developmental biology, genetics, and physiology. Designed primarily for first year graduate students and postdoctoral researchers. A consideration of the various research programs in the Department of Biology. *Fall.* Gilbert.
- 252 SEMINAR IN INSECT PHYSIOLOGY, BIOCHEMISTRY AND ENDOCRINOLOGY (2). Prerequisite, permission of instructor. May be repeated with credit. Current topics and discussion in insect physiology, biochemistry and endocrinology. *Fall and Spring.* Bollenbacher, Gilbert.
- 253 SEMINAR IN EMBRYOLOGY (2). Prerequisite, Biology 52 or permission of the instructor. *May be repeated with credit. Fall or spring.* Harris, Lehman.
- 254 SEMINAR IN CELL BIOLOGY (2). Prerequisite, Biology 52 or permission of the instructor. *May be repeated with credit. Fall or spring.* Harris, Misch, Salmon.
- 255 SEMINAR IN ECOLOGY (2). Prerequisite Biology 54 or permission of the instructor. *May be repeated with credit. Fall and spring.* Hairston, Kuentzler, Peet, Reice, Smith, Stiven.
- 256 SEMINAR IN INVERTEBRATE ZOOLOGY (2). Prerequisite, Biology 105 or permission of the instructor. *May be repeated with credit. Fall or spring.* Jenner, Kier.
- 257 SEMINAR IN VERTEBRATE EVOLUTIONARY BIOLOGY (2). Prerequisite, permission of the instructor. *May be repeated with credit. Fall or spring.* Feduccia.
- 258 SEMINAR IN CELLULAR PHYSIOLOGY (2). Prerequisite, Biology 120 or permission of the instructor. *May be repeated with credit. Fall or spring.* Staff.
- 259 SEMINAR IN COMPARATIVE ANIMAL BEHAVIOR (Neurobiology 259) (2). Prerequisite, permission of the instructor. *May be repeated with credit. Fall or spring.* Mueller, Wiley.
- 260 SEMINAR IN COMPARATIVE PHYSIOLOGY (Neurobiology 260) (2). Prerequisite, Zoology 120 or permission of the instructor. *May be repeated with credit. Fall or spring.* Staff.
- 261 SEMINAR IN ANALYTICAL CYTOLOGY AND ULTRASTRUCTURE (2). Prerequisite, permission of the instructor. *May be repeated with credit. Fall or spring.* Misch.
- 262 SEMINAR IN PHYCOLOGY (2). Permission of instructor or research director. *Fall and spring.* Hommersand.
- 263 SEMINAR IN MYCOLOGY (2). Permission of instructor or research director. *Fall and spring.* Staff.
- 264 SEMINAR IN MOLECULAR BIOLOGY (2). Prerequisite, Biology 53 or permission of the instructor. *May be repeated with credit. Fall or spring.* Bloom, Stafford.
- 265 SEMINAR IN MARINE BIOLOGY (2). Prerequisite, permission of the instructor. *May be repeated with credit. Fall or spring.* Jenner.
- 266 SEMINAR IN NEUROPHYSIOLOGY (2). Prerequisite, permission of the instructor. *May be repeated with credit. Fall or spring.* Staff of Neurobiology Curriculum.

- 267 SEMINAR IN PLANT PHYSIOLOGY (2). Prerequisite, permission of instructor or research director. *Fall and spring.* Hommersand, Matthyse, Scott.
- 268 SEMINAR IN CELL BIOLOGY AND BIOCHEMISTRY (2). Prerequisite, permission of instructor or research director. *Fall and spring.* Domnas.
- 269 SEMINAR IN PLANT SYSTEMATICS (2). Prerequisite, permission of instructor or research director. *Fall and spring.* Bell, Dickison, Gensel, Parks, Massey.
- 270 SEMINAR IN GENETICS (2). Prerequisite, permission of the instructor. *May be repeated with credit. Fall and spring.* Lucchesi, Maroni, Pukkila.
- 271 SEMINAR IN PLANT MORPHOLOGY AND ANATOMY (2). Prerequisite, permission of research director. *Fall and spring.* Dickison, Gensel.
- 272 SEMINAR IN PLANT MOLECULAR AND CELL BIOLOGY (2). Prerequisite, permission of the instructor. *May be repeated with credit.* Current and significant problems in plant molecular and cell biology will be discussed in a seminar format. *Fall or spring.* Jones.
- 275 GENETIC SYSTEMS (Genetics, Microbiology 275) (2). Prerequisite, two courses in genetics or permission of the instructor. An advanced course open to students in genetics and required of trainees in genetics. Each member of the Curriculum in Genetics will present information and problems in the areas of his or her specialization. *Fall. (On alternate years.)* Staff of the Genetics Curriculum.
- 282 PALYNOLOGY (5). Prerequisite, consent of instructor. A consideration of various aspects of palynology, including the morphology, structure, development, systematics, evolution, preparation techniques and analysis of living and fossil pollen grains, spores, and other palynomorphs. *Two lecture and six laboratory hours a week. Fall or spring. (Alternate years.)* Gensel.
- 283 CYTOLOGICAL METHODS (5). Prerequisites, Biology 161 and permission of the instructor. Theory, instruction and training in the preparation of materials for, and in the use of light and electron microscopy. *Two lecture and six laboratory hours a week. Fall or spring. (As occasion demands.)* Staff.
- 290 SEMINAR IN NEUROBIOLOGY (Biochemistry, Neurobiology, Pathology, Pharmacology, and Physiology 290) (3). Prerequisites, one graduate course in the biological sciences and permission of the instructor. *Three lecture hours a week. Fall and/or spring.* Staff of Neurobiology Curriculum.
- 299 INTRODUCTION TO GRADUATE RESEARCH (3). Graduate research for six weeks in two laboratories. Designed primarily for first year students to acquaint them with research techniques and to assess their propensity for research. Arranged by mutual agreement of students and faculty members during fall orientation. *May be repeated once with credit. Six to nine hours per week. Fall and spring.* Staff.

Courses numbered 300 and above are designed for applicants for advanced degrees. Each course requires permission of the instructor or research director. Each may be repeated for two or more semesters with credit.

- 300 RESEARCH IN CYTOLOGY AND CELL BIOLOGY (2 or more). Harris, Koeppe, Misch, Salmon.
- 301 RESEARCH IN ECOLOGY (2 or more). Hairston, Jenner, Mueller, Peet, Reice, Smith, Stiven.
- 302 RESEARCH IN NEUROBIOLOGY (Neurobiology 310; Biochemistry, Pathology, Pharmacology, and Physiology 310) (2 or more). Mueller, Wiley, and members of the Neurobiology Curriculum from the above listed departments.
- 303 RESEARCH IN ETHOLOGY AND ANIMAL BEHAVIOR (2 or more). Mueller, Wiley.

- 304 RESEARCH IN EMBRYOLOGY (2 or more). Harris, Lehman.
- 305 RESEARCH IN GENETICS (Genetics 305) (2 or more). Lucchesi, Maroni, Pukkila, Searles.
- 306 RESEARCH IN MARINE SCIENCES (Marine Sciences curriculum 300) (2 or more). Jenner, Kier.
- 307 RESEARCH IN MARINE SCIENCES ON MOLLUSCA, CRUSTACEA, ICHTHYOLOGY, OR OCEANOGRAPHY (at the Institute for Marine Science, Morehead City) (2 or more). Approval by the Department of Biology required. Chestnut, Fahy, Peterson, Schwartz.
- 308 RESEARCH IN MOLECULAR BIOLOGY (2 or more). Bloom, Koeppel, Pedersen, Stafford.
- 309 RESEARCH IN PHYSIOLOGY: CELLULAR, COMPARATIVE, NEUROPHYSIOLOGY (2 or more). Koeppel, Salmon.
- 310 RESEARCH IN VERTEBRATE OR INVERTEBRATE ZOOLOGY (2 or more). Feduccia, Jenner, Kier.
- 311 RESEARCH IN MYCOLOGY (2 or more). *Fall and spring*. Staff.
- 312 RESEARCH IN PHYCOLOGY (2 or more). *Fall and spring*. Hommersand.
- 313 RESEARCH IN PLANT PHYSIOLOGY (2 or more). *Fall and spring*. Hommersand, Matthyse, Scott.
- 314 RESEARCH IN BIOCHEMISTRY (2 or more). *Fall and spring*. Domnas.
- 316 RESEARCH IN PLANT SYSTEMATICS (2 or more). *Fall and spring*. Bell, Massey, Parks.
- 317 RESEARCH IN PLANT MORPHOLOGY AND ANATOMY (2 or more). *Fall and spring*. Dickison, Gensel.
- 318 RESEARCH IN PALEOBOTANY (2 or more). *Fall and spring*. Gensel.

SPECIAL GRADUATE REGISTRATION

- 393A MASTER'S THESIS IN BIOLOGY (3 or more). *Fall and spring*. Staff.
- 393B MASTER'S THESIS IN BOTANY (3 or more). *Fall and spring*. Staff.
- 394A DOCTORAL DISSERTATION IN BIOLOGY (3 or more). *Fall and spring*. Staff.
- 394B DOCTORAL DISSERTATION IN BOTANY (3 or more). *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0). Students in residence, receiving stipendia, and not otherwise registered must sign up for this number.

CURRICULUM IN BIOMEDICAL ENGINEERING AND MATHEMATICS

RICHARD N. JOHNSON, *Chairman*

Professors

- | | | |
|---------------------|------|---|
| *N. A. COULTER, JR. | (1) | Hemodynamics, Neural Information Processing, Teleogenic System Theory |
| *FRANK A. DIBIANCA | (32) | Digital Medical Imaging, Microelectronics Applications |
| JACOB S. HANKER | (40) | Biomaterials and Biocompatibility; Bone Alloplasts; Molecular and Biomolecular Electronic Devices |
| *R. N. JOHNSON | (27) | Cerebrospinal Fluid Models, Computer Applications, Implantable Devices |
| STEPHEN M. PIZER | (23) | Medical Image Processing |
| L. R. YONCE | (15) | Cardiovascular Physiology |

Research Professor

- | | | |
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| **DONALD S. BEILMAN | (38) | Microelectronics |
|---------------------|------|------------------|

Associate Professors

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|----------------------|------|--|
| *HENRY S. HSIAO | (3) | Medical Instrumentation, Cardiovascular Dynamics |
| ROBERT P. KUSY | (41) | Biomedical Materials, Applied Mechanics Structure-Property Relationships |
| *CAROL L. LUCAS | (24) | Hemodynamics, Pulmonary Circulation, Mathematical Modeling |
| *BENJAMIN M. W. TSUI | (34) | Digital Medical Imaging; Theory and Instrumentation in Nuclear Medicine and in imaging techniques Magnetic Resonance |

Assistant Professors

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|------------------------|------|---|
| *JACK W. BUCHANAN, JR. | (35) | Cardiac Electrophysiology and Modeling; Physiological Instrumentation |
| JEROME A. GILBERT | (39) | Biomechanics |
| *STEPHEN R. QUINT | (29) | Evoked Potentials, Cerebral Blood Flow, Computer Applications |

Research Assistant Professors

- | | | |
|-------------------|------|--|
| *JOHN D. CHARLTON | (37) | Intracranial Pressure, Intensive Care Monitoring, Control Theory |
| *ROY H. PROPST | (31) | Semiconductor Materials and Devices, Signal and Image Processing |

*Core Faculty

**President, Microelectronics Center of North Carolina

Adjunct Associate Professors

***MICHAEL L. MCCARTNEY	(30)	Biomedical Ultrasonic Applications
***DORIS J. ROUSE	(31)	Biomedical Technology Transfer

***Senior Scientist, Research Triangle Institute

Biomedical Engineering and Mathematics is a field stressing the application of engineering techniques and mathematical analysis to biomedical problems. The Curriculum offers graduate education in this field leading to the Master of Science and Doctor of Philosophy degrees.

Students enter this program with a wide variety of backgrounds—in engineering, physical science, mathematics, or biological science. Curricula are tailored to fit the needs and develop the potentials of individual students. All students take the courses of the core curriculum (described below)—with exceptions if they have had equivalent courses elsewhere. In addition, courses in biostatistics, computer science, physiology, and mathematics or engineering provide a well-rounded background of knowledge and skills.

This program is fortunate in its intimate association with faculty of the School of Medicine. It enjoys close working relations with the Departments of Computer Science, Neurology, Physics, Physiology, Radiology, The Dental Research Center and the School of Engineering at Raleigh. It also has close working relations with The Research Triangle Institute and Industry within the Research Triangle area. These associations enable students to obtain research training in a wide variety of fields and facilitate the selection and performance of dissertation research. The student is thus provided with excellent opportunities to realize the basic goal of those who choose careers in this field—the enhancement of medical care for the society in which we live through the application of modern technology.

Admission Requirements

There is no fixed set of requirements for entrance into this program. In general, the student must satisfy the entrance requirements for the Graduate School of The University of North Carolina at Chapel Hill and must have demonstrated interest and capability commensurate with the quality designed into this program.

It is recommended that the student have a good working knowledge of mathematics at least through differential equations, plus two years of physical or engineering science and basic courses in biological science. Where deficits in this preparation are encountered, they can be made up in the first year of graduate training.

Requirements for Degrees

Candidates for degrees in Biomedical Engineering and Mathematics must have met the general requirements of the Graduate School. Degree candidates in this program will be expected to obtain experience working in a research laboratory during their residence here, and to demonstrate proficiency in both teaching and research. For the Ph.D. degree, the dissertation should be adjudged by the graduate committee to be of publishable quality.

Courses for Graduates and Advanced Undergraduates

- *100 INTRODUCTION TO BIOMEDICAL ENGINEERING (1). Introduction to biomedical engineering research, including literature search, faculty presentation of ongoing research, and student discussion of research papers. Staff.
- 102 BIOMECHANICS (4). Prerequisites, Physics 26, Math 128 or equivalent, and permission of the instructor. Fundamental principles of solid and fluid mechanics applied to biological systems. Gait analysis, joint replacement, testing techniques, and viscoelastic models are presented. Papers from current biomechanics literature will be discussed. *Fall.* Gilbert.
- 103 BIOELECTRIC PHENOMENA (3). Prerequisites, Physics 27, Math 128 or equivalent. Fundamental principles of electromagnetism are applied to analysis of bioelectric phenomena, such as passive electrical properties of tissues membrane potentials, Maxwell's equations for tissue volume conductors, etc. *Spring.* Coulter.
- 106 NETWORK TRANSFORM METHODS (3). Prerequisite, Physics 101 and permission of instructor. Analysis of linear systems by transform methods. Applications of Laplace and Fourier transform Fourier series to networks. Pole zero plots and stability analysis. *Three lecture hours a week. Spring.* Propst.
- 107 ACTIVE NETWORK ANALYSIS (4). Prerequisite, Physics 101 and permission of instructor. Physics and network models of active devices; diodes, transistors and integrated circuits. Applications of devices in systems. Frequency response of devices as well as filter design. *Three lecture hours a week and three laboratory hours a week. Fall.* Propst.
- *111 BIOMEDICAL INSTRUMENTATION I (3). Prerequisites, Physics 101 or equivalent, Physics 102 corequisite and permission of the instructor. Topics include analysis of medical instrumentation with emphasis on pressure, flow, bioelectric, and ultrasonic transducers. This course includes a laboratory and interfacing microprocessors with transducers. Students are given the opportunity to design and fabricate original devices. *Spring.* Hsiao, Buchanan.
- 112 BIOMATERIALS (3). Prerequisites, Physiology 140 or equivalent. Chemical, physical, engineering and biocompatibility aspects of materials, devices or systems for implantation in or, interfacing with, the body, cells or tissues. Food and Drug Administration and legal aspects. *Fall.* Hanker, Kusy and Staff.
- *120 REAL-TIME COMPUTER APPLICATIONS I (3). Prerequisite, Computer Science 14 or equivalent. Introduction to digital computers for on-line, real time processing of biomedical signals. Assembly language programming is stressed with applications ranging from control of peripheral devices to interfaces with higher level languages. *Fall.* Charlton, Brickley.
- *121 DIGITAL SIGNAL PROCESSING I (3). Prerequisite, Computer Science 16 or equivalent. This is an introduction to methods of automatic computation of specific relevance to biomedical problems. Sampling theory, analog-to-digital conversion, digital filtering, will be explored in depth. *Spring.* Lucas.

*Core Curriculum

- 123 NUMERICAL METHODS (2). Prerequisites, Math 34 and permission of instructor. Theory and applications of numerical differentiation and integration, curve fitting, numerical solutions to differential equations, multiparameter minimization, Monte Carlo methods. Oriented towards computer solutions of engineering problems. *Fall*. DiBianca.
- 128 ANALYSIS OF DIGITAL SYSTEMS (3). Prerequisites, Physics 101, 102. Application of Boolean algebra to the analysis and synthesis of switching circuits; techniques of minimizing Boolean functions; number systems; arithmetic operations; threshold logic, asynchronous; synchronous machines. *Fall*. Johnson.
- 129 DIGITAL SYSTEM DESIGN AND APPLICATIONS (3). Prerequisites, BMME 128 and permission of instructor. Provides a grounding in the use of semi-custom CMOS gate arrays to implement both analog and digital functions. Computer aided design tools are employed for circuit design and modeling, automatic test pattern generation, fault simulation and design for testability. *Fall*. Johnson, Nagle.
- *132 LINEAR CONTROL THEORY (3). Prerequisite, Math 128 or equivalent. Linear control systems analysis and design are presented. Frequency and time domain characteristics and stability are studied. *Spring*. Charlton.
- 141 MEDICAL IMAGING I (3). Prerequisites, Math 34, Physics 28. Basic physics of x-radiation, gamma radiation, nuclear magnetic resonance and ultrasound are applied to medical imaging problems. Radiation interaction and detection, image analysis and counting statistics are treated. *Fall*. Tsui, DiBianca.
- 142 MEDICAL IMAGING II (3). Prerequisite, BMME 141. Modern medical diagnostic imaging techniques and instrumentation are studied, including classical and digital radiography, computed tomography, nuclear medicine, magnetic resonance, and ultrasound, including discussion of clinical utility. *Spring*. DiBianca, Tsui.

*Core Curriculum

Courses for Graduates

- 201 BIOMEDICAL INSTRUMENTATION II. (3). Prerequisite, BMME 111, or permission of the instructor. The fundamentals of microprocessor theory and design are presented in the context of biological applications. This course includes a laboratory and individual student projects. *Spring*. Hsiao.
- 204 SOLID STATE DEVICES: THEORY AND FABRICATION (3). Prerequisite, Permission of the instructor. Properties of solid state materials and devices. Technology for thick and thin film deposition and impurity injection. Design and fabrication of hybrid circuits. Interconnection of devices, packaging and testing. Propst.
- 220 REAL-TIME COMPUTER APPLICATIONS II (3). Prerequisite, BMME 120, Physics 102. Problems of interfacing minicomputers with biomedical devices and systems are studied, with projects including process control, data acquisition, disk system interfaces, and serial, parallel and DMA interfaces between interconnected minicomputers. *Spring*. Charlton.
- 221 NEURAL INFORMATION PROCESSING (3). Prerequisites, MATH 128 or equivalent, Physiology 140 or equivalent and BMME 103 or equivalent. This course approaches the nervous system as a data processing network, the brain as the computer for a homeostat. *On Request*. Coulter, Johnson.
- 222 HEMODYNAMICS (3). Prerequisites, BMME 102 and Physiology 140 or equivalents. The dynamics of blood flow in blood vessels is studied from the standpoint of modern continuum mechanics. Mathematical models of cardiac action and cardiovascular regulation are included. *On Request*. Lucas.
- 223 DIGITAL SIGNAL PROCESSING II (3). Prerequisites, BMME 121, MATH 128, and BMME 132 or equivalents. Advanced techniques for analyzing biomedical systems and signals are presented, including signal characterization, pattern recognition, and

- parameter estimation. Examples from biomedical literature are studied. Quint.
- 231 SPECIAL TOPICS (Hours to be arranged). Prerequisite, Permission of the instructor. Special library and/or laboratory work on an individual basis on specific problems in biomedical engineering and biomedical mathematics. Direction of students will be on a tutorial basis, and subject matter will be selected on the basis of individual needs. Staff.
- 232 DIGITAL CONTROL THEORY (3). Prerequisite, BMME 132 or equivalent. Discrete time systems performance and stability are represented in the time and frequency domains. Series compensation and state variable design techniques are studied. Student projects employ analog and digital computers to perform discrete time control designs and simulations. *Fall*. Charlton, Quint.
- 233 BIOMATHEMATICAL MODELING (3). Prerequisites, Math 124, 128 or equivalent. Mathematical modeling and computer simulation of physiological and other biomedical systems, with emphasis on application of ordinary and partial differential equations. Analytical and digital solution techniques are considered. Lucas.
- 234 OPTIMAL CONTROL THEORY (3). Prerequisite: BMME 132 or equivalent. Linear and nonlinear system representation using state-space methods are studied. Other techniques include: Pole placement using state variable feedback, phase plane analysis, calculus of variations, the Hamilton-Jacobi approach, Kalman filters and discrete time representation. Students work on projects employing digital computer simulations and computer based design tools. *Spring*. Charlton.
- 235 FINITE ELEMENT ANALYSIS (3). Prerequisite: BMME 102 or equivalent and permission of instructor. The underlying principles associated with the finite element method will be presented along with applications. Topics to be included are the development of the stiffness matrix, node numbering schemes, potential energy and the Rayleigh-Ritz method, and element selection. *Spring*. Gilbert, Lucas.
- 251 DIGITAL X-RAY IMAGING (3). Prerequisites, BMME 141, 142. Advanced topics of physics and instrumentation in digital x-ray imaging technique are treated with emphasis on digital radiography and computed tomography. *Alternate years*. DiBianca.
- 252 DIGITAL NUCLEAR IMAGING (3). Prerequisites, BMME 141, 142. Advanced topics of physics and instrumentation in nuclear imaging and magnetic resonance imaging and spectroscopy. *Alternate years*. Tsui.
- 253 ADVANCED MEDICAL IMAGE PROCESSING (3). Prerequisites, BMME 141 and 142 and permission of instructor. Theory and digital implementation of image processing and reconstruction techniques applied in various medical imaging modalities are discussed. Specific topics include filtering, edge detection techniques and image reconstruction algorithms. *Fall*. Tsui.
- 259 PICTURE PROCESSING AND PATTERN RECOGNITION (COMP 254) (3). Prerequisites, Probability, Linear Algebra, Math 34, Comp 14. Theory and practice of picture coding, picture improvement, picture analysis and pattern recognition as applied to pictures. Pizer, Tsui.
- 280 ROBOTICS (3). Prerequisites, BMME 120, 132 or equivalent. Basic concepts and methods of robot programming, artificial intelligence, machine vision, hierarchical control, and sensory hierarchies, with applications to medical prosthesis and automation of clinical laboratories. Charlton, Gilbert.
- 311 RESEARCH IN BIOMEDICAL ENGINEERING AND BIOMATHEMATICS (Hours to be arranged). Prerequisite, permission of the instructor. Staff.
- 393 MASTER'S THESIS (Hours to be arranged). Staff.
- 394 DOCTORAL DISSERTATION (Hours to be arranged). Staff.
- 400 GENERAL REGISTRATION (0).

GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

PAUL J. RIZZO, *Dean*

Professors

CARL ROBERT ANDERSON	(80)	Strategic Management, Organizational Design, Organizational Decision Making
GARY M. ARMSTRONG	(2)	Public Policy, Deception in Advertising, Sales Force Management
JACK NEWTON BEHRMAN	(6)	Comparative Management, Business and Society
GERALD DEAN BELL	(7)	Organizational Development, Leadership and Personality
EDWARD JOSEPH BLOCHER	(61)	Auditing, Management Accounting
PAUL N. BLOOM	(95)	Public Policy, Nonprofit Marketing, Marketing Professional Services
ROBERT A. EISENBEIS	(65)	Financial Institutions, Financial Markets, Statistics
DOUGLAS ALLEN ELVERS	(18)	Production/Operations Management, Scheduling, Project Management
JOHN PARKHILL EVANS	(20)	Operations Research, Mathematical Programming
WILLIAM ARTHUR FISCHER	(66)	Production/Operations Management, Management of Technology, Materials Management
MARK J. FLANNERY	(97)	Financial Institutions, Financial Markets, Macroeconomic Policy
ROBERT SHIELDS HARRIS	(73)	Corporate Finance, Economics of Regulation
ROBERT SPEIR HEADEN	(23)	Corporate Strategic Planning, International Business, Marketing Management
G. DAVID HUGHES	(24)	Strategic Planning, Marketing/Sales Management, Individual and Group Decision Processes
THOMAS HARLAN JERDEE	(25)	Individual Behavior in Organizations, Personnel Management
JAY EDWARD KLOPMAKER	(29)	Marketing Strategy, Marketing Management, Sales and Advertising Management
HAROLD QUENTIN LANGENDERFER	(31)	Financial Accounting, Income Tax, Management Accounting
J. FINLEY LEE, JR.	(33)	Risk Management
RICHARD IVOR LEVIN	(35)	Business Policy, Strategic Planning, New Ventures
RICHARD ALLAN MANN	(37)	Legal Studies, Regulation of Business, Business Ethics
RICHARD WOLCOTT MCENALLY	(38)	Investments, Business Finance, Investment Banking
CURTIS PERRY MCLAUGHLIN	(39)	Production of Services, Professional Productivity, Management of Nonprofit Organizations

MIKE EDWARD MILES	(59)	Real Estate Development, Real Estate Investment, Business Policy/Strategic Planning
WILLIAM DANIEL PERREAULT, JR.	(62)	Industrial Marketing, Marketing Research Methods, Marketing Strategy
JOHN JULIUS PRINGLE	(43)	Financial Management
RICHARD JAMES RENDELMAN, JR.	(84)	Investments, Corporate Finance, Capital Markets Efficiency
ISAAC NEWTON REYNOLDS	(44)	Financial Accounting Theory and Principles, Governmental Accounting
PAUL J. RIZZO	(128)	Policy
BARRY STUART ROBERTS	(63)	Legal Studies, Business Ethics, Government Regulation
HOWARD OMAR ROCKNESS	(45)	Management Planning and Control Systems, Management Accounting
BENSON ROSEN	(46)	Organizational Behavior, Human Resources Management
DAVID STEPHEN RUBIN	(47)	Operations Research, Integer Programming, Combinatorial Optimization
FREDERICK ANSLEY RUSS	(48)	Marketing, Public Policy Research
JUNIUS HEWITT TERRELL	(50)	Auditing, Financial Accounting, Internal Control
ROLLIE TILMAN, JR.	(51)	Marketing Management, Corporate Strategy, Entrepreneurial Ventures
HARVEY M. WAGNER	(64)	Management, Modeling

Associate Professors

ROBERT SANFORD ADLER	()	Legal Studies, Business Ethics, Government Regulations
THOMAS SCOTT BATEMAN	(116)	Individual Behavior in Organizations, Managerial Decision Making
WILLIAM J. BIGONESS	(60)	Organizational Behavior, Labor-Management Relations, Human Resource Management
RICHARD STANLEY BLACKBURN	(81)	Organizational Behavior, Organizational Research Methods, Philosophy of Organizational Science
LINDA CAROLYN BOWEN	(9)	Financial Accounting, Taxation, Auditing
JOSEPH HENRY BYLINSKI	(83)	Financial Accounting, Auditing
ROBERT BIGELOW DESJARDINS	(17)	Computer and Information Systems, Occupational Health Information Systems
NICHOLAS MICHAEL DIDOW	(15)	Consumer Behavior, Marketing Research Methods, Evaluation Research
DAVID EDWIN HOFFMAN	(53)	Federal Taxation
NANCY LEA HYER	(93)	Manufacturing Technology, Technology Transfer, Industrial Cooperation, International Business
J. MORGAN JONES	(19)	Quantitative Consumer Models, Bayesian Decision Theory
C L KENDALL	(26)	Marketing Management, International Business, Executive Education

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| ANN STEFFEN MARUCHECK | (21) | Production/Operations Management, Distributions Systems Design and Management, Engineering Management |
| ALAN WILLIAM NEEBE | (41) | Resource Allocation, Integer Programming, Facility Location, Computer Reliability |
| ELLEN RUST PEIRCE | (4) | Legal Studies, Labor Law, Government Regulations |
| DAVID J. RAVENSCRAFT | () | Mergers, Takeovers, Sell-offs |
| CARL PAUL ZEITHAML | (121) | Strategic Management, Corporate Political Strategy, Boards of Directors |

Assistant Professors

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|---------------------------|-------|---|
| STEVEN ARTHUR ALLEN | (85) | Financial Accounting, Capital Market Effects of Accounting Information, Accounting Policy |
| MERRIE L. BRUCKS | (78) | Consumer Behavior, Advertising, Public Policy |
| JENNIFER S. CONRAD | (107) | Market Constraints, Stocks and Options |
| ROBERT M. CONROY | (94) | Financial Management, Investments |
| WILLIAM MONTGOMERY CREADY | (101) | Costly Information and Security Markets |
| RICHARD A. D'AVENI | (118) | Strategic Management, Top Management Teams, Bankruptcy |
| NOEL PEYTON GREIS | (129) | Business Forecasting, Decision Analysis, Management of Technology |
| MUSTAFA N. GULTEKIN | (106) | Portfolio Theory, Asset Pricing Models, Corporate Finance |
| IDALENE F. KESNER | (88) | Strategic Management, Business Policy, Organizational Behavior and Theory |
| CHERI T. MARSHALL | (103) | Sales Management, Marketing Strategy, Export Marketing |
| CHARLOTTE H. MASON | (108) | New-Product Evaluation, Diffusion of Innovation, Marketing Research Methodologies |
| RONALD THOMAS PANNESI | (105) | Manufacturing Strategy, MRP II, Implementation of New Technology |
| R. DAVID PLUMLEE | (99) | Auditing, Financial Accounting, Human Information Processing |
| RAMACHANDRAN RAMANAN | (111) | Financial Accounting, Management Accounting, Capital Markets |
| MARC ALLEN RUBIN | (102) | Public Sector Information, Accounting Policymaking, Auditing |
| DEBRA L. SHAPIRO | (120) | Organizational Behavior, Negotiation, Conflict Management |

Lecturer

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| F. VIRGINIA TRAVIS | (127) | Business Communication Skills |
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Visiting Professor

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| WILLIAM ARTHUR COLLINS | () | Financial Accounting, MBA Cost/Managerial |
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Visiting Associate Professor

RICHARD W. WOODMAN () Organizational Behavior, Organizational Change and Development, Research Methodology

Visiting Assistant Professor

JULIE HANEY COLLINS () Federal Income Taxes, Tax Compliance, Effect of Taxes on Individual Behavior

Adjunct Associate Professor

EDWARD MONTGOMERY GRAHAM (79) International Business, Economics

Professors Emeriti

GERALD ALAN BARRETT
R. LEE BRUMMET
DEWITT CLINTON DEARBORN
CLAUDE SWANSON GEORGE, JR.
CLIFTON HOLLAND KREPS, JR.
DANNIE JOSEPH MOFFIE
WILLIAM S. STEWART

The Graduate School of Business Administration offers programs of graduate study leading to the degrees of Master of Business Administration, Master of Accounting, and Doctor of Philosophy.

The Graduate School of Business Administration is located in Carroll Hall, near the center of campus. Facilities for graduate study include micro-computer laboratories, seminar rooms, 60-seat teaching amphitheatres, coffee lounges, and offices for doctoral students.

Computer terminals in Carroll connect with the University's IBM 4381 computer located in the Computation Center in Phillips Hall, adjacent to the School. Graduate students and faculty members use this computer for batch and time-sharing operations and as a remote input/output terminal to gain access to the IBM 3081 computer at the Triangle Universities Computation Center (TUCC) in Research Triangle Park. Through BITNET and other networks, computer users in Carroll Hall can communicate with colleagues around the world and access supercomputers in other parts of the United States.

The 3.4-million-volume Davis Library includes substantial collections in business administration for both research and instructional purposes. The Business Administration and Social Sciences Division maintains an extensive collection of reference materials, including business and economic journals, newspapers, and all the major business services. It offers on-line computer searches of bibliographies and indexes that include all presently available business data bases. The Davis Library is a repository of the publications of the federal government and the United Nations, and it maintains an extensive collection of state publications.

Master of Business Administration

The professional graduate program leading to the degree of Master of Business Administration is designed for graduate students who plan careers as managers. Most MBAs plan careers with private-sector organizations. For others, the program offers valuable preparation for management careers with non-profit organizations, including government, education, and health care delivery systems.

In structure and content, the MBA program reflects the principle that effective management requires the ability to view the organization as an integrated whole, operating within a larger economic, political, and social environment. The curriculum emphasizes the analysis of business and organizational problems, the determination of policy, and the cultivation of the skills and judgment required for responsible management. The program is highly interactive: it gives conscious attention to the personal development of the student through structured and informal contacts with the faculty.

The MBA program is designed for persons with bachelor's degrees in liberal arts, social and natural sciences, engineering, business, and related fields. The curriculum requires two academic years (late August through May). MBAs follow an integrated curriculum during the first year. During the second year, they may use eight elective courses to develop a concentration in one or two areas of special interest, or they may continue to develop their backgrounds as generalists. Two joint degree programs are available: the MBA/JD Program offered in cooperation with the School of Law, and the MBA/MRP, offered with the Department of City and Regional Planning.

The first year of the full-time program is composed of 14 courses of varying length and intensity. Students develop competence in each of the functional areas of business—accounting, finance, marketing, and operations management—as well as a basic understanding of computer systems, quantitative decision tools, organizational behavior, theory of the firm, and macroeconomics. A unique feature of the program is the year-long course in integrative management. Taught by the case method, this weekly seminar provides an introduction to the decision-making process that helps the student to integrate information from the various disciplines of business administration and to articulate his or her analysis in oral presentations and periodic written reports.

Upon the successful completion of the first year, MBAs receive credits in the following courses: BA 200 and 201, Quantitative Methods I and II; BA 202, Computers and Management; BA 230, Operations Management; BA 250, Human Behavior in Management; BA 260, Marketing Management; BA 270; Accounting and Control I; BA 280, Financial Management; BA 281, Managerial Economics; BA 284, Stabilization and Economic Growth; BA 290, International Business; BA 293, Ethics; and BA 297, Integrative Management and Business Communication.

Second-year students in the regular MBA track take ten courses, eight of which are electives. The two required courses are a full semester course in BA 295, Business Policy, and a half-semester course in government regulation. Electives available include field projects that enable the student to apply developing expertise to the solution of an actual management problem. Where appropriate to the student's program, permission may be granted to take graduate electives from other divisions of the University.

Candidates for the MBA degree are normally expected to seek work experience in management during the summer between the first and second years of the program, and the School offers assistance in obtaining suitable positions.

Accounting Preparation. MBAs planning careers in managerial accounting or public accounting can take a special group of accounting courses during the UNC summer session. These courses prepare students who did not major in accounting as undergraduates to take the Certified Public Accountant exam in the fall of their second year.

In the second year of the program, students may choose from a variety of accounting electives, including income taxation and accounting information systems.

Joint Degree Programs. An opportunity exists for a limited number of MBA candidates to earn both a Master of Business Administration degree and a Juris Doctor degree in four years. Selection for this program requires separate application to and admission by both the MBA program and the School of Law. The three-year joint MBA/MRP Program is for students interested in real estate development and urban planning. Selection for this program requires separate application to and admission by both the MBA Program and the Graduate School's City and Regional Planning Department.

Admission. Admission is based on demonstrated potential for responsible leadership, the quality of the student's academic transcripts, and the applicant's test scores. The Admission Committee believes strongly that several years of productive work after graduation from college helps to develop necessary management qualities and increases the value of graduate study in management. Some applicants give outstanding evidence of these qualities during their undergraduate careers and are admitted to the MBA program directly from college. In recent years, ten percent of the class has been admitted directly from college. There are no prerequisite courses or admission; however, the Committee strongly urges that candidates take introductory courses in accounting, business statistics, and microeconomics before entering the program.

Applicants must submit (1) a completed application form; (2) transcripts of all college work, showing satisfactory completion of a bachelor's degree at an accredited college or university; (3) scores on the Graduate Management Admission Test administered by the Educational Testing Service of Princeton, N.J.; and (4) at least three recommendations from professors

and employers. Foreign students must submit scores on the Test of English as a Foreign Language (TOEFL) and submit a special financial form.

Application forms and a brochure containing detailed information about the MBA program may be obtained by writing Ms. Anne-Marie Summers, Director of MBA Admissions, The Graduate School of Business Administration, Campus Box Number 3490, Carroll Hall, The University of North Carolina at Chapel Hill, Chapel Hill, N.C. 27599-3490.

Master of Accounting

The Master of Accounting program is designed to prepare students for leadership positions in the accounting profession. Applicants are required to have completed an accounting concentration in their undergraduate degree or to complete the equivalent of an accounting concentration prior to entering the program. Most of these requirements can be satisfied by successfully completing a special summer program offered through the UNC Summer School during the summer preceding entry to the Master of Accounting Program.

The curriculum emphasizes preparation for the changing structure and environment in which the professional accountant functions. Students develop skills in accounting, auditing, and taxation, as well as the supporting disciplines of economics, quantitative methods, computer information systems, and behavioral sciences. Students also acquire conceptual, judgmental, and communication skills, and become aware of the role of accounting in society, the ethics of the profession, and the importance of self-discipline to the accounting practitioner.

The Master of Accounting is a one-year program. Students take 10 graduate courses, comprising 30 semester hours. Students have an opportunity to pursue advanced study in auditing, information systems, or income taxation through appropriate choice of electives.

Financial Accounting and Auditing Systems: BA 240A and BA 240B, Integrative Accounting; three or four accounting electives, usually including BA 241, Financial Accounting Theory and Methodology, BA 242, Contemporary Issues in Financial Accounting and Reporting, and BA 245, Auditing Systems and Information Control; and four or five electives in supporting areas.

Taxation: BA 240A and BA 240B, Integrative Accounting; four or five electives, chosen from BA 246, Tax Research, BA 247, Federal Income Taxation of Corporations and Shareholders, BA 248, Federal Income Taxation of Controlled Corporations and Taxation of Partnerships, BA 249A, Special Topics in Federal Income Taxation, and BA 249B, Estate, Trust, and Gift Taxation, and three or four electives in supporting areas.

Admission. Admission is based on the student's potential for development during the program and for becoming a high-level professional in the field of accounting. The applicant's performance as indicated by the academic transcript and test scores are important criteria.

The applicant should have a bachelor's degree in business, or its equivalent. The applicant must have completed a minimum of five courses in accounting above the basic financial and management accounting courses. These five courses should include two in intermediate and advanced financial accounting, one in cost accounting, one in auditing, and one in income taxation.

Applicants must submit (1) a completed application form; (2) transcripts of all college work, showing satisfactory completion of a bachelor's degree at an accredited college or university; (3) scores on the Graduate Management Admission Test, administered by the Educational Testing Service of Princeton, N.J.; and (4) at least two recommendations from professors and employers. Foreign students must submit scores on the Test of English as a Foreign Language (TOEFL).

Application forms and a brochure containing detailed information about the program may be obtained by writing to Ms. Winnie Fowler, Administrative Assistant for the Master of Accounting Program, The Graduate School of Business Administration, CB# 3490, Carroll Hall, The University of North Carolina at Chapel Hill, Chapel Hill, N.C. 27599-3490.

Doctor of Philosophy

The doctoral program is designed for men and women who plan careers in teaching and research. The following work at the undergraduate or graduate level should be completed prior to admission to the doctoral program in Business Administration, or completed by course work while in residence: elementary accounting; intermediate economic theory, both microeconomics and macroeconomics; elementary statistics; and elementary calculus. It is desirable that entering students also have computer skills.

The requirements for course work for the doctorate in Business Administration are:

Management Fundamentals. All doctoral students are expected to possess or to acquire basic knowledge of finance, accounting, marketing, organizational behavior, and production. This requirement is interpreted to mean a level of competence roughly equivalent to the first year of the School's MBA program. Most entering students with a strong MBA or equivalent degree do not need additional courses of this type. For students who require additional preparation, the advisory committee may prescribe introductory or elective courses in the MBA program, or other means.

Students normally take Economics 101A and 132A (Microeconomic Theory and Macroeconomic Theory) and three graduate courses in statistics or operations research chosen with the guidance of the advisory committee. These courses help students develop the methodological and analytical techniques that will enable them to contribute to research in their area of specialization. There is no foreign language requirement.

The Area of Concentration. Students take ten to twelve courses in the major and supporting areas. Doctoral specialization is regularly offered in the following areas of concentration:

Accounting	Operations Management
Finance	Organizational Behavior
Management Information Systems	Business Policy
Marketing	

In addition, students may develop specializations in other subject areas, including quantitative methods, business and society, risk management, legal studies, international business, management of not-for-profit organizations, small-business management, and real property economics.

Supporting Courses. Students may use several strategies in selecting their supporting courses. Some area faculties expect their students to complete work in research tools beyond the core requirements. In other cases, supporting courses may be chosen in theoretical disciplines related to the concentration. Advanced work in one or more business disciplines outside the concentration proves useful in many students' programs.

Research Paper. During the summer and fall following the first year, students complete a research paper of publishable quality. The primary purpose of this paper is to help students develop research experience and skills. A number of these papers have been accepted for publication, and about half lead to dissertations.

The Written Doctoral Examination. After completing the coursework, each doctoral student takes a written examination in his or her area of concentration and relevant material from the supporting and analytical courses. The written examination is administered by the faculty in the area of concentration and is normally scheduled within one month after the courses have been completed.

The Dissertation. The dissertation represents a thorough investigation of a definite problem and derives its value from the scholarly and workmanlike manner in which it is organized and presented, from its contribution to learning, and from the development of mental power displayed by the writer. A written prospectus of the dissertation must be presented and approved on the basis of an oral examination by the student's dissertation committee before any substantial amount of work on the dissertation is done.

Experience in Research and Teaching. As part of the requirement for the degree each candidate is expected to serve for one semester as a teaching assistant.

In addition to the above, the student must fulfill the requirements for the degree as presented on page 104-8.

Scholarships and Fellowships

Available to doctoral students in business administration are a number of assistantships, each with a value of \$6,000 for the academic year, and a limited number of non-service awards ranging from \$6,000 to \$10,000 for the academic year. The School provides summer assistantships for doctoral students who receive awards from the University or the School during the academic year. These assistantships carry stipends of \$1,600 for the summer. Once a doctoral student is awarded financial aid, the School generally provides support for six semesters if the student is making satisfactory academic progress.

A number of Business Foundation Scholarships in varying amounts for MBA and doctoral candidates are made available through the Business Foundation of North Carolina, Inc. All MBA applicants are considered for the Richard H. Jenrette Fellowships, which provide tuition and fees and a stipend of \$5,000 annually. Four Maurice W. Lee MBA Fellowships carry annual stipends of \$2,000. Other MBA fellowships include the Burlington Industries Fellowships, the Business Foundation MBA Fellowships, the John P. Evans MBA Fellowship, the Executive Program Fellowship, GTE of the South MBA Fellowship, Lewis S. Morris MBA Fellowship, the R.J. Reynolds Industries Fellowships, Wachovia Bank and Trust Company Fellowship, and the Steve F. Warren MBA Fellowship. A Business Foundation loan fund is available to MBA students.

The Graduate School of Business Administration is a member of the Consortium for Graduate Study in Management, which provides approximately 130 fellowships for minority men and women for the MBA Programs of the nine member universities. Consortium fellowships are awarded in national competition and pay tuition and a living allowance of \$3,000 for the first year of the MBA Program and \$2,000 for the second year.

Minority MBAs are eligible for the CIGNA Corporation Fellowships, which provide tuition and a \$5,000 a year stipend for an entering student each fall.

Detailed information regarding these fellowships, assistantships, and scholarships may be obtained from the Dean of the Graduate School, the Director of MBA Admissions, the Director of the Master of Accounting Program, or the Director of the Doctoral Program in Business Administration.

Courses for Graduates and Advanced Undergraduates

The following courses are prerequisite for 100-level Business Administration courses: BUSI 24, BUSI 71 and BUSI 72, ECON 10 and ECON 100 or 101. See the *Undergraduate Bulletin*.

- solving, and analyzing deterministic decision problems. Topics include matrix algebra, linear programming, network models, and dynamic programming. *Fall and spring*. DesJardins, Jones, Neebe, D. Rubin.
- 111 **PROBABILISTIC MODELS FOR DECISION PROBLEMS (3)**. Prerequisite, Business Administration 24 or equivalent. The use of quantitative tools for formulating, solving, and analyzing probabilistic decision problems. Topics include decision analysis, simulation, queueing, inventory control, and reliability. *Spring*. DesJardins, Jones, Neebe, D. Rubin.
- 120 **RISK MANAGEMENT (3)**. Analysis of the financial problems inherent in the multitude of static risks which confront the business enterprise, and evaluation of the alternative methods of dealing with such problems utilized in modern scientific risk management. *Fall or spring*. Lee.
- 121 **LIFE INSURANCE AND ESTATE PLANNING (3)**. Basic life insurance, corporate employee benefits, and estate planning. Includes wills, trusts, taxation, and business insurance. *Fall or spring*. Lee.
- 122 **ADVANCED RISK MANAGEMENT AND INSURANCE (3)**. Prerequisite, Business Administration 120 or equivalent. An analysis of risk measurement and a study of insurance devices to combat risk in the business firm. *Fall and spring*. Lee.
- 126 **INTRODUCTION TO REAL PROPERTY (3)**. An introduction to the social, political, economic, and investment aspects of real property. *Fall or spring*. Staff.
- 130 **OPERATIONS MANAGEMENT (3)**. Analysis of the production/operations function in both manufacturing and non-manufacturing organizations. Developing production policies which support total organizational goals under varying constraints. *Fall and spring*. Staff.
- 131 **OPERATIONS MANAGEMENT ANALYSIS (3)**. Prerequisite, Business Administration 130 or equivalent. A capstone case analysis course in which the principles of operations management are applied to the solution of problems within the total objectives of the organization. *Fall and spring*. Hyer, McLaughlin.
- 133 **DESIGN AND OPERATION OF PRODUCTION SYSTEMS (3)**. Prerequisite, Business Administration 130 or equivalent. Analysis of the problems of planning and scheduling and production-operating function of a business enterprise. Topics include forecasting, production planning, scheduling, and control, and project management. *Fall*. Hyer, Maruchek, Pannesi.
- 137 **OPERATIONS LOGISTICS MANAGEMENT (3)**. Prerequisite, Business Administration 130 or equivalent. The integration of various logistics activities, e.g., forecasting, purchasing, materials management, which deal with the flow of materials into, through, and out of an organization. *Fall and spring*. Maruchek, Pannesi.
- 140 **LEGAL ENVIRONMENT OF BUSINESS (3)**. An introduction to the legal system with special emphasis upon its relationship to business. Topics covered include an introduction to the judicial system, torts, and contracts. *Fall and spring*. Mann, Peirce, Roberts.
- 141 **COMMERCIAL LAW (3)**. Prerequisite, Business Administration 140 or equivalent. Not open to students who have taken Business Administration 144. A detailed examination of commercial law topics including sales, commercial paper, bank deposits and collections, secured transactions, suretyship, bank regulations, and bankruptcy. *Fall and spring*. Roberts.
- 142 **MANAGERIAL LAW (3)**. Prerequisite, Business Administration 140 or equivalent. Not open to students who have taken Business Administration 144. A detailed examination of the legal aspects of business organizations, including agency, joint ventures, partnerships, limited partnerships, corporations, and securities regulation. *Fall and spring*. Mann.
- 143 **ANTITRUST LAW (3)**. Prerequisite, Business Administration 140 or equivalent. A detailed examination of the federal regulation of competition, including monopolies,

- oligopolies, horizontal and vertical restraints of trade, and price discrimination. *Fall*. Roberts.
- 144 BUSINESS LAW (3). Prerequisite, Business Administration 140 or equivalent. Not open to students who have taken either Business Administration 141 or Business Administration 142. A survey of commercial paper, secured transactions, sales, agency, partnerships, limited partnerships, corporations, and securities regulation. *Spring*. Staff.
- 145 LABOR LAW (3). Prerequisite, Business Administration 140 or equivalent. The main focus of the course is on the employer-employee relationship under the NLRA, including: employer/union unfair labor practices; picket, boycott, and strike activity; fair employment practices and the non-unionized employment environment. *Fall*. Peirce.
- 150 ORGANIZATIONAL BEHAVIOR (3). An introduction to the study of human behavior in organizations. Examines from a managerial perspective the impact of individual, group, and organizational variables on organizational performance and employee satisfaction. *Fall and spring*. Bateman, Blackburn, Rosen, Shapiro.
- 152 MACRO ORGANIZATIONAL DESIGN AND BEHAVIOR (3). Prerequisite, Business Administration 150 or equivalent. Designing complex organizations from technical, structural and behavioral viewpoints in the context of changing technological, social and political environments. Case analyses parallel theoretical study. *Fall and spring*. Staff.
- 153 SOCIOTECHNICAL SYSTEMS (3). Prerequisite, Business Administration 150 or equivalent. Advanced readings and intensive analysis and discussion of cases and problems in sociotechnical systems. *Spring*. Staff.
- 154 PERSONNEL DEVELOPMENT (3). Prerequisite, Business Administration 150 or equivalent. Analysis of problems, methods, and incentives in the development of personnel. Emphasis is on the development of supervisors and executives. *Spring*. Bell.
- 157 PERSONNEL MANAGEMENT (3). Prerequisite, Business Administration 150 or equivalent. Problems, policies, and procedures in the management of personnel, including topics such as staffing, performance appraisal, training, compensation, benefits and services, safety and health, equal employment, discipline, justice. *Fall and spring*. Blackburn, Jerdee, Rosen.
- 158 INTRODUCTION TO LABOR-MANAGEMENT RELATIONS (3). An introduction to labor-management relations with particular emphasis on the collective bargaining process. *Spring*. Staff.
- 160 PRINCIPLES OF MARKETING (3). Marketing organization and methods with emphasis on the social and economic aspects of distribution, consumer problems, marketing functions and institutions, marketing methods and policies. *Fall and spring*. Staff.
- 161 ADVERTISING (3). Prerequisite, Business Administration 160 or equivalent. The organization and functions of advertising from the point of view of the business executive. Topics include economic and social aspects; types of advertising and purposes; media types, selection and evaluation; advertising research. *Fall and spring*. Armstrong, Bloom, Russ.
- 163 SALES MANAGEMENT (3). Prerequisite, Business Administration 160 or equivalent. An overview of the sales management process, including sales force planning, budgeting, recruiting, selection, training, compensation, supervision, and control. *Fall and spring*. Hughes, Russ.
- 164 CONSUMER BEHAVIOR (3). Prerequisite, Business Administration 160 or equivalent. Review of conceptual models and empirical research in consumer behavior. Topics include decisions processes, social and cultural influences, information processing, and ethical issues. *Fall and spring*. Brucks, Didow.
- 165 RETAILING (3). Prerequisite, Business Administration 160 or equivalent. A study of the place of retailing in the economy. Topics include development of the present retail structure, functions performed, principles governing effective operations, modern store policies and practices, and managerial problems. *Fall or spring*. Armstrong, Krusa.

- 168 INTRODUCTION TO MARKETING RESEARCH (3). Prerequisites, Business Administration 24 and 160 or equivalents. An introduction to research methodology with emphasis upon the compilation, analysis and interpretation of data used in the planning and control of marketing operations. *Fall or spring*. Bloom.
- 169 MARKETING POLICIES (3). Prerequisites, Business Administration 160 or equivalent, and senior standing. A problem method course dealing with specialized marketing functions and policies; includes product and line, brands, channels of distribution, prices and pricing, promotion, and diagnosis and control. *Fall and spring*. Armstrong.

NOTE: During the academic year registration in BUSI 170 through BUSI 179 is limited to students who have been admitted into the accounting concentration or by permission of the Undergraduate Program.

- 170 INTERMEDIATE ACCOUNTING I (3). Review of accounting cycle; income measurement and valuation issues related to assets and liabilities; leases; revenue realization applications. *Fall and spring*. Bowen, Plumlee, M. Rubin.
- 171 INTERMEDIATE ACCOUNTING II (3). Prerequisite, Business Administration 170. Income measurement and valuation issues related to stockholders' and partners' equity; price-level and fair value issues; special sales methods; accounting changes; pensions. *Fall and spring*. Plumlee, Reynolds, M. Rubin.
- 172 ADVANCED ACCOUNTING (3). Prerequisite, Business Administration 171. Advanced topics involving foreign exchange, business combinations, home office and branches, consolidations, and not-for-profit entities. *Fall and spring*. Reynolds.
- 173 COST ACCOUNTING (3). Study of cost accounting systems, including cost accumulation, cost measurement and choice of costs to be included in the measurement. *Fall and spring*. Blocher, Cready.
- 174 MANAGEMENT ANALYSIS, REPORTING AND CONTROL (3). Prerequisite, Business Administration 73 or 173. Development of systems, concepts and analytical methods to serve the information needs of management in decision-making and control. *Fall and spring*. Rockness.
- 175 AUDITING (3). A course in auditing theory and practice. Auditing standards, procedures, rules of professional conduct, and related materials of professional importance are studied. *Fall and spring*. Bylinski, Terrell.
- 176 ADVANCED MANAGEMENT ACCOUNTING (3). Prerequisite, Business Administration 173. Use of quantitative methods in management accounting applications. Design and implementation of management control systems. *Fall and spring*. Rockness.
- 177 PRINCIPLES OF FEDERAL INCOME TAXATION (3). Underlying principles of the Federal income tax law; problem recognition and tax planning emphasis. *Fall and spring*. Bowen, Hoffman, Langenderfer.
- 178 ACCOUNTING THEORY (3). Prerequisite, Business Administration 171. Structure of accounting theory, current accounting issues, and accounting environmental issues. *Fall and spring*. Bowen, Reynolds.
- 179 CERTIFIED PUBLIC ACCOUNTING PROBLEMS (3). Prerequisites, major in accounting and permission of the professor. A review of the general and specialized accounting problems which constitute the subject matter of CPA examinations. *Summer*. Langenderfer.
- 180 PRINCIPLES OF FINANCIAL MANAGEMENT (3). Theoretical foundations of optimal financial policy. Problems and cases provide application of theory to financial decisions involving cash flow, capital structure, capital budgeting. *Fall and spring*. Conrad, Conroy, Gultekin, Harris.
- 182 THEORY AND APPLICATION OF FINANCIAL MANAGEMENT (3). Prerequisite, Business Administration 180 or equivalent. A follow-on course to Business Administration 180 which goes more deeply into the theory and application of financial manage-

- ment. Emphasis is placed on investment, financing, and dividend decisions. *Fall and spring*. Pringle.
- 185 FINANCIAL INSTITUTIONS AND MARKETS (3). Prerequisite, Business Administration 180 or equivalent. Analysis of the operating policies of financial institutions and the effect of such policies upon the structure of the capital markets. *Fall and spring*. Eisenbeis, Flannery.
- 186 INVESTMENTS (3). Prerequisite, Business Administration 180 or equivalent. A survey of investment principles and practice. Emphasis is given to the problems of security analysis and portfolio management with special attention to the investment problems of the individual investor. *Fall and spring*. McEnally, Rendleman.
- 189 MULTINATIONAL FINANCIAL MANAGEMENT (3). Prerequisite, Business Administration 180. This course focuses on the international dimension of corporate finance. Emphasis is placed on the analysis of risks unique to multinational activities. *Fall*. Staff.
- 190 ADMINISTRATIVE POLICY (3). Prerequisites, Business Administration 130, 140, 150, 160, 180, English 32 and speech requirement. Open only to seniors majoring in business administration. Comprehensive analysis of administrative policy-making from a total organization point of view, use of case analysis and written reports to develop integrative decision skills. *Fall and spring*. Anderson, D'Aveni, Kesner, Lee, Pannesi, Zeithaml.
- 191 INTRODUCTION TO INTERNATIONAL BUSINESS (3). Prerequisite, senior standing. Problems in operating overseas, including analysis of differences in country settings, legal and financial systems, and governmental policies affecting operations. *Fall or spring*. Graham, Kendall.
- 192 INTRODUCTION TO MANAGEMENT INFORMATION SYSTEMS (3). Prerequisite, senior standing. A survey of the elements and functions of management information systems and an introduction to principles underlying the design of effective systems. *Fall*. DesJardins.
- 194 BUSINESS AND SOCIETY (3). A focus on the relationship between business, government, citizens' and social institutions in a democracy with a market economy. *Fall and spring*. Staff.
- 199 MANAGEMENT SIMULATION (3). Prerequisite, Business Administration 130, 140, 150, 160, 180, English 32 and speech elective. Open only to seniors majoring in business administration. A seminar simulating the operation of a more complex business enterprise. Student teams operating competing firms in an industrial environment simulated by a computer. *Fall and spring*. Elvers, Maruchek, McLaughlin.

Courses for Graduates

- 200 QUANTITATIVE METHODS I (3). Prerequisite, graduate standing in business administration. An introduction to basic mathematical concepts and their application to decision models in management situations. *Fall*. Greis, Jones, Neebe, D. Rubin.
- 201 QUANTITATIVE METHODS II (3). A continuation of Business Administration 200. *Spring*. Greis, Jones, Neebe, D. Rubin.
- 202 COMPUTERS AND MANAGEMENT (1). Computer concepts, computer uses in organizations, interactive modeling techniques and tools. *Fall*. Staff.
- 203 TOPICS IN MANAGEMENT SCIENCE (3). Prerequisites, enrollment in the M.B.A. Program, Business Administration 200 and 201. Selected topics in management science appropriate for M.B.A. students. Topics include duality, networks, integer programming, competitive bidding, dynamic programming, Markov decision problems, simulation and queueing theory. *Spring*. Neebe, D. Rubin.
- 206 DECISION THEORY (Operations Research/Systems Analysis 245) (3). Axiomatic development of subjective probability and utility theory; introduction of decision analysis, statistical decision theory, and game theory. *Fall*. Jones.

- 208 VIDEOLAB IN ORAL PRESENTATION SKILLS (1.5). The objective is to improve oral presentation skills. Students make informative and persuasive presentations on videotape, review the tape, and receive feedback from instructor and peers. *Fall*. Travis.
- 210 DETERMINISTIC METHODS IN OPERATIONS RESEARCH I (Operations Research/System Analysis 210) (3). Prerequisite, calculus of several variables, linear or matrix algebra. A study of the basic principles of linear programming, including the simplex algorithm, duality, and post-optimality and analysis, and an introduction to non-linear programming. *Fall*. D. Rubin.
- 211 DETERMINISTIC METHODS IN OPERATIONS RESEARCH II (Operations Research/Systems Analysis 211) (3). Prerequisite, Business Administration 210 or consent of the instructor. Modeling and solution techniques for problems in integer programming, networks, and dynamic programming. *Spring*. Wagner.
- 212 NONLINEAR OPTIMIZATION (Operations Research/Systems Analysis 212) (3). Prerequisite, Business Administration 210 and advanced calculus or consent of the instructor. Convexity, necessary and sufficient conditions for optimality, sensitivity analysis, and algorithms for unconstrained and constrained problems. *Spring*. Staff.
- 213 ADVANCED LINEAR PROGRAMMING (Operations Research/Systems Analysis 213) (3). Prerequisite, Business Administration 210 or equivalent. Topics in linear programming including large scale problems, special structures, computational considerations, and quadratic programming. *Fall*. (*Alternate years*.) D. Rubin.
- 214 TOPICS IN INTEGER PROGRAMMING (Operations Research/Systems 214) (3). Prerequisite, Business Administration 211. Possible topics include Lagrangian relaxation, Benders' decomposition, group theoretic approaches, location models, and matching and covering models. *Fall*. (*Alternate years*.) D. Rubin.
- 215 RISK MANAGEMENT (3). Evaluation and management of insurable risks faced by a business firm. *Fall or spring*. Lee.
- 216 REAL PROPERTY DECISIONS (3). Introduction to theoretical framework and analytical techniques common to real property decision making. *Fall*. Staff.
- 217 DEVELOPMENT FEASIBILITY AND LAND USE POLICY (3). Prerequisites, graduate standing in business administration, law, economics, or city and regional planning. Analyses of the public-private interface in real estate development. Lectures and readings support student projects which attempt to match entrepreneurial goals with public policy objectives. *Fall or spring*. Miles.
- 220 COMPARATIVE MANAGEMENT (3). Comparison of different managerial styles, methods and settings among the major countries and regions in the world, for the purpose of understanding the problems of doing business in a foreign environment and the different roles of enterprise. *Fall*. Behrman.
- 221 CONTRACT PRINCIPLES AND ANTITRUST ANALYSIS (3). Prerequisite, graduate standing in business administration. To introduce the student to legal process and institutions, general principles of contract law, and antitrust policy and its applications. *Fall or spring*. Roberts.
- 222 BUSINESS ASSOCIATIONS AND SECURITIES REGULATION (3). Prerequisite, graduate standing in business administration. Topics include the law of agency, partnership, limited partnerships, closely held corporations, public corporations, and federal securities regulation. *Fall or spring*. Mann.
- 225 STUDIES IN INTERNATIONAL BUSINESS (3). Prerequisite, graduate standing in business administration. Individual analysis of problems on a functional or an industrial basis. Analysis of a geographic region will also be required, including its attractiveness to U.S. business, its competitive situations and government policies. *Fall or spring*. Graham.
- 230 PRODUCTION MANAGEMENT (3). Prerequisite, graduate standing in business administration. Analysis and solution of production problems in the total firm environment. The development of production policies and controls under varying objectives and constraints. *Fall and spring*. Fischer, Hyer, Maruchek.

- 231 OPERATIONS MANAGEMENT POLICY (3). Prerequisite, Business Administration 230 or equivalent. Operations management policy formation and administration by case and field analysis in selected industries, emphasizing integration of operations management with the major goals of the organization. *Spring*. Pannesi.
- 232 MANAGEMENT INFORMATION SYSTEMS (3). A study of the theory, design and use of man-machine information systems for decision-making in a management context. Analysis of the computer and communications equipment supporting systems. *Fall*. DesJardins.
- 233 FUNDAMENTALS OF ORGANIZATION (2). An intensive examination of the process of organization and its application to managerial endeavors. *Spring*. Bell.
- 234 APPLICATIONS IN OPERATIONS MANAGEMENT (3). Prerequisite, Business Administration 230 or equivalent. Use of quantitative procedures to generate operational solutions to operations management problems drawn from area enterprises. *Fall*. Staff.
- 235 OPERATIONS SYSTEMS (3). Prerequisite, Business Administration 230 or equivalent. Intensive study of approaches to designing efficient operating systems including forecasting; output planning; scheduling and control; inventory control; physical distribution planning and facilities location. *Fall*. Pannesi.
- 236 INFORMATION RESOURCE MANAGEMENT (3). Prerequisites, graduate standing in business administration and Business Administration 232 or equivalent. Recent developments in information resources (hardware, software, data and personnel) and in the manner they are planned for, controlled, and organized. *Fall or Spring*. Staff.
- 237 MANAGEMENT OF TECHNOLOGICAL CHANGE (3). Prerequisite, enrollment in the second year of the M.B.A. Program. Topics in the management of technology including technology forecasting, technology transfer, and the management of R&D groups. *Fall*. Fischer.
- 240A INTEGRATIVE ACCOUNTING (3). Prerequisite, Business Administration 270, 271M, 273M, and 275M, or equivalents. Integration of concepts and tools from accounting and related disciplines; applications to professional accounting problems; emphasis on formulation and communication of professional judgments. *Fall*. Bowen, Langenderfer, Rockness.
- 240B INTEGRATIVE ACCOUNTING (3). Prerequisite, Business Administration 240A. Continuation of 240A. *Spring*. Bowen, Langenderfer, Rockness.
- 241 FINANCIAL ACCOUNTING THEORY AND METHODOLOGY (3). Prerequisite, Business Administration 272M or equivalent. Analysis of structure of accounting theory; income measurement theory; conceptual framework issues; methodology issues relating to revenue and expense recognition, multinational and not-for-profit accounting issues. *Fall*. Bowen, Langenderfer.
- 242 CONTEMPORARY ISSUES IN FINANCIAL ACCOUNTING AND REPORTING (3). Prerequisite, Business Administration 270 or equivalent. An analysis of the current accounting issues considered or being considered by the Financial Accounting Standards Board, the SEC, and by other professional accounting organizations. *Spring*. Allen, Plumlee.
- 243 ADVANCED MANAGEMENT ACCOUNTING (3). Prerequisite, Business Administration 273M or equivalent. Advanced coverage of techniques for providing information to management for decision analysis and control. *Fall*. Blocher, Rockness.
- 245 AUDITING SYSTEMS AND INFORMATION CONTROL (3). Prerequisites, students in Master of Accounting or M.B.A. Program, or permission of instructor. The development of an understanding of 1) accounting internal control issues in computer-based systems, and 2) generalized and special purpose audit software. *Spring*. Blocher.
- 246 TAX RESEARCH (3). Prerequisite, Business Administration 277M or equivalent. A study of the techniques of research in taxation applied to routine and complex tax problems. Concentration on locating and assessing authority, and formal communication. *Fall*. Hoffman.

- 247 FEDERAL INCOME TAXATION OF CORPORATIONS AND SHAREHOLDERS (3). Prerequisite, Business Administration 246 or permission of instructor. An advanced study of corporate taxation with emphasis on Subchapter C: corporate organization, distributions, liquidation, reorganizations, tax option corporations; and special corporate problems. *Fall*. Hoffman.
- 248 FEDERAL INCOME TAXATION OF CONTROLLED CORPORATIONS AND TAXATION OF PARTNERSHIPS (3). Prerequisite, Business Administration 246 or permission of instructor. A study of the tax implications of consolidated tax returns; intercompany transactions; and change of group members. Advanced partnership taxation; organization, operations, and termination. *Spring*. Hoffman.
- 249A SPECIAL TOPICS IN FEDERAL INCOME TAXATION (3). Prerequisite enrollment in the Master of Accounting Program. A study of selected topics in taxation including: policy; tax accounting; tax aspects of compensation; taxation of multinational businesses; and tax administration and procedure. *Spring*. Hoffman.
- 249B ESTATE, TRUST, AND GIFT TAXATION (3). Prerequisite, enrollment in the Master of Accounting Program. A study of Federal estate and gift taxation; income taxation of estates and trusts. Emphasis on tax aspects of income gift and estate planning. *Spring*. Bowen.
- 250 HUMAN BEHAVIOR IN MANAGEMENT (3). Prerequisite, graduate standing in business administration. The analysis of individual and group behavior in organizations and applications to organizational relations. *Fall and spring*. Bateman, Bell, Bigoness, Blackburn, Rosen, Shapiro.
- 252 CONFLICT IN ORGANIZATIONS (3). An understanding of the factors in conflict and conflict resolution within management and between management and employees. *Spring*. Staff.
- 254 ORGANIZATIONAL DEVELOPMENT (3). Methods for changing and developing individuals, groups, and organizations. Analysis of different individual therapy techniques; group growth techniques such as T-groups and encounter groups; organization design strategy. *Fall and spring*. Bell.
- 257 PERSONNEL ADMINISTRATION (3). Prerequisite, Business Administration 250 or equivalent. A study of the factors contributing to the building and maintaining of an effective work force. Analysis of problems by case study. *Fall and spring*. Bigoness, Rosen.
- 260 MARKETING MANAGEMENT (3). Prerequisite, graduate standing in business administration. A course to develop an understanding of marketing problems and to survey policies and procedures for the formulation, execution, and appraisal of marketing programs. *Spring*. Bloom, Didow, Marshall.
- 261 MARKETING RESEARCH (3). Prerequisite, Business Administration 260. An examination of research methodology for marketing decision-making. Emphasizes issues in research design, data collection, and the use of statistical analysis. Lecture and cases or project. *Fall*. Russ.
- 262 INDUSTRIAL MARKETING (3). Prerequisite, Business Administration 260. An analysis of the marketing of industrial goods and services. Lecture and case analyses are used. *Spring*. Klompmaker.
- 263 ADVERTISING MANAGEMENT (3). Prerequisite, Business Administration 260. Management aspects of advertising and sales promotion, including development of advertising strategy and media allocation. Lecture, cases and projects. *Fall*. Klompmaker.
- 267 MARKETING STRATEGY AND CORPORATE PLANNING (3). Prerequisite, Business Administration 260. Conceptual frameworks and analytical techniques useful in dealing with longer-range strategic issues of corporate direction and product-market focus, and the development of marketing strategy and competitively defensible positions. *Fall*. Headen. *Spring*. Marshall.

- 269 SALES MANAGEMENT (3). Prerequisite, Business Administration 260. Management of sales personnel, including recruiting, training, assignment, and control. Lectures and cases. *Spring*. Marshall.
- 270 ACCOUNTING AND CONTROL I (3). Prerequisite, graduate standing in business administration. An advanced problems survey course in financial accounting, covering special reporting problems and analysis of financial statement data. *Fall*. Bowen, Bylinski, Langenderfer, Rockness.
- 271 ACCOUNTING AND CONTROL II (3). Prerequisite, graduate standing in business administration. Accumulation and analysis of cost data for managerial decisions; introduction to management planning and control. *Fall*. Bylinski, Langenderfer.
- 272 ADVANCED FINANCIAL ACCOUNTING THEORY (3). Critical examination of accounting concepts and standards. Emphasis on income determination, particularly controversial issues. Study of current problems and contemporary development reflected in research bulletins, monographs, journals, textbooks, and reports. *Spring*. Langenderfer.
- 272M FINANCIAL ACCOUNTING (3). Prerequisite, Business Administration 270 or equivalent. Income measurement and valuation issues related to assets, liabilities and stockholders' equity. *First summer session*. Staff.
- 273 MANAGEMENT ACCOUNTING THEORY AND PRACTICE (3). Prerequisite, Business Administration 270 or equivalent. The role of accounting and the information function within organizations. Management decision models, analysis, and financial controls are considered. *Fall*. Rockness.
- 273M COST AND FINANCIAL ACCOUNTING TOPICS (3). Prerequisite, Business Administration 272M. A study of cost systems, managerial use of cost information; accounting changes, changes in financial position, statement analysis, price level issues, and replacement cost. *Second summer session*. Staff.
- 274 ACCOUNTING SYSTEMS (3). Prerequisites, Business Administration 171 and 173 or equivalents. Study of the design, operation, and control of accounting information systems and their integration with other information systems. *Spring*. Staff.
- 275M AUDITING AND CONSOLIDATED STATEMENTS (3). Prerequisite, Business Administration 272M. Concepts and procedures involved in auditing; professional ethics, auditing standards, procedures, disclosure problems and various audit opinions on financial statements are studied; and consolidated statements. *Second summer session*. Staff.
- 276 MANAGEMENT CONTROL SYSTEMS (3). Prerequisite, Business Administration 270 or equivalent. Design, installation and evaluation of financially-based management control systems. *Spring*. Blocher, Rockness.
- 277 TAX FACTORS IN BUSINESS DECISIONS (3). Prerequisite, Business Administration 270 or equivalent. Significance of taxes relevant to business decisions; sets in perspective tax factors and other considerations influencing the decision process. *Spring*. Bowen, Hoffman.
- 277M FEDERAL INCOME TAXATION AND PARTNERSHIP ACCOUNTING (3). Prerequisite, Business Administration 270 or equivalent. Concepts and principles of Federal income taxation of individuals and corporations; partnership accounting. *First summer session*. Staff.
- 278 ADVANCED FINANCIAL ACCOUNTING PROBLEMS (3). Prerequisite, Business Administration 271 or equivalent. Concepts and methods underlying financial reporting; analysis and use of financial accounting data. *Fall*. Blocher, Rockness.
- 280 FINANCIAL MANAGEMENT (3). Prerequisite, graduate standing in business administration. Analysis of financial problems and policies of nonfinancial firms including working capital management, capital rationing and cost of capital, and capital structures. *Spring*. Conroy, Pringle.
- 281 MANAGERIAL ECONOMICS (3). Applies economic theory to specific firm and industry situations. *Fall*. Ravenscraft.

- 282 ADVANCED TOPICS IN FINANCIAL MANAGEMENT (3). Prerequisite, Business Administration 280 or equivalent. Analysis of specific financial problems of interest to financial managers. *Fall or spring*. Pringle.
- 283 CORPORATE FINANCING (3). Prerequisite, Business Administration 280 or equivalent. Topics include information relations with financial markets, dividend policy, sources of external capital, marketing of securities instruments, and mergers and acquisitions. *Fall or spring*. McEnally.
- 284 STABILIZATION AND ECONOMIC GROWTH (3). Course emphasizes economic fluctuations and considers domestic and international stabilization problems. *Spring*. Staff.
- 285 FINANCIAL INSTITUTIONS AND MARKETS (3). Prerequisite, Business Administration 280 or equivalent. Financial institutions as suppliers of funds to the money and capital markets. Comparative financial policies of institutions considered in the context of their market environments. *Fall or spring*. Eisenbeis, Flannery.
- 286 INVESTMENT POLICIES (3). Prerequisite, Business Administration 280 or equivalent. A basic treatment of investment policies with emphasis upon long-run values. Portfolio policies of financial institutions are examined. *Fall or spring*. Gultekin, McEnally, Rendleman.
- 287 THEORY OF FINANCIAL MANAGEMENT (3). Prerequisite, Business Administration 280 or equivalent. Conceptual foundations of theory of financial management; the structure of major areas of formalized techniques for improving decision-making in these areas. *Fall or spring*. Rendleman.
- 288 PORTFOLIO MANAGEMENT (3). Prerequisite, Business Administration 286 or equivalent. Policy formulation and actual management for the Reynolds Student Investment Trust of The University of North Carolina at Chapel Hill. *Spring*. McEnally, Rendleman.
- 289 MULTINATIONAL FINANCIAL MANAGEMENT (3). Prerequisite, graduate standing in business administration. Examination of issues raised by trade and financial transactions across national borders. *Fall*. Staff.
- 290 INTERNATIONAL BUSINESS (1.5). Fundamentals of doing business in an international environment. Includes topics such as comparative advantage and international trade policy; balance of payments; exchange rate determination; competing in a global environment; and comparative management systems. *Spring*. Kendall.
- 291 MANAGEMENT OF NOT-FOR-PROFIT ORGANIZATIONS (Human Services Administration 291) (3). An analysis of the problems of managing not-for-profit organizations, including resource allocation, control, marketing, operations, professionalism, evaluation and organization. *Spring*. McLaughlin.
- 292 LABOR-MANAGEMENT RELATIONS (3). An advanced study of the procedure, subject matter and legal framework of collective bargaining. *Fall and spring*. Staff.
- 293 ETHICS (1.5). Course will examine the ethical foundations of capitalism and the institutions that reflect them. It will also discuss several ethical issues currently facing managers. *Fall*. Behrman, Peirce, Roberts.
- 295 BUSINESS POLICY (3). Prerequisite, graduate standing in business administration. Integrating and building upon the business administration core, this course approaches policy-making and administration in an organization from the point of view of top management. *Fall and spring*. Kesner, Zeithaml.
- 296 NEW ENTERPRISE DEVELOPMENT (3). Prerequisite, second-year MBA standing. Starting new ventures, securing venture capital (banks, individuals, SBIC's); legal and tax considerations; preparing and using the business plan; mergers and acquisitions; the new issues market. *Spring*. Tillman.
- 297 INTEGRATIVE MANAGEMENT AND BUSINESS COMMUNICATION (3). Prerequisite, graduate standing in business administration. Two-semester course beginning Fall Semester only. Integration of the functional and tool courses and their application

- to a variety of business problems; emphasis on problem identification and oral and written communication of analysis and recommendations. *Fall and Spring*. Anderson, Levin.
- 298 MANAGEMENT SIMULATION (3). Prerequisite, graduate standing in business administration and permission of the instructor. A seminar in the application of analytical techniques and managerial principles to policy formulation and implementation in a complex computer-simulated environment. *Fall*. Elvers.
- 299 MBA SEMINAR (3). Prerequisite enrollment in the MBA Program. *Fall and Spring*. Staff.
- 300 QUANTITATIVE METHODS IN MANAGEMENT I (3). Prerequisite, graduate standing in business administration or economics. Multivariable deterministic models. Stochastic models, linear equations and matrices, linear systems. *Fall*. Staff.
- 301 QUANTITATIVE METHODS IN MANAGEMENT II (3). Prerequisite, Business Administration 300 or equivalent. Statistical inference, analysis of variance, regression and correlation, time series analysis, multiple regression, design of experiments, statistical decision theory. *Spring*. Staff.
- 302 CURRENT RESEARCH IN MANAGEMENT SCIENCE (0 to 1). Prerequisite, permission of the professor. Survey of the current literature in management science and operations research. *Fall and Spring*. Staff.
- 303 ADVANCED TOPICS IN MANAGEMENT SCIENCE (3). Prerequisite, permission of the instructor. In-depth study of a specific area of contemporary research in management science. *Spring*. Staff.
- 307 SEMINAR IN THE HISTORY OF MANAGEMENT THOUGHT (3). An advanced course dealing with the evolution of management thought. *Spring*. Staff.
- 309 INTRODUCTION TO INVENTORY THEORY (Operations Research/Systems Analysis 225) (3). Prerequisite, permission of the instructor. Introduction of the techniques of constructing and analyzing mathematical models of inventory systems. *Fall*. Wagner.
- 310 NETWORK FLOWS (Operations Research/Systems Analysis 215). Prerequisite, permission of the instructor. Network flow problems and solution algorithms; maximum flow, shortest route, assignment, and minimal cost flow problems; Hungarian and out-of-kilter algorithms; combinatorial and scheduling (CPM and PERT) applications. *Spring*. Neebe, D. Rubin.
- 330 THEORY OF OPERATIONS MANAGEMENT I (3). Prerequisite, permission of the instructor. Rigorous study of traditional and modern issues, problems and approaches in operations management. *Fall*. Maruchek.
- 331 THEORY OF OPERATIONS MANAGEMENT II (3). Prerequisite, Business Administration 330 or equivalent. A continuation of Business Administration 330. *Spring*. Fischer.
- 332 DIFFUSION OF TECHNOLOGICAL INNOVATIONS (3). Prerequisites, doctoral candidate standing and permission of the instructor. Economic, organizational and behavioral forces that underlie the process through which technological innovations are brought into organizations. *Fall*. Fischer.
- 334 APPLICATIONS IN OPERATIONS MANAGEMENT (3). Prerequisite, permission of the instructor. Intensive study of the problems of applying the theory of operations management in actual situations; problems of formulation, model building, data collection and experimentation. *Spring*. Elvers.
- 337 ADVANCED TOPICS IN OPERATIONS MANAGEMENT (3). Prerequisite, permission of the instructor. Intensive study of a specific area in operations management. *Fall*. Staff.
- 338 SEMINAR IN OPERATIONS MANAGEMENT (3). Prerequisite, permission of the instructor. Intensive study of a specific area in operations management. *Spring*. Staff.
- 351 INDIVIDUAL BEHAVIOR IN ORGANIZATIONS (3). Analysis of individual behavior, adjustment, and effectiveness. Examination of perception, learning, problem-

- solving, decision-making, motivation, and personality. Applications to management of human resources. *Fall*. Jerdee.
- 352 INTERPERSONAL AND INTERGROUP BEHAVIOR IN BUSINESS ORGANIZATIONS (3). Intensive critical examination of interpersonal and intergroup behavior, including decision processes, communication, conflict, and conflict resolution in large organizations. Case studies are used to illustrate applications in business. *Spring*. Rosen.
- 353 MACRO ORGANIZATIONAL BEHAVIOR (3). Prerequisite, graduate standing in business administration. Intensive study of theory and research in organizational structure, coordinating and control mechanisms, design parameters, and environments. *Spring*. Staff.
- 354 ORGANIZATIONAL DESIGN AND DEVELOPMENT (3). The development of understanding and skills in changing and evolving organizational design, interpersonal relationships and people, in order to achieve desired organizational goals. *Spring*. Bell.
- 355 METHODS IN ORGANIZATIONAL BEHAVIOR RESEARCH (3). Research in organizational behavior with consideration of establishing experimental designs, data collection, and application of appropriate methods in the analysis of data. *Fall*. Blackburn.
- 356 SEMINAR IN ORGANIZATIONAL BEHAVIOR (3). Prerequisite, permission of the instructor. Intensive study of important current theory and research in organizational behavior. *Fall*. Staff.
- 357 SEMINAR IN PERSONNEL MANAGEMENT (3). Prerequisite, Business Administration 250 or equivalent. Individual research in depth in particular phases of industrial relations: manpower planning, acquisition, control, training, and development; labor relations. *Spring*. Rosen.
- 360 SEMINAR IN MARKETING I (3). Prerequisite, permission of the instructor. Intensive study of problems in establishing marketing goals, consumer demand, product selection and identification, pricing policies and decisions. *Fall*. Brucks.
- 361 SEMINAR IN MARKETING II (3). Prerequisite, Business Administration 360. Intensive study of problems in design of distribution channels, marketing logistics, promotional decisions and evaluations, sales forecasting, and analysis. *Spring*. Russ.
- 363 SEMINAR IN MARKET COMMUNICATION AND STIMULATION (3). Prerequisite, permission of the instructor. Individual research on marketing problems involving communication and stimulation. Typical problems: communication processes of marketers; communication media; objectives and techniques; evaluation of communication effectiveness; promotional programs. *Fall or spring*. Staff.
- 365 SEMINAR IN CURRENT MARKETING TOPICS (1). Prerequisite, permission of the instructor. Advanced research in marketing. A seminar to discuss current research of doctoral candidates, faculty and invited guests. *Fall and spring*. Russ.
- 366 SEMINAR IN DISTRIBUTION MANAGEMENT (3). Prerequisite, permission of the instructor. Advanced study in the area of marketing, logistics, institutions, distribution cost fundamentals, and related problems. *Fall or spring*. Staff.
- 367 ISSUES IN THE DESIGN AND ANALYSIS OF RESEARCH IN MARKETING (3). Prerequisite, graduate standing in business administration. A review of major issues in research in marketing, including philosophy of science, measurement, and experimental and quasi-experimental design. *Fall*. Staff.
- 368 SEMINAR IN MARKETING RESEARCH METHODOLOGY (3). Prerequisite, permission of the instructor. Study of research design, methods of data collection and analysis, sample design, and problems of measurement in research in marketing. *Spring*. Didow, Perreault.
- 372 SEMINAR IN CURRENT ACCOUNTING ISSUES (3). Prerequisite, permission of the instructor. Analysis of current accounting issues through readings, discussion, and individual research assignments. Typical problems include pensions, leases, price-level, and other controversial issues. *Fall*. Staff.

- 374 SEMINAR IN CONCEPTS OF BUSINESS INCOME (3). Prerequisite, permission of the instructor. Concepts of income which have evolved in various disciplines. Degree of interdependence of such concepts. Extent concepts have influenced or been influenced by other concepts. *Fall*. Allen, Langenderfer.
- 376 SEMINAR IN RESEARCH IN ACCOUNTING (1). Prerequisite, permission of the instructor. An informal seminar to discuss current research in accounting. *Fall and spring*. Staff.
- 377 SEMINAR IN TAXATION (3). Prerequisite, permission of the instructor. Analysis of selected topics of taxable entities. Nature and significance of taxation affecting business decisions. Development of tax laws and critical appraisal of current law. *Spring*. Hoffman.
- 380 THEORY OF FINANCIAL MANAGEMENT (3). Prerequisite, permission of the instructor. Review of the theory of financial management. *Fall*. Conroy, Harris.
- 381 THEORY OF FINANCIAL MANAGEMENT II (3). Prerequisite, Business Administration 380 or equivalent and permission of the instructor. Review of tests of various aspects of the theory of financial management, and critical evaluation of the theory's usefulness to financial managers. *Spring*. Conroy, Harris.
- 385 SEMINAR IN RESEARCH IN FINANCE (0 to 1). Prerequisite, permission of the instructor. Advanced research in business finance and investment. An informal seminar to discuss current research of doctoral candidates, faculty, and others. *Fall and spring*. Staff.
- 386 SEMINAR IN PORTFOLIO MANAGEMENT (Economics 386) (3). Prerequisite, permission of the instructor. Development, testing, and economic effects of models for determining the selection of assets. *Fall or spring*. Conrad, Gultekin.
- 387 QUANTITATIVE METHODS IN FINANCE (3). Prerequisite, permission of the instructor. Review of information generating and optimizing models, and their applicability to decision making in finance. *Fall or spring*. Conrad, Gultekin.
- 388 SEMINAR IN FINANCIAL MARKETS (Economics 388) (3). Prerequisite, permission of the instructor. Intensive study of market characteristics and interrelationships, market price and yield determination, impact of monetary and regulatory policies, and effect of market structure on performance. *Spring*. Eisenbeis, Flannery.
- 391 MANAGEMENT I (3). An integrated course in the process of management. *Fall*. Staff.
- 392 MANAGEMENT II (3). An integrated course in the process of management. *Spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Staff.
- 399 SEMINAR (3). Prerequisite, permission of the instructor. Individual research in a special field under direction of a member of the department. *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF CELL BIOLOGY AND ANATOMY

CHARLES R. HACKENBROCK, *Chairman*

Professors

CHARLES R. HACKENBROCK	(28)	Cell and Membrane Biology, Bioenergetics
O'DELL W. HENSON, JR.	(19)	Gross Anatomy, Sensory Physiology, Comparative Anatomy
KENNETH A. JACOBSON	(39)	Dynamic Structure of Membranes, Cytoplasmic Structure, Video Microscopy
MALCOLM C. JOHNSTON	(27)	Developmental Biology, Oral Histology, Teratology
ABRAHAM L. KIERSZENBAUM	(25)	Histology, Reproductive Biology
WILLIAM E. KOCH	(8)	Developmental Biology
JEAN M. LAUDER	(36)	Developmental Neurobiology and Neuroanatomy
JOHN J. LEMASTERS	(29)	Cell Biology, Bioenergetics, Liver Structure and Function
EDITH K. MACRAE	(9)	Histology and Fine Structure
MICHAEL G. O'RAND	(38)	Reproductive Biology, Immunochemistry of Cell Surfaces
PETER PETRUSZ	(13)	Histology, Reproductive Endocrinology
ALDO RUSTIONI	(15)	Neuroanatomy
WALTER E. STUMPF	(17)	Neuroendocrinology, Autoradiography, Histopharmacology

Associate Professors

KEITH W. T. BURRIDGE	(41)	Cell Biology, Structure and Function of the Cytoskeleton
CHARLES W. CARTER, JR.	(20)	X-Ray Crystallography, Structure and Function of Macromolecules
NOELLE A. GRANGER	(42)	Invertebrate Endocrinology and Neuroendocrinology, Gross Anatomy
DOUGLAS M. LAY	(18)	Gross Anatomy, Sensory Physiology, Comparative Anatomy
ROYCE L. MONTGOMERY	(11)	Gross Anatomy, Neuroanatomy, Hippocampus
ROY PEACH	(12)	Histology, Electron Microscopy, Growth and Development
H. BENJAMIN PENG	(49)	Development of the Synapse; Cellular and Developmental Neurobiology
THOMAS W. SADLER	(46)	Embryology, Teratology, Developmental Biology
KATHLEEN K. SULIK	(40)	Embryology, Teratology, Gross Anatomy

Assistant Professor

BRIAN HERMAN	(48)	Cell Biology, Fluorescence Techniques, Cytoskeleton
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Research Associate Professor

MADHABANANDA SAR	(32)	Endocrinology
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Adjunct Associate Professor

LESTER KWOCK	(47)	Effects of Oxidants on the Microvasculature
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Professors Emeriti

RICHARD S. BEAR	(2)
H. STANLEY BENNETT	(3)
CHARLES W. HOOKER	(6)
CORNELIUS T. KAYLOR	(7)
WILLIAM S. POLLITZER	(14)
MARY C. SINGLETON	(16)
CHARLES D. VAN CLEAVE	(23)

The Department of Cell Biology and Anatomy of the School of Medicine offers programs of study leading to the Master of Science and Doctor of Philosophy degrees. The master's degree is not normally a recommended step towards the doctorate, and only in unusual cases is it taken as a terminal degree.

Program of Study

The programs and courses deal with biological structure and function from the molecular and cellular levels to the gross anatomical levels. Some of the department's areas of specialization include: cell biology; molecular biology of cell surfaces, membranes, mitochondria, cytoskeleton, and nuclei; developmental and reproductive biology; endocrinology; structure and function of the auditory system; neuroscience, including neuroanatomy, neurochemistry, and developmental neurobiology; gross and comparative anatomy; electron microscopy (including transmission, scanning, freeze-fracture, and high-voltage EM).

Ph.D. students receive broadly based training in biological structure, biochemistry, and physiology before examination for advancement to candidacy. Specific course requirements may be varied to meet the needs and career objectives of individual students. This is followed by optional further formal study while a dissertation based on original research is prepared and defended. The goal of the program is to produce well trained biomedical scientists with expertise in the methods used in the study of cell biology and biological structure. The Ph.D. student is also required to serve as a graduate teaching assistant for two semesters, and to complete a course in biostatistics or computer science.

The program for the Ph.D. normally takes four to five years. Persons interested in a combined M.D.-Ph.D. program must be accepted into the School of Medicine and the departmental graduate program, whereupon

the combined studies are scheduled in accordance with individual requirements.

Admission Requirements

A B.A. or B.S. degree is required for admission. It is generally expected that applicants will have a strong background in the biological sciences, chemistry, physics and mathematics. A completed application, including transcripts, GRE scores (with a subject test score), and three letters of recommendation should be sent to the Office of the Graduate School, Bynum Hall. A letter outlining career goals and why they would be helped by study in the Department is also required. Complete applications for fall registration should be received no later than February 1 if financial aid in the first year is requested. Prospective students are advised to contact the Director of Graduate Studies in Cell Biology and Anatomy and faculty members whose fields interest them.

Research Facilities

The Department occupies 28,000 square feet of research and office space in addition to teaching space. The Department is located in the modern Swing Building, which includes the Laboratories for Cell Biology and the Electron Microscope Laboratories of the Department.

The Department and its research laboratories contain high resolution transmission, scanning, and high voltage electron microscopes, freeze-fracture units, ultramicrotomes, spectrophotometers including a dual-beam dual-wavelength instrument, preparatory ultracentrifuges, and scintillation counters. Auxillary equipment and facilities are available for optical imaging of all kinds, autoradiography, cytochemistry, radioimmunoassay, tissue culture, electrophoresis, cell and organelle isolation, membrane and protein fractionation, and for other techniques of modern tissue, cell, and molecular biology.

Assistantships and Other Student Aid

Financial assistance in the form of Graduate Research and Teaching Assistantships is available on a competitive basis to a limited number of students.

Courses for Graduates and Advanced Undergraduates

- 101 NEUROANATOMY (Neurobiology 101) (5). The central nervous system and organs of special sense. *Three lecture and four laboratory hours a week, spring.* Rustioni.
- 102 HUMAN HISTOLOGY (4). Prerequisites, Biology 21, 21L, Chemistry 11A, 11L, 21A, 21L., 61, 62; Physics 24, 25, or equivalent; permission of instructor. Introduction to the study of cells, organized tissues, and organ systems at levels of the light and electron microscopes with emphasis on human material, *Fall.* Lemasters, staff.

- 104 INTRODUCTION TO MEDICAL CELL BIOLOGY (1). Prerequisites, Biology 11, 11L; Chemistry 61, 62 or equivalent; permission of instructor. Introduction to the structure and function of cell membranes, membranous organelles, the nucleus, and the filamentous components of the cytoplasm. *Fall*. Burridge.
- 105 GROSS ANATOMY (5). Systematic approach to gross anatomy emphasizing a regional approach stressing head and neck anatomy. Primarily for dental students. *Fall*. Montgomery.
- 106 THE CELL (3). Prerequisite, permission of instructor. Comprehensive introduction to cell structure and function. Emphasis on membrane organization, organelles, the cytoskeleton, motile phenomena and the regulation of cell growth including cancer cell biology. *Fall*. Jacobson, Burridge, staff.
- 107ab GROSS ANATOMY (7). Prerequisite, permission of instructor. Primarily for medical students. Graduate enrollment by availability of space and material. *One lecture, six laboratory hours, fall; two lecture, six laboratory hours, eight weeks of spring*. Henson, staff.
- 109 HUMAN DEVELOPMENT (1). Prerequisite, permission of instructor. Overview of normal human embryological development from fertilization to parturition with an emphasis on the origin and causes of congenital malformations. *Fall and spring*. Sadler.
- 111fs MICROSCOPIC ANATOMY (3). Lectures and laboratory classes provide an understanding of the microscopic anatomy and histology of the basic tissues and major organ systems of the human body. Primarily for dental students. *Fall and spring*. Peach.
- 112 HUMAN ORIGINS (Anthropology 112) (3). An introductory survey of physical anthropology, including the place of man among the primates, human evolution, and racial differences. Consideration is also given to osteology and the interrelationship of cultural and biological factors. *Three lecture hours a week, fall*. Holcomb.
- 115 HUMAN GENETICS AND EVOLUTION (Anthropology 115) (Genetics 115) (3). Fundamental principles of genetics; population genetics; factors of evolution; race and species formation; evolution of primates and man. The interaction of genetics and culture in human behavior, society, and evolution. *Three lecture hours a week, spring*. Pollitzer.
- 118 NEUROENDOCRINOLOGY (Pharmacology 118) (Neurobiology 118) (2). Prerequisite, permission of instructor. A review of presently held concepts in neuroendocrinology with emphasis on topographical aspects of brain structures related to hormone action. *Spring*. (1986 and alternate years.) Stumpf, Sar.
- 119 FUNCTIONAL ANATOMY OF MAMMALIAN REPRODUCTION (3). Prerequisite, permission of instructor. Structural and functional basis of mammalian reproduction, including sex differentiation, germ cells and fertilization, reproductive cycles, pregnancy and lactation, and artificial control of reproduction. *Spring*. (1987 and alternate years.) Petrusz.
- 120 ADVANCED CHORDATE ANATOMY & BIOLOGY (5). Prerequisite, Biology 63. This course will consider vertebrate origins, diversity and evolution. The origin and evolution of the vertebrate classes are considered from the perspective of the anatomical and physiological problems encountered in the shift from one way of life to another. *Fall*. Lay.
- 121 DEVELOPMENTAL BIOLOGY (4). Prerequisite, permission of instructor. A comprehensive study of the mechanisms underlying morphogenesis (generation of form) including cell migration and other morphogenetic movements, cell interactions, cell differentiation and growth regulation. *Spring*. Johnston.
- 122 DEVELOPMENTAL NEUROBIOLOGY (3). Prerequisite, permission of instructor. A comprehensive overview of nervous system development including detailed analysis of selected research topics in developmental neuroanatomy. *Spring*. (1987 and alternate years.) Lauder.

- 123 DEVELOPMENTAL TOXICOLOGY AND TERATOLOGY (Toxicology 123) (2). Prerequisites, basic biology and permission of instructor. A review of aspects of development which are particularly susceptible to teratogenic insults. Mechanisms by which teratogens affect development will be emphasized. *Spring*. Johnston, Pratt.
- 124s BIOLOGICAL SCIENCE LABORATORY (4). Primarily for students of Dentistry. *Eight hours a week, spring*. Staff.
- 191 GROSS ANATOMY FOR PHYSICAL AND OCCUPATIONAL THERAPISTS (Physical Therapy 191) (6). Prerequisites, Biology 63 and 63L and permission of instructor. Fundamental principles and concepts of human gross anatomy for physical therapists taught by lectures and cadaver dissection. Emphasis on functional anatomy. *Three lecture and six laboratory hours a week, fall*. Lay.
- 193 FUNCTIONAL NEUROANATOMY (Physical Therapy 193) (3). Prerequisites, Cell Biology and Anatomy 191, Cell Biology and Anatomy 107 or equivalent, and permission of instructor. Study of basic structure of the brain and spinal cord, including both lecture and laboratory. Primarily for Physical Therapy students. *Four hours a week, spring*. Montgomery.

Courses for Graduates

- 200ab ADVANCED GROSS ANATOMY (4 + 3). Prerequisites, Cell Biology and Anatomy 107ab and permission of instructor. Detailed dissection of the human body. Specific regions may be selected; topics will include topographic, radiographic and cross-sectional anatomy. *Fall and spring*. Henson.
- 202ab BIOLOGICAL ELECTRON MICROSCOPY (Dentistry 202ab) (2). Prerequisite, permission of instructor. *Conference thirty hours*. Peach.
- 204 CONGENITAL MALFORMATIONS OF THE OROFACIAL REGION (Dentistry O.B. 204) (1). Prerequisite, permission of instructor. *Spring*. Staff.
- 207 REGIONAL ANATOMY (3). Prerequisite, permission of instructor. For students of oral surgery, surgical residents, graduate students. *Second Summer Session*. Montgomery.
- 209 ELECTRON MICROSCOPY — PRINCIPLES AND APPLICATIONS (3). Permission of instructor. Lectures on scanning, transmission, high voltage, freeze fracture, analytical and immuno-electron microscopy. Laboratory training in preparation of biological specimens, operation of scanning and transmission microscopes, and darkroom procedures. *Three lecture and 12 laboratory hours per week. First Summer Session*. Lemasters.
- 212ab CYTOCHEMISTRY AND HISTOCHEMISTRY (Dentistry O.B. 212ab) (2). Prerequisite, permission of instructor. Hanker; staff.
- 222 SEMINAR IN STRUCTURAL AND HARD TISSUE PROTEINS (Dentistry O.B. 222) (1). Prerequisite, permission of instructor. *Spring*. Mechanic.
- 233ab CURRENT TOPICS IN BASIC SCIENCE (Dentistry O.B. 233ab) (3,3). Primarily for dental students. Open to a few anatomy students with permission of instructor. *Conference sixty hours, fall and spring*. Staff.
- 301 SEMINAR IN GENERAL ANATOMY (1). Prerequisites, permission of instructor and enrollment in the Cell Biology and Anatomy Graduate Program. A series of weekly lecture-seminars by faculty members and visiting scientists on current research in cell biology and anatomy. *One and one-half hours per week, fall and spring*. Staff.
- 310 RESEARCH (2 or more). Credit to be arranged in individual cases. *Fall, spring, and summer*. Staff.
- 315 RESEARCH LABORATORY APPRENTICESHIP (3). Prerequisites, permission of instructor and enrollment in the Cell Biology and Anatomy Graduate Program. A course for first- and second-year graduate students in Cell Biology and Anatomy, consisting of a research project of limited scope, pursued under the supervision of

a faculty member. *Eight to twelve hours of laboratory per week, fall, spring, summer.*
Staff.

- 393 MASTER'S THESIS (3).
- 394 DOCTORAL DISSERTATION (3).
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF CHEMISTRY

THOMAS J. MEYER, *Chairman*

Professors

TOMAS BAER	(1)	Physical Chemistry
MAURICE S. BROOKHART	(2)	Organic and Organometallic Chemistry
RICHARD P. BUCK	(3)	Analytical Chemistry
MAURICE M. BURSEY	(4)	Analytical Chemistry
JAMES L. COKE	(5)	Organic Chemistry
HENRY H. DEARMAN	(7)	Physical Chemistry
ERNEST L. ELIEL	(8)	Organic Chemistry
BRUCE W. ERICKSON	(37)	Organic and Biological Chemistry
SLAYTON A. EVANS, JR.	(9)	Organic Chemistry
JOHN H. HARRISON	(10)	Biological Chemistry
WILLIAM E. HATFIELD	(11)	Inorganic Chemistry
RICHARD G. HISKEY	(13)	Organic and Biological Chemistry
EUGENE A. IRENE	(38)	Electronic Materials, Solid State Chemistry
RICHARD C. JARNAGIN	(16)	Physical Chemistry
DONALD C. JICHA	(17)	Inorganic Chemistry
CHARLES S. JOHNSON, JR.	(18)	Physical Chemistry
JAMES W. JORGENSEN	(36)	Analytical Chemistry
PAUL J. KROPP	(20)	Organic Chemistry
WILLIAM F. LITTLE	(21)	Organic Chemistry
THOMAS J. MEYER	(23)	Inorganic Chemistry
J. CHARLES MORROW, III	(24)	Physical Chemistry
ROYCE W. MURRAY	(25)	Analytical Chemistry
ROBERT G. PARR	(34)	Physical Chemistry
LEE G. PEDERSEN	(26)	Physical Chemistry
EDWARD T. SAMULSKI	(44)	Polymer Physical Chemistry
LINDA L. SPREMULLI	(28)	Biological Chemistry
JOSEPH L. TEMPLETON	(31)	Inorganic Chemistry

Associate Professors

RICHARD W. LINTON	(27)	Analytical Chemistry
THOMAS M. MAYER	(43)	Electronic Materials, Physical and Analytical Chemistry
ROGER E. MILLER	(29)	Physical Chemistry
THOMAS N. SORRELL	(35)	Organic Chemistry

Assistant Professors

MAX L. BERKOWITZ	(30)	Physical Chemistry
MICHAEL T. CRIMMINS	(39)	Organic Chemistry
BEVERLY J. ERREDE	(32)	Biological Chemistry
JOHN W. OLESIK	(22)	Analytical Chemistry
NANCY L. THOMPSON	(41)	Physical and Biological Chemistry

Professors Emeriti

FRANCIS N. COLLIER

JAN J. HERMANS

SAMUEL B. KNIGHT

HENRY C. THOMAS

The Department of Chemistry offers graduate programs leading to the degrees of Master of Arts, Master of Science (nonthesis), and Doctor of Philosophy in the fields of analytical, biological, inorganic, organic, and physical chemistry, as well as in the more applied areas of microelectronics, polymer chemistry, and biotechnology. Close interaction between the departments of Chemistry, Physics, and Biochemistry reinforces the broad nature of the graduate research program.

Doctor of Philosophy

The Ph.D. degree in Chemistry is a research degree and students normally begin research during the first year in graduate school. As soon as the entering student has selected a research advisor, an advisory committee (SAC) is established in order that an appropriate course of study, designed to meet individual needs, can be developed. The Ph.D. degree consists of completion of a suitable program of study, teaching experience, a preliminary doctoral oral exam, a written comprehensive examination which is satisfied by cumulative examinations, an original research project culminating in a dissertation, and a final oral examination.

Master of Arts

The Master of Arts degree requires a minimum of 30 semester hours of credit. Courses are determined by the Student's Advisory Committee. Also required are a written comprehensive examination which may be satisfied by cumulative examinations, a thesis, and a final oral examination. The M.A. degree is a terminal degree. Admission to the Ph.D. program after completion of the M.A. degree in our Department requires approval by the Chemistry Graduate Studies Committee.

Master of Science (nonthesis)

The Master of Science (nonthesis) degree requires a minimum of 30 semester hours. The candidate must earn at least 24 hours of graduate credit in chemistry and allied subjects, which may include graduate seminars numbered 200 or higher, but does not include Chem 331, 341, 351, 361, and 381 (referred to collectively as 3X1). As a substitute for the thesis the candidate must earn a minimum of 6 hours of Chem 3X1 (a research methodology and seminar course). The student's program of study is determined by the Student's Advisory Committee. Also required is a written examination which may be satisfied by cumulative examinations, and a

written report submitted to the student's research director describing work done while registered for Chem 3X1. Admission to the Ph.D. program after completing the M.S. degree in our Department requires approval by the Chemistry Graduate Studies Committee.

Research Interests

(1) *Analytical. Separation methods:* theory and application of chromatography; liquid chromatography in capillary columns; capillary electrophoresis; chromatographic detectors; ultramicro analysis; *spectroscopic methods:* ion and electron microprobe techniques; Fourier transform infrared and photoacoustic studies; chemical analysis of surfaces (X-ray photoelectron spectroscopy, Auger electron spectrometry, UV photoelectron spectroscopy, secondary ion mass spectrometry, scanning electron microscopy, X-ray microanalysis); Mass spectrometry of biological, environmental, organic, and inorganic compounds; Ion structures by ion-molecule collision phenomena; collisionally activated decomposition, and ion molecule reactions; laser Raman spectroscopy; surface- and resonance-enhanced Raman spectroscopy; atomic emission, absorption, and fluorescence spectroscopy; *electrochemical methods:* electroanalytical and spectroelectrochemical techniques; surface absorption; chemically modified electrodes; microstructured polymer films; ion-selective membrane electrodes, biosensors; electrochemical synthesis; electrocatalysis; nonaqueous chemistry; coordination chemistry; kinetics and mechanisms of electrode processes, ionic transport in solids; membrane electro-chemistry including digital simulation of transient and equilibrium properties; *methods of data interpretation:* analog and digital computer optimization of experiments; microcomputer applications in chemistry; digital image processing.

(2) *Biological.* Physicochemical investigations of the mechanism of action and subunit structure of pyridine nucleotide dependent dehydrogenases; energy transduction in biological membranes; kinetics in complex biochemical systems; molecular biology and molecular genetics; mechanism of protein biosynthesis; metabolic regulation; gene organization and regulation of gene expression; transport of proteins across organellar membranes; chemical modification of proteins; structural studies of macromolecules and polymers; interaction of small molecules and DNA; characterization of proteins by laser light scattering; postribosomal modification of proteins; chemical synthesis of peptides and proteins (automated solid-phase synthesis); microanalysis of peptides and proteins (automated amino acid analysis, Edman sequencing, and liquid chromatography), protein engineering through chemical synthesis; biochemical studies of the serum complement and clotting cascades; molecular immunology; computer graphics and molecular modeling of biomolecules; mathematical methods for comparison of genetic sequences; recognition of patterns in DNA and protein sequences.

(3) *Inorganic*. Chemistry of transition metal elements; spectral and magnetic properties of transition metal compounds, crystal field theory and molecular orbital theory; reactions of coordinated ligands; coordination compounds involving Group IV donors; kinetics and mechanisms of inorganic reactions; the synthesis of transition and post-transition metal compounds; X-ray crystallography; structural investigations of transition metal complexes and organometallic compounds; nuclear magnetic and electron paramagnetic resonance; electrochemistry and photochemistry of metal complexes; metal catalyzed organic reactions; the preparation and conductivity properties of semiconducting and potentially superconducting materials; magnetic interactions in extended systems; cooperative phenomena; metalloporphyrin chemistry; metal peptide complexes; metal complexes of nucleic acid constituents.

(4) *Organic*. Stereochemistry and conformational analysis; photochemistry; synthesis and biological reactions of natural products; peptide synthesis; protein engineering; structure-function studies on polypeptides and proteins; mechanistic and synthetic studies in organometallic chemistry; nuclear magnetic resonance; kinetics; organosulfur and organophosphorus chemistry; surface effects in chemical behavior; chemistry of reactive intermediates including carbocations, carbanions, carbenes and radical pairs; chemistry of metalloporphyrins and other metal chelating agents; new synthetic methods including asymmetric synthesis.

(5) *Physical Chemistry*. *Surface science*: electron and optical spectroscopies of surface complexes, thermal desorption and isotopic tracer measurement on species of submonolayer coverage, surface etching and deposition initiated by electric discharges, ion beams and laser beams, mechanisms of reactive etching. *Molecular dynamics*: Photoionization and multiphoton ionization mass spectroscopy, state-to-state ion molecule reactions, crossed molecular beam scattering, molecular motion and reaction rates in solutions examined by photon correlation spectroscopy and holographic relaxation spectroscopy. *Biophysical chemistry*: membrane phenomena, physical chemistry of DNA complexes, nonlinear kinetics and cell differentiation, phospholipid Langmuir-Blodgett films, time-resolved fluorescence microscopy, laser light scattering applied to protein aggregation and the determination of mechanical properties of biological gels, dynamics in liquids. *Photochemistry*: photoelectron spectroscopy of molecules, photolytic charge separation and transport in organic solids and liquids, multiphoton ionization and fragmentation. *Molecular spectroscopy*: laser spectroscopy in cooled molecular beams of transient species, ions and molecular complexes, sub-doppler infrared spectroscopy, ion photodissociation studies, development of spectroscopic techniques, double resonance spectroscopy, pulsed field gradient NMR and NMR imaging. *Theoretical chemistry*: quantum chemistry, density functional theory, quantum biology of neurotransmitters and pharmacological agents, energy minimization, protein dynamics, coop-

erativity, molecular graphics, mutagenesis, statistical mechanics of a liquid phase, structure and dynamics of aqueous solutions, kinetics in condensed phases, mechanical properties of polymers, state to state chemistry, reactions and energy transfer at solid surfaces.

(6) *Chemical Microelectronics*. Fundamental chemistry and properties of materials relevant to modern microelectronics; techniques (plasma, ion beam, laser beam, photochemical, electrochemical, high pressures and high temperatures) for the preparation of electronics materials in thin film form; characterization of thin films properties in particular kinetics of formation, electronics, mechanical and optical properties, and kinetics of etching; new and highly conductive organic and inorganic materials including their synthesis and structural characterization; spatially resolved chemical analysis of surfaces, thin films, and microstructures; phenomena initiated by optical energy (or ion plasmas) which are driven by it, store it, or respond to it in a spatial pattern.

Attention is drawn to the possibility of arranging, through consultations with staff of the Departments of Chemistry and Physics, a program combining course work in the two departments with thesis research in either department in such a way as to provide training in a borderline area in which methods of theoretical and experimental physics are applied to chemical problems. A similar program may be arranged between the Departments of Chemistry and Biochemistry and Nutrition.

Facilities and Equipment

Research is carried on in the William Rand Kenan, Jr.,-Laboratories, a modern facility of 130,000 square feet completed in 1971. Additional space is utilized in the Venable Laboratories of approximately the same size, while undergraduate laboratories are housed in the John Motley Morehead Laboratories completed in 1986. Included are some major facilities managed by Ph.D. level staff scientists. The Laser Laboratory houses various CW and pulsed laser systems, as well as a laser Raman spectrometer. The NMR Laboratory includes 100, 200, 250, and 400 MHz FT-NMR spectrometers. The Department's surface facility includes two ESCA instruments, a scanning electron microscope, as well as SIMS, and Auger equipment. The protein sequencing laboratory is a joint facility in conjunction with NIEHS in the Research Triangle Park. In addition, the Department maintains various UV-visible spectrometers, diode array, EPR, and FT-IR spectrometers, mass spectrometers, and magnetic susceptibility equipment as well as an automated X-Ray facility. The Department also maintains a number of mini- and microcomputers, many of which are directly linked to the departmental VAX computer, for on-line data acquisition and control of experiments.

Computing services are among the most important for modern research. In this area the University facilities include an IBM 4381 (MVS); this is

an instructional tool as well as a high speed input/output device for the Triangle Universities Computation Center (TUCC). There are three major central processors at TUCC: an IBM 3081-K (MVS), an IBM 370/168-3 (MVS), and a Floating Point Systems 164 array processor. Several terminals are available for a link with TUCC. The departmental VAX 11/780/Microvax II computer system contributes an attractive computing facility which is available exclusively to members of the Department.

To back up the research programs, the Department provides a number of services. Machine, glass, and electronics shops are provided to assist in construction and maintenance of specialized equipment. Technicians are also available to run certain specialized instruments.

The William Rand Kenan, Jr.-Chemistry Library and reading room, conveniently housed in Venable Laboratories, contains complete sets of the most important chemical periodicals, many books of reference, an extensive collection of monographs, and books of historical value and interest, amounting to more than 35,000 volumes.

Financial Aid and Admission

On the basis of academic and research attainments, the Department awards a number of industrial fellowships and predoctoral research and teaching appointments. All outstanding prospective graduate students who apply for admission/support will be automatically considered for University fellowships.

There are approximately 190 graduate students in our Department. More than 70 teaching assistantships are open to graduate students. The duties of the assistants include the preparation for and supervision of laboratory classes in the larger elementary courses and examination of laboratory reports.

Applications for assistantships and fellowships should be made by February 1, although applicants for assistantships will be considered after that date. All applicants (foreign and U.S.) must take the Graduate Record Examination. All foreign students whose native language is not English must take the TOEFL examination in addition to the Graduate Record Examination. However, foreign students who hold a degree from a primarily English-speaking institution are exempt. Both the TOEFL and GRE should be taken as early as possible, preferably in October or December.

Application forms for admission/support, as well as information about the Department, may be obtained from the Director of Graduate Studies in Chemistry.

Courses for Graduates and Advanced Undergraduates

- 101 SPECIAL PROBLEMS IN CHEMISTRY (1-3). Prerequisite, to be determined by consultation with Director of Undergraduate Studies. *Equivalent of one to three hours a week, fall and spring.* Chemistry Faculty.

- 120 POLYMER CHEMISTRY (3). Prerequisite, Chemistry 62; prerequisite or corequisite, Chemistry 180 or 182. Introduction to polymer chemistry; synthesis and reactions of polymers; thermodynamics and kinetics of polymerization; physical characterization of polymers; industrial uses of polymers. *Spring*. Organic and Physical Chemistry Faculty.
- 121 SYNTHESIS OF POLYMERS (3). Prerequisites, Chemistry 51 and 62. Synthesis and reactions of polymers. *Fall*. Organic and Inorganic Chemistry Faculty.
- 122 PHYSICAL CHEMISTRY OF POLYMERS (3). Prerequisite, Chemistry 181; prerequisite or corequisite, Chemistry 182. Kinetics of polymerization, molecular weight, distribution and molecular weight measurements, solution properties, solid state properties of macromolecules. *Spring*. Physical Chemistry Faculty.
- 123 INTERMEDIATE POLYMER CHEMISTRY (3). Prerequisite, Chemistry 122. Rheology and mechanical properties of polymers; plastics, fiber, and elastomer technology. *Spring*. Chemistry Faculty.
- 124L POLYMER CHEMISTRY LABORATORY (2). Prerequisites, Chemistry 121 and 122. Thermal analysis; solution viscosity; gel permeation chromatography; end group analysis; synthesis; characterization of an unknown polymer. One four-hour laboratory and one one-hour lecture a week. *Spring*. Chemistry Faculty and Staff. (Fee required.)
- 130 INTRODUCTION TO BIOLOGICAL CHEMISTRY (Biology 130) (3). Prerequisite, Chemistry 62 and 62L; Biology 11. The study of cellular processes including catalysis, metabolism, bioenergetics and biochemical genetics. The structure and function of biological macromolecules involved in these processes will be emphasized. *Spring*. Biological Chemistry Faculty.
- 131 NUCLEIC ACID CHEMISTRY (Biochemistry 131) (3). Prerequisite, Chemistry 130. Study of reactions and chemical properties basic to nucleic acids; chemical synthesis as well as biosynthesis; nucleic acids in protein biosynthesis. *Spring*. Biological Chemistry Faculty; Errede, Erickson, Harrison, Hiskey, Spremulli, Thompson.
- 132 PROTEIN CHEMISTRY (Biochemistry 130) (3). Prerequisite, Chemistry 130. Structural properties of proteins; active site chemistry; chemical modification of proteins; metalloproteins; coenzyme-enzyme interactions; organization of enzyme systems. *Fall*. Biological Chemistry Faculty.
- 133 ENZYME MECHANISMS AND KINETICS (3). Prerequisite, Chemistry 132. A detailed discussion of enzyme catalysis; principles of catalysis; enzyme kinetics; the active site of enzymes; allosteric interactions between subunits; the mechanism of coenzyme catalyzed reactions. *Fall*. Biological Chemistry Faculty.
- 135 PHYSICAL CHEMISTRY OF BIOLOGICAL MACROMOLECULES (3). Prerequisites, Chemistry 130, 181 and 182. Structure of proteins, nucleic acids and lipids. Structural transitions and intermolecular interactions. Properties of macromolecular assemblies. Techniques for the study of structure and function—optical spectroscopy, magnetic resonance, hydrodynamics, scattering, diffraction. *Fall*. Physical Chemistry Faculty.
- 136L LABORATORY TECHNIQUES FOR BIOPOLYMERS (2). Prerequisites, Chemistry 130, 170L. Prerequisite or corequisite, Chemistry 180, 181, or 182. An introduction to important chemical techniques and research procedures of use in the fields of protein and nucleic acid chemistry. *Two three-hour laboratories a week, and one one-hour lecture a week*. *Spring*. Biological Chemistry Faculty. (Fee required.)
- 137 MEMBRANE CHEMISTRY (Biochemistry 137) (3). Prerequisites, Biology 11, Chemistry 130; corequisite or prerequisite, Chemistry 180 or 181. The structure and properties of synthetic membranes and of naturally occurring biological membranes. *Spring*. Biochemistry and Chemistry Faculties.
- 138 CHEMISTRY OF METABOLIC REGULATION (3). Prerequisites, Chemistry 130 and 180. Energy metabolism and its regulation, nitrogen metabolism, biosynthesis of amino acids, fatty acid metabolism. *Fall*. Biological Chemistry Faculty.

- 140 MODERN METHODS OF INSTRUMENTAL ANALYSIS FOR THE HEALTH AND ENVIRONMENTAL SCIENCE (3). Prerequisites, Chemistry 41, 62, and 62L; prerequisite or corequisite, Chemistry 180 or 181. Instrumental analysis survey. Electroanalysis; IR, luminescence, atomic, NMR, X-ray, and mass spectroscopies; HPLC, GC, and electrophoresis separations; enzyme analysis; radiochemistry; automated analyzers. *Spring*. Analytical Chemistry Faculty.
- 141 INTERMEDIATE ANALYTICAL CHEMISTRY (2). Prerequisite, Chemistry 41; prerequisite or corequisite, Chemistry 181; corequisite, Chemistry 141L. Spectroscopy, electroanalytical chemistry, chromatography, thermal methods of analysis and signal processing. *Fall*. Analytical Chemistry Faculty.
- 141L INTERMEDIATE ANALYTICAL CHEMISTRY LABORATORY (2). Prerequisite, Chemistry 41; prerequisite or corequisite, 181; corequisite, Chemistry 141. Experiments in spectroscopy, electroanalytical chemistry, chromatography, thermal methods of analysis and signal processing. *One four-hour laboratory a week and one one-hour lecture a week. Fall*. Analytical Chemistry Faculty and staff. (Fee required.)
- 142L LABORATORY IN ANALYTICAL RESEARCH TECHNIQUES (3). Prerequisite, Chemistry 180 or 182. Introduction to computers, digital and analog electronics in specific applications to chemical instruments, computer simulation of chemical instruments, computer control D/A and A/D conversion, chemometric techniques. One three-hour laboratory and two one-hour lectures a week. *Spring*. Analytical Chemistry Faculty. (Fee required.)
- 144 SEPARATIONS (2). Prerequisite, Chemistry 180 or 182. Theory and applications of equilibrium and nonequilibrium separations techniques. Extraction, countercurrent distribution, gas chromatography, column and plane chromatographic techniques, electrophoresis, ultracentrifugation, and other separation methods. *Spring*. Analytical Chemistry Faculty.
- 145 ELECTROANALYTICAL CHEMISTRY (3). Prerequisite, Chemistry 180 or 182. Basic principles of electrochemical reactions, electroanalytical voltammetry as applied to analysis and the chemistry of heterogeneous electron transfers, analog electronics and electrochemical instrumentation. *Fall*. Analytical Chemistry Faculty.
- 146 ANALYTICAL SPECTROSCOPY I (3). Prerequisite, Chemistry 180 or 181. Fundamentals of interactions of electromagnetic radiation with matter, vibrational, electronic, nuclear magnetic, mass spectrometries, scattering-based spectroscopy, instrumentation and signal processing. *Fall*. Analytical Chemistry Faculty.
- 147 ANALYTICAL SPECTROSCOPY II (2). Prerequisite, Chemistry 180 or 181. Principles and applications of X-ray absorption and emission, photoelectron, Raman, gamma-ray, Mossbauer and internal reflection spectroscopy, nuclear quadrupole and electron spin resonance, fluorescence, optical rotary dispersion and circular dichroism, secondary emission methods. *Spring*. Analytical Chemistry Faculty.
- 150 INTERMEDIATE INORGANIC CHEMISTRY (3). Prerequisites, Chemistry 51 and 181. Electronic states of transition metal ions, symmetry labels, ligand field theory and angular overlap model for coordination complexes, kinetics and mechanisms of transition metal reactions, organometallic chemistry, biomimetic chemistry. *Fall*. Inorganic Chemistry Faculty.
- 151 THEORETICAL INORGANIC CHEMISTRY (1-3). Prerequisite or corequisite, Physical Chemistry. Chemical applications of symmetry and group theory, crystal field theory, molecular orbital theory. The first third of the course, corresponding to one credit hour, covers point symmetry, group theoretical foundations, and character tables. *Fall*. Inorganic Chemistry Faculty.
- 152 CHEMICAL BONDING (1-2). Prerequisite, Chemistry 151. Qualitative and quantitative aspects of chemical bonding; molecular orbital theory; ligand field theory; spin-orbit coupling; electron repulsion terms. The first half of the course will cover quantum mechanics relevant to chemical bonding and the second half applications to inorganic chemistry. *Spring*. Physical and Inorganic Chemistry Faculty.

- 153 PHYSICAL METHODS IN INORGANIC CHEMISTRY (3). Prerequisite, Chemistry 151. Introduction to the physical techniques used for the characterization and study of inorganic compounds. Topics include electronic and vibrational spectroscopy, electron and nuclear magnetic resonance, static magnetic susceptibilities, and X-ray diffraction. *Spring*. Inorganic Chemistry Faculty.
- 160 INTERMEDIATE ORGANIC CHEMISTRY (3). Prerequisite, Chemistry 62; prerequisite or corequisite, Chemistry 62L. Organic reaction mechanisms and organic synthesis. *Fall*. Organic Chemistry Faculty.
- 166 ADVANCED ORGANIC CHEMISTRY I (3). Prerequisite, Chemistry 160. A survey of fundamental organic reactions including substitutions, additions, eliminations, and rearrangements; static and dynamic stereochemistry; conformational analysis; molecular orbital concepts and orbital symmetry. *Fall*. Organic Chemistry Faculty.
- 167 ADVANCED ORGANIC CHEMISTRY II (2). Prerequisite, Chemistry 160 or 166. Spectroscopic methods of analysis with emphasis on elucidation of the structure of organic molecules: ^1H and ^{13}C NMR, infrared, ultraviolet, ORD-CD, mass and photoelectron spectroscopy. Chemistry 146 and 167 may not both be taken for academic credit. *Spring*. Organic Chemistry Faculty.
- 168 SYNTHETIC ASPECTS OF ORGANIC CHEMISTRY (3). Prerequisite, Chemistry 166 or 175. Modern synthetic methods and their application to the synthesis of complicated molecules. *Spring*. Organic Chemistry Faculty.
- 170L SYNTHETIC CHEMISTRY LABORATORY I (2). Prerequisites, Chemistry 51, 62 and 62L. An integrated treatment of both organic and inorganic synthesis. *One four-hour laboratory and one one-hour lecture a week, fall and spring*. Chemistry Faculty and Staff. (Fee required.)
- 171L SYNTHETIC CHEMISTRY LABORATORY II (2). Prerequisite, Chemistry 170L. An integrated treatment of both organic and inorganic synthesis. *One four-hour laboratory and one one-hour lecture a week, fall and spring*. Chemistry Faculty and Staff. (Fee required.)
- 175 MECHANISMS OF ORGANIC AND INORGANIC REACTIONS (4). Prerequisites, Chemistry 150, 160. Kinetics and thermodynamics; free energy relationships; isotope effects; acidity and basicity; kinetics and mechanisms of substitution reactions; one- and two-electron transfer processes; principles and applications of photochemistry; organometallic reaction mechanisms. *Fall*. Inorganic and Organic Chemistry Faculty.
- 180 INTRODUCTION TO BIOPHYSICAL CHEMISTRY (3). Prerequisites, Chemistry 61, Physics 25C, Math 32. Does not carry credit toward graduate work in Chemistry or credit toward B. S. degree in Chemistry. Application of thermodynamics to biochemical processes; enzyme kinetics; properties of biopolymers in solution. *Spring*. Physical Chemistry Faculty: Baer, Berkowitz, Dearman, Jarnagin, Johnson, Miller, Morrow, Parr, Pedersen, Thompson.
- 181 PHYSICAL CHEMISTRY I (3). Prerequisites, Chemistry 21; Math 34; Physics 27, 58, or 61. Introduction to quantum mechanics, atomic and molecular structure, and spectroscopy. *Fall*. Physical Chemistry Faculty.
- 181L PHYSICAL CHEMISTRY LABORATORY I (2). Corequisite or prerequisite, Chemistry 181. Experiments in physical chemistry. *One four-hour laboratory a week, fall*. Physical Chemistry Faculty and Staff. (Fee required.)
- 182 PHYSICAL CHEMISTRY II (3). Prerequisite, Chemistry 181. Thermodynamics, kinetic theory, chemical kinetics, statistical mechanics. *Spring*. Physical Chemistry Faculty.
- 182L PHYSICAL CHEMISTRY LABORATORY II (2). Corequisite or prerequisite, Chemistry 182. Experiments in physical chemistry. *One four-hour laboratory a week, spring*. Physical Chemistry Faculty and Staff. (Fee required.)
- 184 THERMODYNAMICS AND INTRODUCTION TO STATISTICAL THERMODYNAMICS (1-3). Prerequisite, Chemistry 182. Thermodynamics, followed by an introduction to the classical and quantum statistical mechanics and their application to simple

- systems. The section on thermodynamics can be taken separately for one hour credit. *Fall*. Physical Chemistry Faculty.
- 185 CHEMICAL DYNAMICS (3). Prerequisites, Chemistry 181, 182. Experimental and theoretical aspects of atomic and molecular reaction dynamics. *Spring*. Physical Chemistry Faculty.
- 186 INTRODUCTION TO QUANTUM CHEMISTRY (3). Prerequisites, Chemistry 181, 182. Introduction to the principles of quantum mechanics. Approximation methods; angular momentum; simple atoms and molecules. *Fall*. Physical Chemistry Faculty.
- 187 INTRODUCTION TO MOLECULAR SPECTROSCOPY (3). Prerequisite, Chemistry 186. Interaction of radiation with matter; selection rules; rotational, vibrational and electronic spectra of molecules; laser based spectroscopy and nonlinear optical effects. *Spring*. Physical Chemistry Faculty.
- 188 QUANTUM CHEMISTRY (3). Prerequisite, Chemistry 186. Applications of quantum mechanics to chemistry. Molecular structure; time-dependent perturbation theory; interaction of radiation with matter. *Spring*. Physical Chemistry Faculty.
- 189 STATISTICAL MECHANICS (3). Prerequisite, Chemistry 184. Applications of statistical mechanics to chemistry. Ensemble formalism; condensed phases; nonequilibrium processes. *Spring*. Physical Chemistry Faculty.
- 190 FUNDAMENTALS OF MATERIALS SCIENCE (3). Prerequisite, Chemistry 182; or prerequisite, Physics 28 and prerequisite or corequisite, Physics 105. Crystal geometry; diffusion in solids; mechanical properties of solids; electrical conduction in solids; thermal properties of materials; phase equilibria. *Fall*. Irene.
- 191 MATHEMATICAL TECHNIQUES FOR CHEMISTS (3). Prerequisites, knowledge of differential and integral calculus. Chemical applications of higher mathematics. *Fall*. Chemistry Faculty.
- 192 CHEMISTRY AND PHYSICS OF ELECTRONIC MATERIALS PROCESSING (Physics 144) (3). Prerequisite, Chemistry 182, or Physics 25C or 27, and permission of the instructor. A survey of materials processing and characterization used in fabricating microelectronics devices. Crystal growth, thin film deposition and etching and microlithography, characterization techniques, electric and dielectric properties of materials. *Spring*. Chu and Mayer.
- 193 CHEMISTRY AND PHYSICS OF SURFACES (3). Prerequisite, Chemistry 190. The structural and energetic nature of surface states and sites; experimental surface measurements; reactions on surfaces including bonding to surfaces and adsorption, interfaces. *Spring*. Irene, Jarnagin, Mayer.

Courses for Graduates

- 231 SEMINAR IN BIOLOGICAL CHEMISTRY (2 each). Prerequisite, graduate standing.
- 232 Literature survey dealing with topics in protein chemistry and nucleic acid chemistry. *Fall and spring*. Biological Chemistry Faculty.
- 233 SPECIAL TOPICS IN BIOLOGICAL CHEMISTRY (1-3). Modern topics in biological chemistry. *Fall and spring*. Biological Chemistry Faculty.
- 242 LITERATURE SEMINAR IN ANALYTICAL CHEMISTRY (2 each). 242 given in even numbered years; 243 given in odd-numbered years. *Spring*. Analytical Chemistry Faculty.
- 244 SPECIAL TOPICS IN ANALYTICAL CHEMISTRY (1-2). Modern topics in analytical chemistry, including advanced electroanalytical chemistry, advanced mass spectrometry, chemical instrumentation, and other subjects of recent significance. *Two lecture hours a week, fall and spring*. Analytical Chemistry Faculty.
- 252 SPECIAL TOPICS IN INORGANIC CHEMISTRY (1-3). Prerequisite, permission of instructor. Research level survey of topics in inorganic chemistry and related areas. *Fall and spring*. Inorganic Chemistry Faculty.

- 254 LITERATURE SEMINAR IN INORGANIC CHEMISTRY (2). Prerequisite, graduate status. *Fall and spring*. Inorganic Chemistry Faculty.
- 258 X-RAY STRUCTURE DETERMINATION (3). Prerequisites, permission of instructor; a knowledge of elementary and differential calculus will be assumed. This course is designed to introduce students to the techniques used in solving crystal structures by X-ray diffraction. *Three lecture hours a week, fall*. Inorganic Chemistry Faculty.
- 261 SEMINAR IN ORGANIC CHEMISTRY (2 each). Prerequisite, graduate standing. One afternoon meeting a week and individual consultation with the professor in charge. *Fall and spring*. Organic Chemistry Faculty.
- 264 SPECIAL TOPICS IN ORGANIC CHEMISTRY (1-3 each). *Two lecture hours a week, fall and spring*. Organic Chemistry Faculty.
- 267 ORGANIC CHEMISTRY (2 to 6). Prerequisite, to be determined by consultation with professor in charge. *Three to six hours a week, fall and spring*. Organic Chemistry Faculty.
- 281 SEMINAR IN PHYSICAL CHEMISTRY (2 each). Prerequisite, graduate standing. *Two hours a week, fall and spring*. Physical Chemistry Faculty.
- 282 SPECIAL TOPICS IN PHYSICAL CHEMISTRY (1-3 each). Prerequisite, permission of instructor. Modern topics in physical chemistry, chemical physics, or biophysical chemistry. *One to three lecture hours a week, fall and spring*. Physical Chemistry Faculty.
- 288 PRINCIPLES OF CHEMICAL PHYSICS (3 each). Prerequisite, Chemistry 281 or 289 Physics 160 or permission of the instructor. The quantum mechanics of molecules and their aggregates. Atomic orbitals, Hartee-Fock methods for atoms and molecules.

Research Courses

- 331 RESEARCH METHODOLOGY AND SEMINAR IN BIOLOGICAL CHEMISTRY (1 or more). Seminar and directed study on research methods of biological chemistry. This course provides a foundation for master's thesis or doctoral dissertation research. *Fall and spring*. Biological Chemistry Faculty.
- 341 RESEARCH METHODOLOGY AND SEMINAR IN ANALYTICAL CHEMISTRY (1 or more). Seminar and directed study on research methods of analytical chemistry. The course provides a foundation for master's thesis or doctoral dissertation research. *Fall and spring*. Analytical Chemistry Faculty.
- 351 RESEARCH METHODOLOGY AND SEMINAR IN INORGANIC CHEMISTRY (1 or more). Seminar and directed study on research methods of inorganic chemistry. The course provides a foundation for master's thesis or doctoral dissertation research. *Fall and spring*. Inorganic Chemistry Faculty.
- 361 RESEARCH METHODOLOGY AND SEMINAR IN ORGANIC CHEMISTRY (1 or more). Seminar and directed study on research methods of organic chemistry. The course provides a foundation for master's thesis or doctoral dissertation research. *Fall and spring*. Organic Chemistry Faculty.
- 381 RESEARCH METHODOLOGY AND SEMINAR IN PHYSICAL CHEMISTRY (1 or more). Seminar and directed study on research methods of physical chemistry. The course provides a foundation for master's thesis or doctoral dissertation research. *Fall and spring*. Physical Chemistry Faculty.
- 393 MASTER'S THESIS (Hours vary). Prerequisites, Chemistry 331, 341, 351, 361, or 381. *Fall and spring*. Graduate Faculty.
- 394 DOCTORAL DISSERTATION (Hours vary). Prerequisites, Chemistry 331, 341, 351, 361 or 381. *Fall and Spring*. Graduate Faculty.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF CITY AND REGIONAL PLANNING

MICHAEL A. STEGMAN, *Chairman*

Professors

RICHARD N. L. ANDREWS	(37)	Environmental Policy
EDWARD M. BERGMAN	(14)	Planning Theory, Local Economic Planning and Development Policy
RAYMOND J. BURBY	(40)	Land Use and Environmental Policy, Community Facilities, Hazards Management
C. GORMAN GILBERT	(16)	Transportation Planning
DAVID R. GODSCHALK	(11)	Land Use Policy, Dispute Resolution, Growth Management
EDWARD J. KAISER	(5)	Urban Development Processes, Land Use Planning, Planning Methodology
EMIL E. MALIZIA	(12)	Economic and Real Estate Development
DAVID H. MOREAU	(10)	Environmental Planning, Water Resources Planning, Systems Analysis
MICHAEL A. STEGMAN	(6)	Housing and Public Policy, Real Estate Development
SHIRLEY F. WEISS	(7)	Entrepreneurial Land Use Decisions, Central City Revitalization, New Community Development

Associate Professors

HARVEY A. GOLDSTEIN	(36)	Policy Analysis, Planning Theory, Urban Economic and Spatial Structure
WILLIAM M. ROHE	(22)	Social Behavioral Aspects of Urban Development, Neighborhood Planning and Development
DALE WHITTINGTON	(29)	Environmental Planning, Public Investment Theory, International Planning, Resource Economics

Visiting Associate Professor

MICHAEL I. LUGER	(38)	Urban and Regional Economics and Development, Public Policy Analysis, Infrastructure and Housing
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Assistant Professor

LINDA LACEY	(32)	Planning Methods, Demographic Analysis, International Planning
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Instructor

DANA R. WEIST	(37)	Public Finance, Budgeting, Economic Analysis and Quantitative Methods
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Adjunct Professor

DENNIS A. RONDINELLI

International Planning

Associated Faculty

DAVID J. BROWER

(34) Planning Law

CHARLES E. DAYE

Housing and Community Development

MILTON S. HEATH, JR.

Natural Resource Law

JONATHAN B. HOWES

Planning and Government

NANETTE V. MENGEL

Professional Communication

MIKE E. MILES

Real Estate Development

JUDITH W. WEGNER

Land Use and Local Government Law

Professors Emeriti

F. STUART CHAPIN, JR.

MAYNARD M. HUFSCHMIDT

JOHN A. PARKER

JAMES M. WEBB

CITY AND REGIONAL PLANNING

The state of North Carolina, the Research Triangle region, and the community of Chapel Hill are ideally suited to serve as the home base of a nationally ranked program in city and regional planning. The UNC campus is just 30 miles west of Raleigh, the state capital and location of many agencies of state government. Through research projects, internships, and workshop courses, faculty and students interact with agencies such as the Departments of Natural Resources and Community Development, Labor, and Transportation, the Board of Science and Technology, and the North Carolina Housing Finance Agency.

The 5,600 acre Research Triangle Park, which boasts 40 large research facilities employing more than 25,000 people and an annual payroll of more than \$1 billion, is even closer to campus. The park, which has come to symbolize the style of high-tech economic development emerging in many growing U.S. regions, is the engine that drives the area's rapid growth. The Raleigh/Durham metropolitan area, of which the Research Triangle Park and Chapel Hill are part, has been identified as one of 30 metropolitan areas in the country that will account for half the new jobs that will be created in the nation between now and the year 2000. North Carolina is the nation's tenth most populous state and is growing by about 1.5 percent a year. The Research Triangle area is growing three times as fast. The future urbanization patterns of other areas are evident in the Research Triangle area today.

Problems and opportunities associated with rapid and uneven rates of economic growth; the financing of new infrastructure in growing communities in ways that do not overburden existing taxpayers; the creation of programs to improve housing and living conditions of families whose lives

have not yet been touched by the economic revolution of the eighties—these and related issues challenge faculty and students alike to apply their intellectual skills and research interests to help find solutions to current planning problems.

The Department of City and Regional Planning at The University of North Carolina was established in 1946. It was among the first ten planning education programs in the United States. The original bases of the department and its program were ideas about regionalism, broad scale development planning, and the application of social science methods to practical problems of government which were being explored on the Chapel Hill campus in the 1930s and 1940s. This was the first planning department to be established with its principal university base in the social sciences rather than in landscape design, architecture, or engineering. It has retained and strengthened that social science legacy through the multidisciplinary research and teaching programs of its faculty.

At the start of the program in 1946, planning was defined as:

“the union of modern social science, design and engineering. It utilizes social science techniques to analyze the adjustments between men and their physical environment, and adjustments among men in their efforts to meet human needs. Through the planning process ways and means of meeting these needs are developed through social organization and the application of design and engineering techniques. . . .”

From an original concern for applications of social science to regional development needs, the department has broadened its scope to include urban, state, and community planning and to cover physical, social, economic, and natural environmental concerns. Recently, the implementation and management aspects of planning—carrying out public policy through programs, projects, budgeting and finance, regulatory controls, and other actions—have also been emphasized.

The concept of development as a goal of planning remains central to the department's mission. Whether the objectives are improved physical, social, economic, or environmental conditions, or more efficient and equitable policies and programs, planning is a way of effectively marshalling resources to achieve public development objectives. The professional planner combines an understanding of urban and regional theory grounded in a spatial context with a grasp of the planning and management methods necessary to guide development toward desired goals. These skills take on added importance during the 1980s with the emergence of expanded state and local responsibilities, and increased public-private development ventures.

Graduates of the program apply their professional knowledge as local and regional planners, private consultants, state and federal government

officials, public interest group staff members, and development organization planners. To be an effective professional in these varying contexts requires a continuously updated knowledge base; so the field planner must be supported by active researchers. Thus, the overall mission of the department is twofold: to educate practitioners and researchers capable of leadership in planning, and to expand the frontiers of knowledge about the effects of public and private actions on development processes through faculty research and service.

Degrees Offered

The department offers two degrees and one undergraduate major: the Master of Regional Planning and the Doctor of Philosophy in Planning and an undergraduate interdisciplinary major in public policy analysis. The two-year master's degree program is oriented to preparing for the professional practice of planning. The Ph.D. program is oriented to preparing for careers in research and university teaching in planning. The undergraduate major in public policy analysis is oriented to improve students' competence to judge public policies as informed citizens. The requirements of the three programs are described in detail in subsequent sections of the catalog. The two graduate degree programs are largely independent. Applicants should indicate which program they wish to enter.

Facilities and Equipment

The Department of City and Regional Planning is housed in New East Hall and maintains laboratory space in Hanes Hall. New East Hall contains a microcomputer laboratory, lecture and seminar rooms, offices, and the F. Stuart Chapin, Jr. research library containing books, periodicals, pamphlets, reports, and maps used in the study of planning.

The Chapin Library, with some 16,000 books and 9,400 reports, is one of the outstanding planning research collections in the country. The general facilities of the University Library and of the several departmental libraries are also available to students enrolled in the Department of City and Regional Planning.

Mainframe and additional microcomputer facilities, including console connection to the Triangle Universities Computation Center, are also available to students through the Institute for Research in Social Science and through the UNC Computation Center.

Students in the Department

During the past forty years students have entered the department from all parts of the United States, from Canada, and from many other countries. The educational backgrounds of students who have entered the department and who now hold positions of responsibility in the profession cover a wide

range of undergraduate fields. Among them are architecture, biology, botany, business, economics, engineering, forestry, geography, history, landscape architecture, philosophy, political science, public policy analysis, psychology, public administration, sociology, and urban studies.

Graduates hold positions as directors of planning in the planning departments of small and large cities; as directors of state and regional planning programs; as associate and assistant planners in city, county, metropolitan, and regional planning agencies, in housing and urban development agencies, in various branches of the federal service, in public interest organizations and associations, in research organizations and in private development firms and banks; as private consultants; as planning advisors to communities and developing areas; and as deans, chairmen, and faculty members of educational institutions.

The Planning Profession and Employment Opportunities

During the last twenty years the field of planning has expanded considerably. The planning function is now a central part of municipal, county, and state government. In addition, planning agencies have been established and are operating within the framework of metropolitan, regional, and national governmental programs.

This period of increasing planning activity has also broadened the scope of planning. In addition to design, research, and analysis, present-day planning functions include program management and implementation activities within public agencies and private organizations as well as coordination between government and business units. Planners increasingly are called upon to lead policy analysis teams, to mediate conflicts, to advise decision-makers of project impacts, and to package development proposals.

Employment opportunities in planning agencies are varied. In general the work involves collection and processing of data; physical, environmental, and socioeconomic analysis; the preparation and evaluation of alternative proposals; and the formulation and implementation of programs for action.

As a consequence of the growth of planning activities throughout the world, adequately trained and qualified members of the profession are in demand both in this country and abroad.

Equally important to the advancement of the field is the increasing need for advancing theory and knowledge in urban and regional development and for highly motivated teachers of planning. There has been a steadily increasing demand for teachers and researchers among universities and research organizations in the United States, Canada, and overseas.

Together with the faculty, hundreds of the department's 1,200 alumni in all parts of the country form an effective job referral and placement network for new and old graduates alike. Large numbers of our graduates in such key metropolitan centers as Boston, New York, Washington, Atlanta,

Orlando/Miami, Chicago, and on the West Coast provide invaluable assistance to students in their initial job search and throughout their professional careers. Alumni keep in touch with the department and each other through the Annual Alumni Newsletter, which the department publishes and distributes to all graduates.

Application and Admission

Application for admission should be received in Chapel Hill by February 1 for admission to the following fall term. Late applications will be processed and admissions granted on a space-available basis. Decisions on admissions and financial aid are made beginning February 15, and all decisions are generally complete by April 15.

Forms and instructions for application will be mailed by the department on request. Each applicant is required to pay a nonrefundable \$35.00 fee when submitting an application.

Since the department has limited accommodations, applicants are advised to apply for admission as early as possible. In cases where the applicant is transferring from another graduate planning program or has had considerable experience in planning, admission at the opening of the spring semester is permitted. Applicants who are able to visit the department for personal interviews are invited to do so. The Planning Careers Weekend, hosted by the department each March, provides applicants an opportunity to discuss their professional interests with faculty and enrolled students.

Admission Requirements

All students entering the department must have received a bachelor's degree from an institution of recognized standing. While the design professions, the social sciences, and engineering are the most clearly relevant undergraduate backgrounds for planning, there is increasing need in the field for people prepared in the humanities, natural sciences, and business administration as well as many opportunities for students from other fields.

Applicants are required to take the Graduate Record Examination (GRE). This examination, which should be taken as early as possible (preferably in October prior to the beginning of the academic year in which the student wishes to enter the department), is administered five times a year in conveniently located centers throughout the United States and in many other countries. To be eligible to take the examination, the candidate must have an application accompanied by the appropriate fee on file approximately fifteen days in advance of the scheduled date of the examination. Examinations are generally scheduled in October, December, February, April, and June. A bulletin of information giving full particulars may be obtained from most colleges and universities, or by writing to Graduate Record Examinations, CN 6000, Princeton, NJ 08541-6000. The results of this exami-

nation are recognized as contributory, not determinative, evidence of the qualifications of the applicant.

Admission Decisions

Decisions on admissions are made by the Graduate School on the basis of recommendations submitted by the department. In making admissions recommendations, a student-faculty committee reviews all applicants in terms of established department policy. The major criteria used are the applicant's preparation for graduate professional education as indicated by the personal statement of interest in planning filed with the application, academic preparation as indicated by the undergraduate transcript and the GRE, and personal recommendations from teachers and employers.

In addition we seek to achieve a reasonable balance of students across the primary areas of specialization in the department so as to make good use of faculty resources, and we seek to have students from a variety of academic and geographic backgrounds. Although previous professional or preprofessional work experience in planning or a related field is not required, it is considered in admission decisions. Generally part of each class has planning-related experience.

The department has a strong commitment to providing increased opportunities for minority and disadvantaged persons to enter the planning profession and actively encourages admission of women and racial minorities.

Transfer Credit

Students desiring to transfer to Chapel Hill from another graduate planning program may do so if they meet the admission requirements. Courses submitted for transfer must be reviewed and approved by this faculty. The maximum credit that may be transferred from another program is 12 semester hours.

Similarly, students wishing to transfer nonplanning graduate course work taken elsewhere may do so up to a maximum of 12 semester credit hours, providing that the courses were not credited to another degree and that the courses are judged by the department to be appropriate to the elective requirements of the student's program at Chapel Hill. Graduate courses taken while in undergraduate status at other universities are not transferable.

A minimum of three semesters in residence is required.

The Professional Master's Degree Program

The program leading to the degree of Master of Regional Planning prepares the candidate for professional planning practice. The curriculum covers social and institutional problems and settings, and planning and management skills.

Satisfactory completion of the degree requires completion of a minimum of 48 credit hours, including an area of specialization and a departmental paper in that area. The normal course load is 12 to 15 credit hours per semester. Thirty-six of the required 48 credits must be taken in the planning department.

Course work for the degree is divided into general requirements, area of specialization, and electives. Each student is assisted in the design of his or her educational program by a faculty adviser, who helps to select courses appropriate for the student's educational interests and goals.

General Course Requirements

All master's degree students are expected to meet certain general course requirements. These presently consist of courses covering planning theory, urban spatial theory, analytical methods, planning law, and a planning workshop. These basic course topics constitute a core of knowledge and skills prerequisite to completion of the master's degree program.

The planning theory requirement is met by completing Planning 204. The analytical methods requirement is met by completing Planning 130 and 131. Planning 214 fulfills the spatial theory requirement. Students select a planning workshop (Planning 222 or 223) and a planning law course (from among Planning 230, 233, or another approved course taught in the Law School) that is appropriate for their specialization.

Areas of Specialization

Each student develops an area of specialization in planning in consultation with faculty advisers. The area of specialization identifies the fields of professional practice in which the student expects to develop competence and begin a professional career.

Areas of specialization offered by the department reflect a combination of available faculty resources, current practice employment opportunities, and longer term societal needs. As these factors change, specialization content is adjusted. The specializations offer different blends of technical knowledge, planning and management skills, philosophies about the role of the planner, and theories for understanding relevant problems and contexts.

The department offers five areas of specialization:

Economic and Community Development builds on social, political, economic, and spatial theories of industrial, enterprise, labor, and social group behavior, and deals with alternative methods of planned intervention at scales which range from the neighborhood to multistate regions. Local economic and community development problems and issues, such as slum conditions or unemployment,

are approached through practice-based analytic, program design, and financing methods. Workshops with public, private, non-profit, or community-based clients afford opportunities to test economic or community development strategies. Topics covered include design of development and re-development plans, strategies, and projects; economic, social, and fiscal impact studies; industrial and occupational forecasting; industrial, fiscal, employment, and neighborhood development policies; community, labor market, and site studies; business incubation, retention, and revitalization strategies; economic and community adjustment plans; sources, uses, and instruments of development finance; public-private ventures; community and employee ownership; and spatial dimension of changes in social and economic activity.

Land Use and Environmental Planning prepares students for careers in planning and management of the physical environment and its development. The primary focus is the U.S. state and local context, although much of the material is relevant to both national and international contexts. Required knowledge includes understanding of urban spatial relationships, natural systems functions, physical resource utilization, urban development processes, human activities patterns, and legal/institutional arrangements for government planning, regulation, and capital investment. Theoretical principles of urban form and spatial structure are combined with resource economics concepts to build a rationale for pursuing the public interest through planning and intervention into private markets. Necessary skills include acquisition and analysis of physical systems information; estimation of impacts from proposed projects; preparation of land use, environmental, and growth management plans; drafting and administration of development regulations and capital improvement programs; evaluation of site plans and project proposals; and communication and policy implementation. These skills are applied through methods dealing with political and institutional as well as land use and environmental factors at the project, neighborhood, city, county, and regional scales.

Real Estate Development and Housing builds on institutional and behavioral theories of the local housing and land markets, including the roles and functions of public and private participants in the development process, economic and urban spatial theories, and models of investment behavior. Normative theories are used to identify and explore the public interest in development, the causes of market failure, and the justifications for public intervention involving regulation and codevelopment. The dominant methods include microcomputer-based real estate investment analysis, project

design and evaluation, development marketing and management, and economic and market feasibility studies. Skills and understanding are taught, generally using the case method, and applied in a field-oriented workshop in which students prove the feasibility of real-world development projects. Topics include public/private financing programs, affordable housing, real estate marketing, construction management, real estate syndication, land development risk mitigation, dynamics of the development process, development impacts of large-scale development, and development dispute resolution.

Urban Services and Infrastructure relies on economic theory and engineering principles to develop an understanding of how urban services are planned and managed, and how urban infrastructure is planned and financed. It develops the rationale for local government intervention and for determining the proper scope and application of regulatory policies and the public provision of goods and services. Methods include economic analysis for service pricing and financing, impact analysis of facilities, and project evaluation techniques. Problem-solving workshops serve municipal or public-authority clients and focus on the development of infrastructure inventories, service pricing and financing structures, and urban service plans. Topics emphasized are the management of urban transportation and urban water services and the provision of transportation, water resources, and waste and storm water facilities. The specialization also considers air quality, toxic and non-toxic solid waste disposal, highways, parking, and tele-communications.

Planning in Developing Areas trains planners from both industrialized and less developed countries to work on management, research, administrative, and planning issues at the local, regional, and national levels in developing areas. Theories of economic development, social change, environmental degradation, and urbanization are presented as well as analytical tools and quantitative techniques that prepare students to embark on a wide variety of careers that meet the needs of donor agencies and governments in developing countries. Students receive training in development planning techniques, cost-benefit analysis and project appraisal, project management, and population planning. Special emphasis is placed on the use of microcomputers for development planning work. Students are also expected to develop planning skills in another area of specialization such as land use planning, environmental management, real estate and housing, or community and economic development.

In addition to focusing on these areas of specialization, students may pursue other fields of planning within the department's curriculum. For example, a student can combine two areas of specialization or focus in depth on a narrower portion of a particular specialization, such as growth management or transportation planning. A concentration might be built around a set of skills, such as quantitative analysis or development management, or around a practice context, such as metropolitan areas or small towns.

The objective of defining areas of specialization is to identify the subject areas where there exists a critical mass of courses sufficient to allow both breadth and depth of coverage. The intent is to build upon the particular educational strengths and resources of the department and the university. Our goal is to offer each student the optimum combination of structure and flexibility to develop his or her talents and knowledge as fully as possible.

Each area of specialization has a unique set of required courses which are sequenced and coordinated to provide effective coverage of the area as efficiently as possible. Generally, specialization courses account for 12 credit hours. Thus, in a 48-credit hour program, half the credits are taken to fulfill basic requirements or specialization requirements while half are electives chosen by the student in consultation with faculty advisors. In addition to the four course requirements in planning theory, urban spatial theory, and analytical methods, students are required to take the most appropriate planning law course and problem-solving workshop as determined by their faculty advisers.

General Electives

Additional courses are required beyond the general required courses and courses in the area of specialization. General electives may be used to complement and support the area of specialization, to specialize in another area of professional planning, to develop skills in a discipline (economics, design, sociology, etc.) or another professional program represented on campus (public administration, health administration, environmental engineering, business administration, etc.), or to develop general competence for professional practice through courses selected both within the department and from the regular offerings of the university. Nine credits may be taken outside the department.

Summary of Course Requirements

	<u>Total</u>	<u>Must Be In DCRP</u>	<u>May Be Outside of DCRP</u>
Planning Theory	3	3	—
Urban Spatial Theory	3	3	—
Planning Law	3	—	3
Analytical Planning Methods	6	6	—
Planning Applications	3	3	—
Area of Specialization	12*	12	—
Electives/Supporting Courses	18	9	9
Total	<u>48</u>	<u>36</u>	<u>12</u>

*Varies by area of specialization.

Departmental Paper

The Departmental Paper required of all master's degree students is an original piece of work involving a substantial degree of independent research and analysis of a topic related to planning practice. The requirement may be met by a paper of standard format. The requirement can also be fulfilled with a product in some other form such as a plan or audiovisual presentation.

Ordinarily students will submit an individually prepared paper. The student submits the paper topic and outline to the faculty in his/her area of specialization. The faculty approves the topic and assigns a faculty member to serve as major adviser for the paper. The student may invite another faculty member to serve as a reader. Both must approve the final paper. The paper is completed during the final semester in residence. Papers are filed by the department as part of the permanent record of the student's work.

The Doctoral Program

In comparison with the master's degree, which signifies preparation for professional planning practice, the degree of Doctor of Philosophy in City and Regional Planning is conferred upon those who have completed, with high distinction, a rigorous program of preparation for research and teaching in planning. Candidates must demonstrate mastery of the materials in an area of specialization within planning, of the concepts of planning theory, and of the methods of advanced research, and illustrate this mastery through a comprehensive examination and a dissertation resulting from independent research.

The degree requires a minimum of 51 credits, not including the dissertation. Of these, 45 credits must be completed before the doctoral examinations

may be taken. At least 24 of the 51 credits must be taken in departments other than City and Regional Planning.

The professional master's degree in planning is not required of persons wishing to qualify for the doctorate. However, prior to admission to candidacy, the student undertaking study for the degree of Doctor of Philosophy in the Department of City and Regional Planning must demonstrate a knowledge of the professional practice of planning. Such knowledge is usually acquired through selected graduate courses offered at The University of North Carolina at Chapel Hill or at other institutions offering acceptable programs, or through some equivalent preparation acceptable to the student's committee.

Areas of specialization and appropriate coursework for doctoral students are jointly determined by the students and their program committees. Particular efforts are made to develop programs which meet student needs, build on their prior academic training, and for which substantial departmental and universitywide faculty resources are available. Areas of specialization ordinarily include at least 18 credits of coursework. While the substantive focus of these areas may vary from student to student, each set of courses designated as an area of specialization must be mutually reinforcing and coherent; must prepare the student for expertise in some body of knowledge, methodology, or problem area; and must provide the student with adequate skills and knowledge to do research.

A student may take a formal minor in another discipline with the consultation and approval of the appropriate department and the student's program committee. The minor emphasizes the achievement of methodological and related skills necessary to extend the student's research capabilities within a chosen area of specialization. Supportive complementary relationships between the two program components must be demonstrated.

It is important that the Ph.D. Admissions Committee be able to identify an applicant's program interests from application materials submitted for review to the Graduate School and the department. In addition to any supplemental material the applicant may wish to submit in support of his or her application, the statement called for in the department's supplemental application should describe the proposed area of concentration and specific program coursework and research interests, and information on relevant prior academic and professional training. The admissions process consists of two related phases. First, the Admissions Committee renders judgment about the academic qualifications of the Ph.D. applicant. Second, assuming academic qualifications are met, the committee attempts to identify the applicant's program interests and the stage of development of those interests, and then considers the extent to which departmental and universitywide resources may be marshalled in support of those stated interests. Thus, academic qualifications are a necessary but not sufficient basis for admission into the doctoral program. Applicant interests must be clear and uni-

versity resources must be supportive to ensure the development of a strong Ph.D. program.

Doctoral candidates who hold master's degrees in planning require generally a minimum of three semesters in residence before beginning the dissertation. Other candidates may require five or more semesters, depending on their preparation.

Persons wishing to be considered for admission to the doctoral program and for fellowships and assistantships that may be available to doctoral candidates are advised to communicate with the department as far in advance as possible of the date they wish to enter. While the university financial awards are made in the spring each year, the deadline for applications for certain fellowships available to Ph.D. candidates is in January preceding the August in which the applicant plans to begin the doctoral program. It is beneficial for an applicant to visit the department to discuss doctoral program requirements and to describe his or her interests prior to making formal application for admission.

Further information about the doctoral program may be obtained from the program director, Professor Edward Kaiser.

Combined Program in Law and Planning

Under a combined program sponsored by the School of Law and the Department of City and Regional Planning, students may pursue the J.D. and Master of Regional Planning degrees together. Taken jointly, the two degrees may be obtained in four years rather than the five years ordinarily required. The combined program seeks to develop professionals capable of dealing with both the legal and planning aspects of urban and regional policy problems. Coursework is designed to prepare students for a variety of professional roles in which a knowledge of planning methodology and process, coupled with the analytical skills and professional expertise of the lawyer, are essential. These include administrators and staff of public agencies and consulting firms in the fields of planning, housing, development, and environmental protection, and members of private law firms and public legal staffs.

To enter this program, students must apply separately to both the School of Law and the Department of City and Regional Planning, and must be accepted independently by both. Students entering the program spend their entire first year in either the Department of City and Regional Planning or the Law School, and the student must make this choice at the time of admission. The second year is normally spent full time in the program not selected in the first year. After the first two years the student has an additional 43 semester credits to complete in the Law School and 12 semester credits to complete in planning.

A catalog and application for admission to the Law School may be obtained from:

Admissions Office
School of Law, CB# 3380
The University of North Carolina at Chapel Hill
Chapel Hill, North Carolina 27599

Further information may be obtained from the program advisers:

- Professor David R. Godschalk, Department of City and Regional Planning
- Professor Judith Wegner, School of Law.

Joint Specialization in Real Estate Development

With the support of a curriculum development grant from the Urban Land Institute (ULI), the Department of City and Regional Planning and the Graduate School of Business Administration have created a joint area of specialization in real estate development. Among the goals of the program are:

- to develop excellence in the study and analysis of development and to graduate students who will improve the state of land use planning and development practices;
- to train urban planners in real estate development, economics, and finance; how to assess the relative costs and benefits of various types of development regulations; and how to improve the regulatory process and improve development practices;
- to broaden the real estate training experiences of business students to include the public/private financing of affordable housing, codevelopment, and other projects which meet public development goals;
- to introduce business students to the public values associated with the regulation of physical development and the bases for land use planning and controls;
- to establish strong links between the new program in real estate development and members of the development community and the region.

Combined Program in Planning and Transportation Engineering

A combined program leading to graduate degrees in city and regional planning and transportation engineering is offered in collaboration with the Department of Civil Engineering of North Carolina State University at Raleigh. The combined program, which calls for 60 semester credit hours, leads to the degrees of Master of Regional Planning and Master of Science in Civil Engineering or Master of Civil Engineering. This program is open to students with undergraduate degrees in civil engineering. For other

students, coursework in transportation is available at NCSU with approval of the instructor. For further information write to the Chairman of the Department of City and Regional Planning, The University of North Carolina at Chapel Hill, and to the Chairman of the Department of Civil Engineering, North Carolina State University at Raleigh.

Public Policy Analysis Program

For undergraduate students interested in the study of public policy, the Public Policy Analysis Program provides a unique educational opportunity. The Program is an interdisciplinary curriculum involving the Departments of Political Science, Economics, Planning, Sociology, and Philosophy.

Students who declare public policy as a major are required to complete a seven-course core which provides a rigorous intellectual framework and skills for analyzing public policy options. Students are also required to take additional courses in an area of specialization. Internships between the junior and senior years are strongly recommended, and students are assisted in locating internships.

Course Requirements for Public Policy Majors:

I. Seven Core Courses

1. Introduction to Public Policy Analysis (POL SCI 71)
2. Ethics and Policy Analysis*
3. Public Policy and the Market*
4. Methods of Research for Policy Choices and Evaluation*
5. Statistics for Policy Decisions*
6. Political and Administrative Feasibility of Policies (POL SCI 74)
7. Advanced Individual Projects (POL SCI 94D)

*There are several courses to select from to satisfy the requirement.

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Students in Other Departments

Students taking majors in other departments may be admitted to courses in city and regional planning provided they have the necessary prerequisite training and permission of the instructor. A limited number of courses are open to undergraduate students, and priority is given to students majoring in Public Policy Analysis and those who are in the Undergraduate Honors Program in Urban and Regional Studies. Minor programs for qualified students who are candidates for master's and doctoral degrees in other fields also may be arranged.

Research Programs in Urban and Regional Studies

Through the Center for Urban and Regional Studies, the Institute for Research in Social Science, the Water Resources Research Institute, the Institute for Environmental Studies, and the Carolina Population Center, members of the faculty and graduate students in the Department of City and Regional Planning and in related departments collaborate on research in a wide range of subject areas concerning planning, human behavior, and the environment.

Established in 1953 and later expanded under a grant from the Ford Foundation, the program of the Center for Urban and Regional Studies is concerned with theoretical and empirical research in urban processes and area development. The center has a permanent staff for planning and administration of its program and for the development of a research-oriented program of services to local and state governments in North Carolina and elsewhere. The department's faculty utilizes the center to pursue research interests and collaborates with faculty members of other departments in the university on research projects.

The Institute for Environmental Studies, established in 1965, provides within the university a means for furthering research and teaching the various fields of environmental quality on an interdisciplinary basis. Members of the department's faculty and graduate students use the institute to participate with other departments in seminars and discussions on broad aspects of environmental quality in the natural and social sciences, in engineering, and in public health.

In 1964 the Water Resources Research Institute was established to support research on all aspects of water resources including the planning, programming, and analysis of urban and regional systems for development and control of quantities and quality of water and related land use. The institute serves as a focal point for faculty and student research and interdisciplinary seminars relating to water resources.

The Carolina Population Center, established in 1966, provides coordination of the universitywide, interdisciplinary program in population research and training. Its efforts span the social, behavioral, and health sciences, and it provides research services to faculty doing research in the U.S. and abroad. Departmental faculty and students are engaged in international research through the CPC.

The Institute for Economic Development was created in 1971 within the Extension Division of the University to sponsor the Basic Economic Development Course. Now under the auspices of the Department of City and Regional Planning, the institute promises to strengthen the department's research and teaching mission and to enlarge its service capacity.

In addition to these activities organized under an institute or center, faculty members are engaged in research projects administered by the department.

Several other facilities in the nearby Research Triangle Park enrich and support the department's teaching and research programs:

Triangle Universities Computation Center—TUCC is a not-for-profit corporation founded and administered by Duke University, North Carolina State University at Raleigh, and The University of North Carolina at Chapel Hill. The center's principal activity is to provide computing facilities and services for these three universities, the North Carolina Educational Computing Service (NCECS), which extends these services to some fifty other institutions of higher education in North Carolina, and the Research Triangle Institute.

Triangle Universities Computation Center is one of the largest educational information teleprocessing centers of its kind in the world. Its IBM 3081-K and IBM 370/168 mainframes, FPS-164 supercomputer, and Hewlett Packard 2000 minicomputer are linked to the three local campuses by microwave or high-speed telephone lines and to the other institutions by various telephone services. Through Telenet, Edunet, and Bitnet, TUCC also provides special services to several institutions across the United States and Canada, and can make special computer services of many other institutions available to the TUCC computing community.

Research Triangle Institute—RTI is a not-for-profit corporation that conducts research under contract to departments of federal, state, and local governments, public service agencies, foundations, and industry clients ranging from local firms to national corporations.

The institute was created as a separately operated affiliate of the three major universities that form the Research Triangle. Initial start-up funding for RTI was provided through a grant from the Research Triangle Foundation.

Since research operations began in 1959, RTI has grown to a full-time, permanent staff of approximately 950. Contract revenues exceed \$42 million annually.

The institute is organized into major groups whose areas of capability span social and economic systems and human resources, statistical sciences, survey research, chemistry and life sciences, energy, engineering, and environmental sciences.

National Center for Health Statistics—The U.S. Public Health Service's National Center for Health Statistics (NCHS) located the Developmental Laboratory in the Research Triangle Park (RTP) in September 1966. A staff of 150 came to the Research Triangle Park in November 1968.

Over 200 people are now employed at the RTP facility of NCHS. The RTP facility houses the Computer Center Branch, Data Preparation Branch, Programming and Systems Development Branch, and headquarters of the Division of Data Processing. Also located at the RTP facility is the Technical Services Branch of the Division of Vital Statistics, which provides

assistance and guidance to states as part of the National Vital Statistics System.

Environmental Research Center, U.S. Environmental Protection Agency—The Environmental Research Center, the largest field installation of the U.S. Environmental Protection Agency, was dedicated in December 1971. Today it is an international center of scientific expertise in environmental research.

Triangle Universities Center for Advanced Studies, Incorporated—The Triangle Universities Center for Advanced Studies, Incorporated (TUCASI) represents an additional effort in the Research Triangle of North Carolina to capitalize on the presence in a small radius of three major doctoral-research institutions, their facilities, libraries, and auxiliary resources. It is a joint activity of The University of North Carolina at Chapel Hill, Duke University in Durham, and North Carolina State University at Raleigh. TUCASI is the parent body that will sponsor development of advanced study enterprises on its 120-acre campus within the Research Triangle Park. The Center, chartered in 1975, is governed by a Board of Trustees, representing the constituent universities, the Research Triangle Foundation, and elected members.

The National Humanities Center was the first resident activity on the TUCASI campus. The center opened in 1978 as an institute for advanced study in history, literature, philosophy, and other fields of the humanities. Each year 40–45 leading scholars from the United States and other nations come to the center to pursue individual research and engage in interdisciplinary seminars, lectures, and conferences. Their work results in books, articles, and various other contributions to learning. The center's program funding and administrative costs are supported by grants from major foundations, corporations, the National Endowment for the Humanities, the Triangle Universities, and individuals.

The North Carolina Microelectronics Center, MCNC, is the second activity to be placed on the TUCASI campus. MCNC, in its own highly sophisticated design, fabrication, and laboratory building provides educational and research facilities and services in microelectronics to the Triangle Area Universities, UNC-Charlotte, NC A&T University in Greensboro, and the Research Triangle Institute.

UNC Institute for Transportation Research and Education—The Institute for Transportation Research and Education (ITRE) is a division of The University of North Carolina General Administration. Its responsibilities include facilitation of transportation-related programs throughout the 16 campuses of the University. Affiliated faculty and staff of ITRE are located on various campuses of the University and at ITRE's Research Triangle Park facilities.

Included among ITRE's activities are workshops, short courses, research projects, and training programs for transportation professionals throughout North Carolina.

Courses for Graduates and Advanced Undergraduates

- 107 ENTREPRENEURIAL DECISIONS (3). Prerequisite, PLAN 106 or permission of instructor. A seminar and field experience in balanced new communities, retirement communities, planned unit developments (PUDs), regional and community shopping centers, industrial/research parks, and recreation-theme parks. Focus on the decision-making process, entrepreneurial risk in building the urban environment, and uncertainties in long-range planning and development. *Fall*. Weiss.
- 108 NEW TOWNS AND LARGE-SCALE DEVELOPMENT (3). Examination of issues and problems in new towns and large-scale development in the U.S. and abroad; comparative evaluation of development processes and projects in the public and private sectors; independent studies on planning process, public policy, financial feasibility, implementation, governance, and community concerns. *Spring*. Weiss.
- 110 SELECTED TOPICS IN URBAN STUDIES (3). An introduction to the functioning
111 of the urban area as a complex system, and to the analysis of policies aimed at development and change. *Fall or spring*. Faculty.
- 122 URBAN ECONOMICS (ECON 122) (3). Prerequisite, Economics 100 or 101 or equivalent. Urban problems facing us today; unorganized growth, disparate land uses, fiscal crisis, the ghetto, poverty, employment, housing and transportation inadequacies, and crime. *Fall or spring*. Faculty.
- 124 URBANIZATION AND PLANNING IN THE THIRD WORLD (3). Surveys, theories, issues, and planning strategies employed in developing countries. Topics include rapid population growth and urbanization, squatter settlements, regional inequalities, problems of the urban and rural poor, and national urbanization policies. *Fall*. Lacey.
- 125 URBAN SERVICES AND INFRASTRUCTURE (3). Examination of public services and facilities provided by local governments. Institutional framework, alternative service delivery mechanisms, public policy and history. Analysis of financing, pricing, public regulation, impacts, efficiency and effectiveness. *Spring*. Faculty.
- 126 URBAN TRANSPORTATION PLANNING (3). Fundamental characteristics of the urban transportation system as a component of urban structure. Methodologies for the analysis and planning of urban transportation. Techniques for the analysis of problems and the evaluation of plans. *Fall*. Gilbert.
- 127 PUBLIC TRANSPORTATION (3). A seminar investigating alternative public urban transportation systems including mass transit, innovative transit services, and paratransit schemes. The systems will be examined from economic, land use, social, technical, and policy perspectives. *Spring*. Gilbert.
- 129 TRANSPORTATION PLANNING MODELS (3). Techniques for predicting transportation demand. The transportation planning process; data collection, trip generation, modal choice, trip distribution and assignment. System evaluation techniques: social, economic, and environmental impacts of transportation; investigation of innovative modeling techniques. *Spring*. Faculty.
- 130 STATISTICS AND INFORMATION ANALYSIS (3). Foundation course in statistical concepts and methods. Descriptive statistics, estimation and hypothesis testing, simple correlation and regression, and information acquisition, analysis and presentation. Microcomputer laboratory. *Fall*. Kaiser, Rohe.
- 131 QUANTITATIVE METHODS IN PLANNING (3). Fundamental quantitative methods as aids in prediction and decision making in planning, including multivariate statistics, decision analysis. Introduction to computer programming and simulation. *Spring*. Whittington.

Courses for Graduates

- 200 SPECIAL TOPICS IN PLANNING AND URBANISM (3). Reading and discussions to provide opportunities to develop new concepts and topics in various aspects of city and regional planning. *Fall or spring*. Faculty.
- 204 THEORY OF PLANNING I (3). Concepts and logic of planning as a professional activity. Critical overview of current theories leading students to development of a personal philosophy applicable to their work as planners. *Fall*. Bergman.
- 205 THEORY OF PLANNING II (3). Construction of methodologies for evaluating various theories of planning and intensive analysis of the North American planning theory literature. Doctoral-level introduction to the area. *Spring*. Goldstein.
- 207 PROFESSIONAL COMMUNICATIONS (Var.). Workshop on effective professional communications skills. *Writing* module focuses on writer and written work to build strength of expression. *Oral/graphics* module focuses on descriptive and persuasive powers, and on using graphics for problem-solving and presentations. *Spring*. Godschalk, Mengel.
- 209 PLANNING AND GOVERNMENT (POLI 209) (3). Seminar on the nature and scope of the planning function in government, with particular emphasis on planning and domestic policymaking in the federal executive branch, and its legislative and inter-governmental relationships. *Spring*. Howes.
- 210 ECONOMIC ANALYSIS FOR PUBLIC POLICY PLANNING (3). Principles of microeconomic analysis for public policy planning. Emphasis on applications of theory and methods of economic analysis to policy problems in the public sector. *Fall*. Weist, Whittington.
- 214 URBAN SPATIAL STRUCTURE (3). Spatial analysis techniques; locational behavior of various urban activity systems; neighborhood change; political organization of metropolitan regions; normative/future perspectives on urban form. *Fall*. Goldstein.
- 219 ENVIRONMENTAL SYSTEMS ANALYSIS (ENVR 219) (3). Multiobjective programming and planning techniques applied to environmental and resource management. Review of selected models on water quantity and quality, air quality, land use, and public facilities location. *Fall*. Whittington.
- 222 PLANNING WORKSHOP (3). Problem-solving, client-based course designed to give students experience in applying planning theory and methods to actual problem situations. Second-year students select the section which most closely relates to their specialization. *Fall or spring*. Faculty.
- 223A REAL ESTATE MARKET AND FEASIBILITY (BUSI 217) (3). Applications workshop focused on the real estate development process in which student teams must demonstrate the feasibility and desirability of a realistic commercial, industrial, residential, office, or mixed-use project. *Spring*. Malizia.
- 225 PUBLIC ECONOMICS FOR PLANNING AND POLICY (3). Prerequisite, PLAN 210. The economics of the public sector, including welfare economics and cost-benefit analysis, principles of federal finance, regulation, trade, and related topics. Applies theory to planning and policy problems. *Spring*. Faculty.
- 226 STATE AND LOCAL PUBLIC FINANCE I (3). Principles, practices and institutions of state and local public finance. Emphasis on application of theory and method to policy problems. Topics include expenditure determination, financial reporting, taxes, borrowing. *Fall*. Weist.
- 227 STATE AND LOCAL PUBLIC FINANCE II (3). Prerequisites, PLAN 226 or instructor's permission. Topics include municipal service delivery systems, advanced treatment of the municipal bond market, tax and expenditure limitations, alternative revenue sources including user fees and development fees, intergovernmental aid. *Spring*. Weist.
- 230 PLANNING LAW (3). Governmental organization and enabling legislation for planning: eminent domain, dedication, official map, and other property-acquisition tech-

- niques; land use regulations, including nuisance ordinances, deed restrictions, building regulations, subdivision regulations, and zoning. *Spring*. Faculty.
- 231 ENVIRONMENTAL POLICY ANALYSIS (ENVIR 253) (3). Structure and dynamics of U.S. environmental policy making as they affect environmental management. Legislation, regulation, administration, and the roles of science and analysis in political decisions are presented. Two lecture and two seminar hours per week. *Spring*. Andrews.
- 232 PUBLIC INVESTMENT THEORY AND TECHNIQUES (ENVR 282) (3). Theory and techniques of public investment planning and benefit cost analysis involving synthesis of economic, political and technologic aspects. Special focus on project and program evaluation in the Third World. *Spring*. Whittington.
- 233 NATURAL RESOURCE LAW AND POLICY (ENVR 283) (3). An examination of the law of resource use and development, its administration and underlying policies. Particular attention is given to water resources law, regulatory law, and natural resource administration. *Spring*. Heath.
- 234 WATER RESOURCES PLANNING AND POLICY ANALYSIS (ENVR 284) (3). Introduction to water resources planning and management. Emphasis on federal and state water resources policies and development of analytical skills for identification of environmental problems associated with urban water resources development. *Fall*. Moreau.
- 238 REVITALIZING THE CENTRAL CITIES: PROCESS, PRODUCT, AND POTENTIAL (3). Critical examination of processes of urban redevelopment, renewal, conservation, preservation, adaptive reuse, new towns-in-town as they have evolved in the older cities of the United States. Key legislation, public policies, and revitalization programs in the public and private sectors are reviewed through an extensive reading list and consideration of a broad range of city studies. *Fall*. Weiss.
- 239 POLICY WORKSHOP (Political Science 239) (3). Application of theories and techniques of policy analysis and planning to current public problems for actual clients. Focus on design and execution of policy research, and interpretation and presentation of results. Topics may vary from section to section and year to year. *Spring*. Faculty.
- 240 LAND USE AND ENVIRONMENTAL POLICY (3). History, institutional setting, rationale of state and local land use and environmental policies. Program and policy frameworks, public and private actors, political and market processes, resource utilization concepts, and policy issues in contemporary development and resource management. *Fall*. Andrews.
- 241 LAND USE AND ENVIRONMENTAL PLANNING (3). Methods of land and environmental planning at urban and regional scales. Analysis of land use and capability, environmental impacts, population and economic change, and infrastructure capacity. Preparation of land use and critical areas plans. *Spring*. Godschalk and Kaiser.
- 242 PROJECT AND SITE PLANNING (3). Techniques of site analysis, project programming, and arrangement of structures on the land. Workshop covering design and review of urban development projects, within limitations of regulatory standards and market criteria. *Fall*. Godschalk.
- 244 DEVELOPMENT AND ENVIRONMENTAL MANAGEMENT (3). Coordination of public powers and private actions to implement development plans and conserve environmental resources. Regulatory, public investment, incentive, and policy instruments used in land use and environmental guidance systems. *Fall*. Kaiser.
- 245 LAND USE AND ENVIRONMENTAL ANALYSIS. Methods for data management and predictive analysis of land use, natural resources, environmental quality, and infrastructure systems in urban settings. Information systems, land use allocation models, environmental impact analysis. *Spring*. Burby and Moreau.
- 247 NEIGHBORHOOD PLANNING (3). Introduction to the rationale and practice of neighborhood planning, including neighborhood level sociological and political concepts, design and conservation, organizational structures for planning, community

- organizing approaches, government programs and funding, and recent experience. *Spring*. Rohe.
- 251 REAL ESTATE INVESTMENT AND AFFORDABLE HOUSING (3). Fundamentals of real estate investment analysis; techniques of investment analysis, including computer applications and modeling; public interest in private investment decisions; tax and public policy and affordable housing. Taught by the case method. *Spring*. Stegman.
- 252 HOUSING AND PUBLIC POLICY (3). Examination of housing and market dynamics. Government intervention, the mortgage market and construction industry, housing markets and market analysis, racial discrimination, substandard housing, the homeless, affordability. Evaluation of public policies. *Fall*. Stegman.
- 253 ISSUES IN HOUSING MARKET-DYNAMICS (3). Prerequisite, PLAN 252 or permission of instructor. Detailed inquiry into a number of theoretical issues relating to market dynamics; the formulation, execution, and evaluation of housing policy. Among the possible subjects of investigation are the structure of the housing market, filtering, housing costs, the nature and efficiency of the construction industry, the economics of slums. *Spring*. Stegman.
- 254 DEVELOPMENT DISPUTE RESOLUTION (3). Contemporary methods of resolving development disputes through negotiation, bargaining, and mediation. Techniques and skills applicable to solving controversies over planning and implementation of public and private development projects. *Fall*. Godschalk.
- 255 THE DEVELOPMENT PROCESS (BUSI 218) (Var.). Examination of real estate development from public or private developer's perspective. Process includes stages of activity, decision points, risk control techniques, modelling, and broad-gauged feasibility analysis. Teaching cases used extensively. *Spring*. Stegman and Miles.
- 261 URBAN AND COMMUNITY ECONOMIC DEVELOPMENT (3). Political-economic study of city economies as subnational entities with changing and volatile economic structures. Planning strategies to accumulate and share productive and social capital. *Spring*. Bergman.
- 263 DEVELOPMENT PLANNING TECHNIQUES (3). Basic analytical techniques for analyzing the development of local and regional economies. Topics include social accounts, indicator construction, shift-share analysis, regional input-output analysis, and economic forecasting techniques. *Spring*. Goldstein.
- 264 REGIONAL DEVELOPMENT THEORY (3). Theoretical perspectives on regional economic development and planning in developing areas. Topics include economic base theory, trade theory, location theory and growth poles, product cycle theory, entrepreneurship and innovation theories. *Fall*. Malizia.
- 266 COMMUNITY DEVELOPMENT PLANNING (3). Basic goals of community development planning, and public, private, and joint approaches to fostering community change or stability are examined. Methods of community analysis, community organization, project design and implementation. *Fall*. Rohe.
- 267 LOCAL DEVELOPMENT AND FINANCE (3). Examination of economic and community development from the strategic and project perspectives. Consideration of project financing and development finance. Other topics include strategic and contingency planning, project management, market studies, and feasibility analysis. *Spring*. Malizia.
- 269 EMPLOYMENT PLANNING (3). The study of how employment planning contributes to an overall understanding of planned interventions that seek to improve the conditions of employment, the size distribution of work-derived income, and the equitable access of economically active populations to such work and earnings. *Spring*. Bergman.
- 272 ENVIRONMENTAL AND RESOURCE MANAGEMENT IN DEVELOPING COUNTRIES (3). Prerequisite: PLAN 232. An examination of environmental and resource policy issues in Third World countries and their relation to economic development prospects. Topics covered include deforestation, desertification, river basin development, and rural water supply. *Fall*. Whittington.

- 274 MICROCOMPUTER APPLICATIONS IN DEVELOPMENT PLANNING (3). Microcomputer applications for planning in developing countries. Issues covered include problems of technology transfer, appropriate technology, and operation and maintenance of equipment. Special emphasis is given to Lotus 1-2-3- and dBase III applications. *Fall*. Whittington and Lacey.
- 275 POPULATION AND HOUSING POLICIES IN THE THIRD WORLD (3). Methods of analyses and policy issues concerned with population growth and slum and squatter settlements in Third World cities. Topics include demographic techniques, population policies, and alternative housing solutions for the urban poor. *Spring*. Lacey.
- 301 DESIGN OF POLICY-ORIENTED RESEARCH (3). Logic of designing research for the analysis of planning problems and the formulation of public policies. Elements of research design, case study, survey research, quasi-experimental designs, and the social experiment are covered. *Spring*. Goldstein.
- 302 ADVANCED SEMINAR IN RESEARCH DESIGN (3). Advanced treatment of topics introduced in PLAN 301. *Fall*. Faculty.
- 310 PLANNING SEMINAR (Var.). Original research, fieldwork, readings, or discussion of selected planning issues under guidance of a member of the faculty. *Fall or spring*. Faculty.
- 315 INDEPENDENT STUDY (3). This course permits full-time graduate students enrolled in the Department of City and Regional Planning who wish to pursue independent study of a research or project nature to do so under the direction of a member of the Department faculty. *Fall or spring*. Faculty.
- 394 DOCTORAL DISSERTATION (credits variable). Faculty.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF CLASSICS

G. KENNETH SAMS, *Chairman*

Professors

EDWIN L. BROWN	(1)	Classical Didactic Poetry, Hellenistic Civilization, Virgil
GEORGE A. KENNEDY	(6)	Greek and Latin Rhetoric and Oratory, Literary Criticism
GERHARD KOEPEL	(7)	Roman Art and Architecture
JERZY LINDERSKI	(27)	Cicero, Roman Law, Roman History
KENNETH J. RECKFORD	(11)	Greek and Roman Comedy, Roman Satire
G. KENNETH SAMS	(13)	Greek Archaeology, Near Eastern Archaeology
PHILIP A. STADTER	(16)	Greek Historiography, Plutarch, Renaissance Latin
MARIA TSIAPERA	(36)	Historical Linguistics, Modern Greek
WILLIAM C. WEST III	(17)	Classical Greek Prose, Greek History, Latin Literature

Associate Professors

JAY DAVID BOLTER	(30)	Greek Literature, Computer Application
GEORGE W. HOUSTON	(4)	Latin Literature, Roman History, Epigraphy
SARA MACK	(24)	Virgil, Augustan Poetry, Homer
PETER M. SMITH	(26)	Greek Philosophical Literature, Greek Tragedy, Homer
CECIL W. WOOTEN	(35)	Greek and Latin Prose, Rhetoric, Greek and Latin Language

Assistant Professors

DAVID M. GANZ	(32)	Medieval Latin, Palaeography
MARIE-HENRIETTE GATES	(28)	Near-Eastern Archaeology
LAURENCE STEPHENS	(38)	Linguistics, Metrics, Old Latin

Professors Emeriti

T. ROBERT S. BROUGHTON
HENRY R. IMMERWAHR
BERTHE M. MARTI
EMELINE H. RICHARDSON

Graduate work in the Department of Classics is primarily designed to meet the needs of students who intend by intensive study and research to specialize in the Classics. The M.A. prepares especially for teaching at the secondary level; the Ph.D. for research and teaching at the university level.

The Department also cooperates with the other language departments in the University in making available the great literatures of the world. To this end there are offered courses in Greek and Latin literature which do not require an ability to read either language in the original. Such courses are designed to place emphasis on aspects of the Greek and Latin genius,

on the forms of literature created in the ancient world and perpetuated, and on their permanent contributions of Greece and Rome to Western civilization. These courses may be elected as part of a major for the Curriculum in Comparative Literature or as a minor, or part of a major, in other departments.

The Department also offers courses in classical and medieval Latin for students of medieval studies in other departments.

The University is a contributing member of the American Academy in Rome, the American School of Classical Studies at Athens, the American Research Institute in Turkey, and the Institute of Nautical Archaeology. There are thus numerous opportunities for study and archaeological activity abroad.

Requirements for Advanced Degrees

The degree of Master of Arts is offered with a concentration in Greek, Latin, or Classical Archaeology. The degree of Doctor of Philosophy is offered with a concentration in Greek and Latin, Classics with historical emphasis, Classical Archaeology, or Classical Latin and Medieval Studies. A minor in related departments may be permitted on application. Students are encouraged to broaden their program by taking supporting work in related languages or literatures or in Art, History, Linguistics, or Philosophy.

Teaching assistance or lecture instruction equivalent to at least three contact hours a week for one semester, or until teaching competence is acquired, is required of all doctoral candidates.

Requirements for advanced degrees are stated in general above (see "Graduate Degree Requirements"), but exact prescription of the courses can be determined only upon a knowledge of the needs of the individual applicant. A brochure describing the various programs in greater detail is available from the Department.

Graduate students in other departments may, with the approval of their department advisor, pursue a Minor in Medieval Studies through the Department of Classics; for details see the last section of the Classics entry.

GREEK

Courses for Graduates and Advanced Undergraduates

- 101X ELEMENTARY CLASSICAL GREEK FOR GRADUATE STUDENTS (0-3). Introduction to grammar and vocabulary. Reading of easy selections from Plato or other authors. Graduate students whose major departments permit them to take these courses for credit should register for 101 and 102.
- 102X Registration in 101X and 102X carries no graduate credit. *Spring and fall.* Staff.
- 106 GREEK DIALECTS (3). Prerequisite, Greek 22. (Alternate years.)
- 107 GREEK COMPOSITION (3). Prerequisite, Greek 21, or 22. (Alternate years.) Kennedy.
- 108 READINGS IN EARLY GREEK POETRY (3). Prerequisite, Greek 21, or 22. (Alternate years.) Brown.

- 109 READINGS IN GREEK LITERATURE OF THE FIFTH CENTURY (3). Prerequisite, Greek 21, or 22. (Alternate years.) Reckford, Stadter.
- 110 READINGS IN GREEK LITERATURE OF THE FOURTH CENTURY (3). Prerequisite, Greek 21, or 22. (Alternate years.) Kennedy, Wooten.
- 121 INTRODUCTORY MODERN GREEK (3). No prerequisite. An introduction to the grammar, vocabulary, and idiom of the language of modern Greece, intended to give a basic reading knowledge, but also useful as an introduction for students who wish, after additional practice, to attain fluency in the spoken language. In the second semester easy selections from contemporary Greek literature will be read. *Fall and spring*. Tsiapera.
- 140 PROBLEMS IN THE HISTORY OF CLASSICAL IDEAS (3). Prerequisite, permission of the Department. Offered regularly in first and second summer sessions each year. For description see Summer School Catalogue.
- 158 GREEK NEW TESTAMENT (Religion 119) (3). Prerequisite, Greek 21. Offered on application by five students. Stadter.

Courses for Graduates

NOTE: One or two Greek courses numbered in the 200's are offered each semester.

- 200 GREEK LITERARY FORMS (3). Prerequisite, reading knowledge of Greek. For doctoral students. Greek sources for literary history and criticism; oral poetry; formation of genres and canons; collections of fragments; beginnings of artistic prose; scholia; principles of interpretation. (Alternate years.) Kennedy.
- 201 GREEK EPIGRAPHY (3). West.
- 204 GREEK PALAEOGRAPHY (3).
- 211 GREEK LYRIC POETRY (3). Brown.
- 212 GREEK TRAGEDY (3). Smith, Reckford.
- 213 GREEK COMEDY (3). Reckford.
- 214 GREEK PHILOSOPHICAL LITERATURE (3). Smith.
- 215 GREEK RHETORIC AND ORATORY (3). Kennedy.
- 216 GREEK HISTORICAL LITERATURE (3). Stadter, West.
- 217 HELLENISTIC POETRY (3). Brown.
- 218 LATER GREEK PROSE (3). Stadter.
- 251 HOMER (3). Smith.
- 252 SOPHOCLES (3). Reckford.
- 253 THUCYDIDES (3). Stadter.
- 256 DEMOSTHENES (3). Kennedy.
- 301 GREEK SEMINARS (3). *Topic for 1987-88: Demosthenes*, Wooten.
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- 341 SPECIAL READING (3). *Fall and spring*. Staff.
- 393 MASTER'S THESIS (3 or more). *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more) *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

LATIN

Courses for Graduates and Advanced Undergraduates

- 101 Section C. ELEMENTARY CLASSICAL LATIN FOR GRADUATE STUDENTS
- 101X (0-3)
- 102 Section M. ELEMENTARY MEDIEVAL LATIN FOR GRADUATE STUDENTS
- 102X (0-3)

These courses are designed as a preparation for the reading knowledge examination for higher degrees. Passing of the examination at the end of 102 (102X) will certify that the requirement has been satisfied. Students whose major departments permit them to take these courses for credit should register for 101, 102. Those not expecting credit should register for 101X, 102X, *One semester each*. Staff.

- 110 INTRODUCTORY LATIN COMPOSITION (3). Prerequisite, Latin 22 or equivalent. Review of Latin grammar and idiom, exercises in composition, introduction to stylistics. (Alternate years.) Stephens.
- 111 READINGS IN LATIN LITERATURE OF THE REPUBLIC (3). Prerequisite, Latin 21 or 22. (Alternate years.) Linderski.
- 112 READINGS IN LATIN LITERATURE OF THE AUGUSTAN AGE (3). Prerequisite, Latin 21 or 22. (Alternate years.) Reckford, Mack.
- 113 READINGS IN LATIN LITERATURE OF THE EMPIRE (3). Prerequisite, Latin 21 or 22. (Alternate years.) Houston.
- 114 READINGS IN LATIN LITERATURE OF LATER ANTIQUITY (3). Prerequisite, Latin 21 or 22. (Alternate years.) Ganz, Kennedy.
- 130 MEDIEVAL LATIN LITERATURE TO THE END OF THE CAROLINGIAN PERIOD (3). Prerequisite, Latin 14 or 102X. *Every year*. Ganz.
- 140 PROBLEMS IN THE HISTORY OF CLASSICAL IDEAS (3). Prerequisite, permission of the Department. *Offered in the first and second summer sessions each year*. For description see Summer School Catalogue.
- 141
- 171 RENAISSANCE HUMANISM AND THE LATIN TRADITION (3). Prerequisite, Latin 21 or equivalent. (Alternate years.) Scaglione.

Courses for Graduates

NOTE: One or two Latin courses numbered in the 200's are offered each semester.

- 201 LATIN LITERARY FORMS (3). Prerequisite, reading knowledge of Latin. For doctoral students. Latin sources for literary history and criticism; imitation of Greek originals; Roman originality; collections of fragments; rhetorical features; commentaries; principles of interpretation. (Alternate years.) Kennedy, Mack, Reckford, Wooten.
- 202 LATIN EPIGRAPHY (3). Linderski.
- 203 LATIN PALAEOGRAPHY (3). Ganz.
- 207 LATIN COMPOSITION AND PROSE STYLES (3). Stephens.
- 210 HISTORY OF LATIN AND ITALIC DIALECTS (3). Stephens.
- 221 FRAGMENTS OF EARLY LATIN POETRY (3). Mack.
- 222 ROMAN HISTORICAL LITERATURE (3). Study of Sallust, Caesar, Suetonius or the minor historians of the empire. Houston, Linderski.
- 224 ROMAN DRAMATIC LITERATURE (3). Study of the comedies of Plautus and Terence or the tragedies of Seneca. Reckford.
- 225 ROMAN LYRIC AND ELEGIAC POETRY (3). Study of the forms of lyric and elegiac poetry with special attention to Catullus, Horace, Tibullus, or Propertius. Reckford, Mack.
- 226 ROMAN SATIRE (3). Study of the development of satiric forms with special attention to Horace or Juvenal. Reckford.
- 230 LATIN LITERATURE FROM THE 10TH TO THE 13TH CENTURY (3). Reading in selected medieval Latin prose and verse authors. Ganz.
- 261 CICERO: POLITICAL CAREER (3). Linderski.
- 262 CICERO: LITERARY CAREER (3). Kennedy.
- 263 LUCRETIUS (3). Reckford.
- 264 VIRGIL (3). Mack.
- 265 LIVY (3). Linderski.
- 266 OVID (3). Mack.

- 270 PETRONIUS (3). Reckford.
 274 TACITUS (3). Houston.
 301 LATIN SEMINARS (3 each). Topic for 1987-88: Historiography, Linderski.
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 341 SPECIAL READING (3). *Fall and spring*. Staff.
 393 MASTER'S THESIS (3 or more). *Fall and spring*. Staff.
 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Staff.

CLASSICAL ARCHAEOLOGY

Courses for Graduates and Advanced Undergraduates

- 140 PROBLEMS IN HISTORY OF CLASSICAL IDEAS (3). Prerequisite, permission of
 141 the department. Offered in the first and second summer sessions each year. For descrip-
 tion see the Summer School Catalogue.
 187 MESOPOTAMIA AND THE LEVANT IN THE BRONZE AGE (3). The archaeology
 of Mesopotamia and the Levant in the Bronze Age, from ca. 3500 to 1200 B.C. (Alternate
 years.) Gates.
 188 THE ARCHAEOLOGY OF THE NEAR EAST IN THE IRON AGE (3). A survey
 of the principal sites, monuments, and art of the Iron Age Near East from ca. 1200
 to 500 B.C. (Alternate years.) Sams.
 189 THE ARCHAEOLOGY OF ANATOLIA IN THE BRONZE AND IRON AGES (3).
 A survey of Anatolian archaeology from the third millenium through the sixth century
 B.C. (Alternate years.) Sams.
 190 GREEK ARCHITECTURE (3). (Alternate years.) Sams.
 191 ARCHITECTURE OF ETRURIA AND ROME (3). (Alternate years.) Koepfel.
 193 GREEK PAINTING (Art 193) (3). *Spring*. Sturgeon.
 194 ARCHAIC GREEK SCULPTURE (Art 194) (3). (Alternate years.) Sturgeon.
 195 CLASSICAL GREEK SCULPTURE (Art 195) (3). (Alternate years.) Sturgeon.
 196 HELLENISTIC GREEK SCULPTURE (Art 196) (3). (Alternate years.) Sturgeon.
 198 AEGEAN CIVILIZATION AND NEAR EASTERN BACKGROUNDS (Art 198) (3).
 (Alternate years.) Sturgeon.

Courses for Graduates

- 201 GREEK EPIGRAPHY (3). See above, courses in Greek.
 202 LATIN EPIGRAPHY (3). See above, courses in Latin.
 290 FIELD PRACTICUM IN ARCHAEOLOGY (3). Seminar in archaeological excavation
 techniques to be conducted in the field (1987: ancient Near Eastern site in Syria). Previous
 excavation experience is expected. *Summer or Fall*. Gates, Sams.
 294 GREEK TOPOGRAPHY (3). Study of chief archaeological sites of Greece and of
 existing buildings and monuments. Attention to the problems of excavation and the
 role of the sites in Greek history. (Alternate years.) Sams.
 296 ROMAN SCULPTURE (3). (Alternate years.) Koepfel.
 297 ROMAN PAINTING (3). (Alternate years.) Koepfel.
 298 ROMAN TOPOGRAPHY (3). (Alternate years.) Koepfel.
 299 ETRUSCAN ART (3). (Alternate years.) Staff.
 310 SEMINAR IN ARCHAEOLOGY (3). Topic for 1987-88: The Near East after Alexan-
 der. Gates.
 341 SPECIAL READING IN ARCHAEOLOGY (3). *Fall and spring*. Gates, Koepfel,
 Sams.
 358 SEMINAR IN ANCIENT ART (Art 358). (3). *Fall and spring*. Sturgeon.

- 393 MASTER'S THESIS (3 or more). *Both semesters.* Brown, Gates, Koepfel, Sams.
 394 DOCTORAL DISSERTATION (3 or more). *Both semesters.* Gates, Koepfel, Sams.

CLASSICS IN ENGLISH

Courses Not Requiring a Reading Knowledge of the Greek and Latin Language.

The following courses in classical literature and civilization are especially designed to supply the necessary foundation for those who, without a reading knowledge of the ancient languages, wish a broader culture or plan to specialize in modern literature, history, art, etc. When properly approved they will be allowed to count as part of the major requirements in other departments. They may be taken also to satisfy the requirements of a minor in literature. See also under Comparative Literature.

Courses for Graduates and Advanced Undergraduates

- 103 GREEK AND ROMAN EPIC (3). Reading of ancient epics, with emphasis on epic after Homer. Structure of the poems, history of epic as literary form, the poems as expressions of the spirit of their ages. (Alternate years.) Kennedy.
- 107 GREEK DRAMATIC LITERATURE (3). Students will be assumed to have read a few of the plays as taught in Classics 33 or 62. Origin and growth of the Greek theatre and drama; literary quality of the plays; religious, social, and political ideas of the fifth century B.C. (Alternate years.) Reckford.
- 109 GREEK AND ROMAN HISTORICAL LITERATURE (History 109) (3). They study in English translation of selections from Herodotus, Thucydides, Livy, Tacitus, and others with consideration of their literary qualities and their readability as historians. (Alternate years.) Linderski.
- 111 THE RHETORIC OF THE SOPHISTS, PLATO, AND ARISTOTLE (Comp. Lit. 111) (Speech 111) (3). Detailed study of the conceptualization of rhetoric in Greece, the sophistic movement, Plato's *Gorgias* and *Phaedrus*, and Aristotle's *Rhetoric*. (Alternate years.) Kennedy.
- 112 CLASSICAL, CHRISTIAN AND POST-CLASSICAL RHETORICS (Comp. Lit. 112) (Speech 112) (3). Prerequisites, Classics 11, Comparative Literature 111, Speech 111 or permission of instructor. Study of the classical tradition in rhetoric and reactions against it from the fourth century B.C. to the 18th century of the Christian era. Special attention to Cicero, Quintilian, Augustine, the humanists, Ramus, and British rhetoricians of the 18th century. (Alternate years.) Kennedy.
- 114 GREEK AND ROMAN COMEDY (3). A comparative study of the surviving works of Aristophanes, Menander, Plautus, and Terence, with attention to aspects of ancient production and influence of modern comedy. (Alternate years.) Stadter, Reckford.
- 115 ROMAN LAW (3). The course will present an introduction to Roman law, public and private. On the basis of Roman texts in translation (or the original if desired), we will discuss a) the principles of Roman constitutional law and b) the legal logic and social importance of Roman civil law. (Alternate years.) Linderski.
- 118 INTRODUCTION TO BYZANTINE CIVILIZATION (3). Intellectual and social history of the Byzantine Empire from Justinian to 1453, noting the interaction of classical and Christian culture and Byzantium's influence on neighboring peoples and on the Renaissance. (Alternate years.)
- 121 GREEK PHILOSOPHICAL LITERATURE (3). An examination of major Greek philosophers, read in English translation, in the context of Greek intellectual history

and civilization. (Alternate years.) Smith.

235 CLASSICAL CRITICISM (Comp. Lit. 235) (3). (Alternate years.) Kennedy.

MEDIEVAL STUDIES

Minor in Medieval Studies: Graduate majors in other departments who wish to declare a Medieval Studies minor may do so with the approval of their departmental advisor. Although M.A. candidates take a formal minor, some departments permit them to take several courses outside their major: interested students should consult their departmental advisors. Any student may, of course, take Medieval Studies courses without seeking a formal minor.

The student who wishes to earn a minor in Medieval Studies must, at a minimum, take five courses chosen from the core of options indicated below.

- a. 2 courses in Latin: LATIN 203 (Latin palaeography) and a course in medieval Latin studies (LATIN 114, 130, or 230).
- b. 3 courses from at least 2 of the following areas (a student may not count courses taken in the major department toward this minor):
 1. Medieval vernacular language and literature (in the original language).
 2. Medieval history (CLASSICS 118, HISTORY 119, 120, 121, 122, 137, 239, 311, 312).
 3. Medieval art history or musicology (ART 158, 177, 181b, 277, 350, 351; MUSIC 240, 251).

Appropriate seminars may be substituted for the above courses with the permission of the instructor and the Medieval Studies Advisor.

Courses in Medieval Studies

ART

- 158 The Illuminated Book (Folda)
 173a Northern Art of the Fourteenth and Fifteenth Centuries (Folda)
 177 Medieval Art (Folda, Armi)
 181 Gothic Art and Sculpture (Armi)
 277 Romanesque Architecture (Armi)
 350 Seminar in Medieval Art (Folda)
 351 Seminar in Medieval Art (Armi)

CLASSICS

- Latin 102 Section: ML Elementary Medieval Latin for Graduate Students (Ganz)
 Latin 115 Latin Literature of the Later Empire/Augustine (Ganz)
 Latin 130 Medieval Latin to the End of the Carolingian Age (Ganz)
 Latin 171 Renaissance Humanism and the Latin Tradition (Scaglione)
 Latin 203 Latin Palaeography (Ganz)
 Latin 230 Latin Literature from the 10th to the 13th Century (Ganz)

- Latin 304 Medieval Seminar (Ganz)
 Greek 204 Greek Palaeography
 Classics 112 Classical, Christian and Post Christian Rhetoric (Kennedy)
 Classics 118 Introduction to Byzantine Civilization

COMPARATIVE LITERATURE

- 170 The Middle Ages (Kane)
 171 Renaissance Humanism and the Latin Tradition (Scaglione)
 241 History of Literary Criticism, Plato to 1700 (Scaglione)

ENGLISH

- 151 English Literature of the Middle Ages (Kennedy)
 153 Medieval Romance (Kennedy)
 237 Old English Grammar and Readings (Eble, Leinbaugh, O'Neill, Wittig)
 238 History of the English Language
 250 Beowulf (Leinbaugh, Wittig)
 251 Studies in Middle English Literature (Kane, Kennedy)
 252 Studies in Chaucer (Kane)
 350 Seminar in Old English Language and Literature (Wittig)
 351 Seminar in Middle English Literature (Kane)
 398 Seminar in the Use of Medieval Manuscript Materials (Kane)

GERMANIC LANGUAGES

- 161 History of the German Language (Smith, Roberge)
 202 German Palaeography (Tax)
 210 Older German Literature to 1050 (Tax)
 221 Gothic (Smith, Roberge)
 222 Old High German
 232 Old Saxon (Smith, Roberge)
 233 Old Norse I (Smith)
 234 Old Norse II (Smith)
 235 Middle High German Grammar (Francke)
 236 Middle High German Literature (Tax, Francke)
 237 Middle High German Poetry (Tax, Francke)
 250 Late Medieval Literature

HISTORY

- 119 The Medieval University (McVaugh)
 120 The Medieval Church (Pfaff)
 121 Medieval Thought and Learning (Behrends)
 122 Europe in the Early Middle Ages (Behrends)
 137 Medieval England (Pfaff)
 150 History of Science from the Greeks to Newton (McVaugh)
 234 France, the German Empire and the Papacy in the High Middle Ages (Behrends)
 239 Medieval England (Pfaff)
 311 Medieval History (Behrends)
 312 Medieval England (Pfaff)

LINGUISTICS

- 105/ Celtic (Old Irish *or* Old and Middle Welsh) (O'Neill)
 Arabic 201/2 Romance Arabic Studies

MUSIC (Monophonic Song)

- 240 Proseminar in Medieval Music (Nadas)
 251 Ars Antiqua and Ars Nova (Nadas)
 337 Seminar in Medieval Music (Nadas)

PHILOSOPHY

- 152 Topics in Medieval Philosophy (Galligan)

RELIGION

- 169 Medieval Religious Texts (Kaufmann)

ROMANCE LANGUAGES

- French 126 History of the French Language (Montgomery, Burns)
 French 201 Survey of French Literature to the Seventeenth Century
 French 221 Old French (Montgomery)
 French 222 Old French Literature (Montgomery, Burns)
 French 223 The French Medieval Drama (Montgomery, Burns)
 French 248 French Literature of the Fourteenth and Fifteenth Centuries (Montgomery)
 French 331 Seminar in Old French Literature (Montgomery, Burns)
 Italian 201 Survey of Italian Literature I (Scaglione, Rao)
 Italian 221 Old Italian (Scaglione)
 Italian 231/2 Dante (Scaglione)
 Italian 245 The Italian Trecento (Scaglione)
 Romance 220 Vulgar Latin (Montgomery)
 Romance 225 Provençal (Montgomery, Burns)
 Romance 324 Romance Palaeography (Montgomery)
 Spanish 213 Medieval Poetry (Dominguez)
 Spanish 221/2 Old Spanish (Sharpe)
 Spanish 224 Medieval Prose

SLAVIC

- 207 Old Church Slavonic (Feinberg)

CURRICULUM OF COMPARATIVE LITERATURE

DIANE R. LEONARD, *Chairman*

Professors

- | | | |
|-------------------|-----|---|
| LILIAN R. FURST | (4) | Nineteenth Century Literature, Problems and Methods |
| ALDO D. SCAGLIONE | (3) | Renaissance, Baroque, Literary Criticism to 1700 |

Associate Professor

- | | | |
|------------------|-----|---|
| DIANE R. LEONARD | (2) | Realism, Modern Narrative, Modern Literary Criticism and Theory |
|------------------|-----|---|

Assistant Professor

- | | | |
|-----------------------|-----|---|
| EARL JEFFREY RICHARDS | (5) | Eighteenth Century Literature, Eighteenth and Nineteenth Century Literary Criticism |
|-----------------------|-----|---|

Professors Emeriti

- | | | |
|----------------------|-----|---|
| ALFRED G. ENGSTROM | (6) | Symbolism |
| EUGENE H. FALK | (1) | Modern Novel, Modern Theatre, Literary Theory |
| WERNER P. FRIEDERICH | (8) | Baroque, Classicism and Enlightenment |

The graduate program in Comparative Literature is based on the concept that the literatures of the West form a broad unity which transcends national boundaries. The Curriculum stresses the systematic exploration of styles, themes, genres, movements, literary theory and literary criticism. Students take many of their courses in the cooperating literature departments, and may choose among their rich offerings in the literatures of England, France, Germany, Ancient Greece and Rome, Italy, Portugal, Spain, Latin America, Russia and the United States.

Requirements for advanced degrees are as follows: the Master of Arts degree program consists of ten courses and a thesis. Five courses should be elected in Comparative Literature, three courses in a first literature and two courses in a second literature.

Candidates for the Doctor of Philosophy degree are urged to concentrate on an area of specialization, such as an international period or genre, in three literatures belonging to at least two different linguistic groupings (e.g., they should not all three be Romance literatures). Special arrangement can be made for a program in medieval literature or in one ancient and two modern literatures. All candidates are also expected to demonstrate a knowledge of at least one national literature in its historical scope from the Middle Ages to the present regardless of the area of specialization.

Moreover, candidates must show competence in literary theory and criticism, and in the problems and methods specific to Comparative Literature. A reading knowledge of Latin is required of medieval and Renaissance specialists, and French or German of students specializing in post-Renaissance Literature. A formal minor in Medieval Studies is also available (see the end of the Classics entry).

Courses for Graduates and Advanced Undergraduates

A. PERIOD COURSES

- 140 READING COURSE (3). Staff.
- 170 THE MIDDLE AGES (3). Study of selected examples of western medieval literature in translation, with particular attention to the development of varieties of sensibility in various genres and at different periods. Kennedy.
- 171 RENAISSANCE HUMANISM AND THE LATIN TRADITION (3). Prerequisite, Latin 21 or equivalent. Topics in the evolution of Humanism from the Twelfth Century School of Chartres through Petrarch to Erasmus, including the transmission and assimilation of ancient texts; reading in Latin from a variety of writers.
- 172 LITERATURE OF THE CONTINENTAL RENAISSANCE IN TRANSLATION (3). Discussion of the major works of Petrarch, Boccaccio, Machiavelli, Castiglione, Ariosto, Tasso, Rabelais, Ronsard, Montaigne, Cervantes, and Erasmus. Masters.
- 173 BAROQUE (3). Comparative analysis of the characteristic themes of Seventeenth Century prose and poetry with sampling of representative texts from Italy, France, Spain, Germany, and England.
- 174 THE EIGHTEENTH CENTURY (3). A study of eighteenth-century European literature, its regional manifestations, the development of its genres, and its relation to the Enlightenment, Neoclassicism, Rationalism, and cults of sensibility. Readings of major literary and philosophical texts, and recent critical assessments. Richards.
- 175 ROMANTICISM (3). An exploration of the period concept of Romanticism, using manifestoes and critical writings of the time, modern studies on the subject, and selected literary works. Furst.
- 176 REALISM (3). An exploration of the period concept of Realism through selected novels and critical writings. Naturalism as an outgrowth of Realism will also be considered. Leonard.

B. GENRE COURSES

- 180 CONCEPTS AND PERSPECTIVES OF THE TRAGIC (3). Ancient and modern versions of tragic themes, tracing the transformation of the myths in the light of emerging concepts of tragedy.
- 184 THE DRAMA FROM IBSEN TO BECKETT (3). The main currents of European drama from the end of the nineteenth century to the present.
- 185 APPROACHES TO THE NOVEL (3). The narrative techniques of selected works by Proust, Kafka, Mann, Faulkner, Sartre, Woolf, Camus. (Alternate years.) Leonard.

C. SPECIAL TOPICS COURSES

- 145 HISTORY OF AESTHETICS (3). Ancient and modern positions in aesthetics, with attention to their philosophical foundations, and their significance to the study of literature. Including Plato, Aristotle, Plotinus, Karl and Hegel.
- 190 SYSTEMS OF VERSIFICATION (3). A comparative study of systems of versification in England, France, Germany and Russia. Syllabic, syllabo-tonic, and tonic systems are presented in the light of linguistic exigencies and literary traditions. (Alternate years.) Vickery.

- 191 AUTOBIOGRAPHY AS A LITERARY FORM (3). The rise and evolution of interest in the self in literary forms from St. Augustine's to Rousseau's *Confessions* through Abelard, Dante, Petrarch, Cellini, and Montaigne.
- 192 BRECHT'S WORLD OF THE THEATRE (3). A comparative study of Brecht's major plays in conjunction with his literary models and sources from Shakespeare to Shaw. Mews.
- 194 KAFKA AND CAMUS (3). A thematic and formal comparison of some of their main works.
- 195 SPECIAL TOPICS IN COMPARATIVE LITERATURE (3). Staff.

Courses for Graduates

- 201 PROBLEMS AND METHODS IN COMPARATIVE LITERATURE (3). The course deals with the history of Comparative Literature, bibliographical materials, with the various orientations in Europe and in America, with problems of methodology, periodization, literary movements, and basic concepts of literary theory. (Alternate years.) Furst.
- 240 READING COURSE (3). Staff.
- 241 HISTORY OF LITERARY CRITICISM, PLATO TO 1700 (3). Major trends in theory of literature, rhetoric, poetics, and practical criticism from Plato to Aristotle, Cicero, Horace, Longinus, Quintilian, the medieval and Renaissance poetics and rhetorics, Boileau and Dryden. (Alternate years.) Kennedy.
- 242 HISTORY OF LITERARY CRITICISM, EIGHTEENTH AND NINETEENTH CENTURIES. A study of the major theoretical and critical writings, with emphasis on Vico, Diderot, Johnson, Lessing, Herder, Kant, Schiller, Schelling, the Schlegels, Coleridge, Taine, Zola, Brunetiere, De Sanctis, and Croce. (Alternate years.) Richards.
- 243 HISTORY OF LITERARY CRITICISM, THE TWENTIETH CENTURY (3). A presentation of major trends in modern critical theory, with emphasis on Saussure, Russian Formalism, the Prague Circle, semiotics, phenomenology and hermeneutics. (Alternate years.) Leonard.
- 245 ROMAN INGARDEN'S THEORY OF LITERATURE AND THE ARTS (3). A presentation of Ingarden's phenomenological concepts of literary structure, aesthetic focus, and evaluation.
- 310 SEMINAR (3). *Fall and spring*. Staff.
- 393 MASTER'S THESIS (3) *Spring and fall*. Staff.
- 394 DOCTORAL DISSERTATION (3). *Spring and fall*. Staff.
- 395 RESEARCH. Staff.
- 400 GENERAL REGISTRATION (0).

Cross-Listed Courses

- 111 THE RHETORIC OF THE SOPHISTS, PLATO, AND ARISTOTLE (3). Kennedy. (Classics)
- 112 CLASSICAL, CHRISTIAN, AND POST-CLASSICAL RHETORICS (3). Kennedy. (Classics)
- 142 PHILOSOPHY IN LITERATURE (3). Smyth. (Philosophy)
- 153 MEDIEVAL ROMANCE (3). Kennedy. (English)
- 235 CLASSICAL CRITICISM (3). Kennedy. (Classics)

DEPARTMENT OF COMPUTER SCIENCE

JAY NIEVERGELT, *Chairman*

Professors

FREDERICK P. BROOKS, JR.	(0)	Graphics, Computer Architecture, Software Engineering
PETER CALINGAERT	(4)	Computer Science Education, Programming, Translators
HENRY FUCHS	(11)	Graphics, Computer Architecture, Picture Processing
JOHN H. HALTON	(26)	Analytic, Combinatorial and Probabilistic Methods for Solving Problems
GYULA A. MAGÓ	(2)	Computer Architecture, Programming Languages, Parallel Computation
JAY NIEVERGELT	(29)	Algorithms and Data Structures, Geometric Computation, Interactive Systems
STEPHEN M. PIZER	(6)	Picture Processing and Display, Medical Applications, Numerical Computing
DAVID PLAISTED	(28)	Theorem Proving, Computational Complexity, Logic Programming
DONALD F. STANAT	(3)	Algorithm Design and Analysis, Programming Language Semantics, Parallel Computation
STEPHEN F. WEISS	(10)	Information Storage and Retrieval, Automatic Analysis of Natural Languages

Associate Professor

JOHN B. SMITH	(25)	Text and Natural Language Analysis
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Assistant Professors

DAVID V. BEARD	(27)	Database Systems, Human Factors
J. DEAN BROCK	(23)	Parallel Computation, Computer Architecture, Programming Language Semantics
JAMES M. COGGINS	(31)	Computer Vision, Medical Applications
KYE S. HEDLUND	(22)	Computer Architecture, VLSI Design, Parallel Computation
BHARADWAJ JAYARAMAN	(18)	Parallel Computation, Programming Languages, Operating Systems
JAN F. PRINS	(33)	High-Level Programming Languages, Program Translation and Optimization, Formal Program Development
RICHARD T. SNODGRASS	(19)	Database Systems, Distributed Systems, Multiprocessors
AKHILESH TYAGI	(34)	Architecture, Computer-Aided Design, VLSI Complexity Theory
YUKI WATANABE	(30)	VLSI Design

Research Assistant Professor

JOHN POULTON (32) Computer Architecture, VLSI Design

Lecturers

VERNON E. CHI (35) Implementation of VLSI Systems

ERWIN M. DANZIGER (12) Business Data Processing

Adjunct Professor

J. TURNER WHITTED (21) Computer Graphics, VLSI

Adjunct Associate Professors

WILLIAM GROVES (36) Computer Center Management

DANIEL A. PITT (37) Computer Networks, Communications
Protocols

WILLIAM V. WRIGHT (14) Interactive Computing Systems, Application
Oriented Languages, Graphics

The Department of Computer Science was established in the College of Arts and Sciences in 1964 for the purpose of offering graduate-level instruction and pursuing research in computer science.

The teaching program has three objectives:

1. To train teachers and researchers at the Ph.D. level.
2. To train competent and broadly skilled practitioners of computer science via the professional M.S. program and minor programs for graduate students in other fields.
3. To furnish basic instruction in computer use to undergraduates. A Computer Science option in the Mathematical Sciences program is available.

The Department of Computer Science does research and conducts graduate and undergraduate teaching. Research particularly emphasizes:

- interactive computer graphics and image processing
- VLSI design
- software engineering
- the architecture of classical and cellular computers
- natural language processing
- databases and information retrieval
- theoretical studies including algorithm design and analysis.

Two closely related graduate degree programs are offered. One is a Ph.D. program to prepare teachers-researchers for higher education and advanced researchers for universities, government, and industry. The other is a professional M.S. program to prepare highly competent and broadly skilled practitioners. Compared to that of many otherwise similar departments, our curriculum is perhaps more oriented to the design and application of

real computer systems, and to that portion of theory which clearly guides and supports practice.

An M.S. candidate must earn 30 semester hours of credit. A thesis is optional; if one is written it counts for 6 hours. Course work in the M.S. program consists of a core of required courses and a few electives. A modular curriculum provides great flexibility in permitting a student to omit all or part of a required course on material he has already studied. A comprehensive examination is required. In addition, the student must have performed the following: (1) programmed and documented a program product; and (2) written a significant piece of technical prose. A student who has met either of these requirements before enrolling should bring the associated documents with him. For others, requirement 1 can be satisfied by course work. Requirement 2 can be satisfied by a special writing course, by the thesis, or by presentation of satisfactory documentation of previous work. Although the M.S. has been earned in as little as 12 months, two academic years are normally required by a student with an assistantship.

A Ph.D. candidate must take several elective courses, typically 15-18 hours, in addition to the courses required in the M.S. program, and must have satisfied the two requirements listed above. Other requirements include passing written and oral comprehensive examinations, and submitting a dissertation which presents an original contribution to knowledge. The normal time needed by a full-time student with an assistantship is from three to five years. Students whose records are strong may bypass the M.S. degree and proceed directly into Ph.D. study.

Close cooperation with the Department of Computer Science at Duke University widens the course, concentration, and advising opportunities available to the students of both institutions. Coordinated scheduling, free cross-registration, and a two-way television link between the institutions enable students to select from courses at Duke in addition to those available at UNC. The formal courses are supplemented by an extensive colloquium series.

Microelectronics Program

The Department participates in a developing regional microelectronics thrust in several ways. As a participating institution in the \$85 million Microelectronics Center of North Carolina (MCNC), it has access to the IC design, testing, and fabrication facilities at the MCNC Central Laboratories, as well as MCNC's state-wide microwave video and digital networks connecting nine research and educational institutions. Microelectronics related curricula are shared among all MCNC institutions via two-way, interactive video tele-classing across the MCNC video network.

UNC's \$1.2 million Microelectronic Systems Laboratory (MSL) provides capability to build experimental prototypes of large, complex digital systems and computers based on Very Large Scale Integrated (VLSI) circuits of

our own design. The MSL is currently developing two VLSI based systems, and has completed five, the most ambitious being the latest Pixel-Planes engine, a 3-D graphics display system which contains over one quarter million processors.

UNC's Microelectronics Design Laboratory (MDL) provides design tools and computing resources to support the design of full-custom VLSI circuits.

Research Facilities

Graduate students have access to all departmental research and teaching computer facilities. These include an environment for software development, mail, news, and text processing; a microprocessor and small systems teaching laboratory; and six specialized departmental research laboratories for graphics, VLSI chip design, the building of computers, communication research, software systems, and natural language and text processing.

All department computer systems are connected by means of an ethernet local area network and operate the UNIX operating system. The department's general computing facilities include one 16-megabyte VAX-11/785, one 4-megabyte VAX-11/780, one 6-megabyte VAX-11/750, one 10-megabyte Data General MV/10000, over 50 Sun Microsystems workstations with the Network File System (NFS), and over 30 other workstations and personal computers. These machines are supported by over 8-gigabytes of on-line disk storage, and an assortment of high speed dot matrix printers through typeset quality laser printers.

The well-equipped Graphics Laboratory includes another 4-megabyte VAX-11/780, dedicated for graphics work; an Evans and Sutherland PS-300 color vector display; Vector General 3303 vector display; two Adage 3000 raster display systems with high-precision Tektronix 690 SR monitors, a varifocal mirror 3-D display, and two color Masscomp workstations; as well as a large variety of manual input devices, 3-D viewing aids, videotape recorders, cameras, and digitizers.

The Microelectronics Design Laboratory (MDL) operates two dedicated 6-megabyte VAX-11/750's, four VAXstation GPX color workstations and several color Sun workstations, a high-precision Ramtek and two Lexidata color raster systems, plotters, and several Vectrix color raster workstations. It is networked via a microwave link to the Microelectronics Center of North Carolina (MCNC).

The Microelectronics Systems Laboratory (MSL) provides facilities for the rapid prototyping of large scale, high-performance VLSI systems. It supports architectural research by fabrication of prototypes based on custom designed VLSI chips. A full time staff of nine enables the laboratory to implement systems of significant size and complexity, using hundreds or thousands of VLSI circuits.

State-of-the-art facilities allow in-circuit real-time diagnostic probing of IC's using SEM E-beam technology, fabrication of dense, high-performance

thick-film multilayer hybrid circuit modules, and integration of chip, module, and board design. Coordinated design and test tools as well as fabrication robots provide the ability to produce prototypes of entire systems with extremely fast turn-around.

The Department's new building, Sitterson Hall, provides state-of-the-art facilities in support of computer science research. An integrated data-voice-video switching system provides an advanced experimental facility for research in office automation, communications software, and video teleconferencing. Most rooms are wired for a mix of high speed data, voice and video. Two video classrooms allow teleclassing to any or all of the institutions served by the MCNC microwave network. Special conditioned power, extra cooling, lightning protection, and laboratory facilities are housed in a traditional architecture designed to provide a high-tech capability within a relaxed ambience.

Other computing facilities networked to ours and available to us include The University of North Carolina Academic Computing Services which operates an IBM 4381, and the Triangle Universities Computation Center (TUCC) which operates an IBM 3081K with a Floating Point Systems FPS-164 array processor. Both IBM systems run VM and MVS, with WYLBUR. The Microelectronics Center of North Carolina (MCNC) operates two VAX-8600, one VAX-11/750, two Convex mini-super computers, and numerous workstations all operating under the UNIX operating system.

Graduate students have 24-hour access to the Brauer Library, which has extensive holdings in mathematics, physics, statistics, operations research and computer science. All university libraries, with their large collections and access to on-line searching, are available to our graduate students.

Admission and Financial Aid

Entering students must have either a strong background in mathematics and the ability to program in some procedure-oriented language, or significant experience in computer use and four semesters of mathematics, including calculus. A baccalaureate degree with at least a B average is required, not restricted to any specific major subject. For those now planning undergraduate programs, we recommend courses in discrete mathematics, probability theory, linear algebra, modern algebra, elementary linguistics, and foreign language, in preference to computer science courses. High scores on all aptitude tests of the Graduate Record Examination are also required. Although GRE advanced test scores are not required, applicants are encouraged to take the advanced test in computer science, engineering, or mathematics, if appropriate. Each applicant must submit directly to the Department a short statement describing his objectives in pursuing graduate study and his experience with computers. Applicants whose native language is not English must submit TOEFL scores as evidence of ability to use both

written and spoken English. Admission is based solely on merit, with no discrimination based on race, religion, national origin or sex.

Half-time assistantships are available for first-year students. These appointments carry stipends of \$8,000 for the academic year 1987-88; stipends do not include tuition and fees but include compensation to offset the increase in tuition rate to those who do not qualify for in-state tuition. To apply for an assistantship, an applicant need only check the appropriate item on the admission application. Applicants for assistantships are automatically considered for all available fellowships. Financial support of students whose work performance and academic progress are satisfactory is normally renewed. Applicants who do not obtain an assistantship are eligible for loans; opportunities also exist for part-time employment elsewhere in the University and in the Research Triangle area. All students who have desired part-time employment have found satisfactory arrangements with little delay.

Applications for admission, with or without financial assistance, starting in either semester, will be considered at any time. For maximum consideration, however, fall semester applications, complete with statement of objectives, and all transcripts and recommendations, should be received by the Graduate School no later than February 1. To ensure meeting that deadline, the Graduate Record Examination should be taken no later than December.

For further information write to the Director of Graduate Admissions, Department of Computer Science, CB# 3175, Sitterson Hall, Chapel Hill, N.C. 27599-3175.

- 14 INTRODUCTION TO PROGRAMMING (3). Introduction to computer use. Approaches to problem-solving; algorithms and their design; fundamental programming skills. *Fall, spring and summer*. Staff.
- 104 APPLICATIONS PROGRAMMING I. See COMP 110. *Summer*.
- 105 APPLICATIONS PROGRAMMING II. See COMP 110. *Summer*.
- 110 APPLICATIONS PROGRAMMING I AND II (4). Prerequisite, COMP 14. A practical course emphasizing techniques appropriate for applications programming and data processing. Programming style; control and data structures; use of secondary storage; efficiency of computation and storage. Hardware and software systems. *Fall and spring*. Staff.
- 112 SCIENTIFIC PROGRAMMING (PHYS 193) (3). Prerequisites, MATH 128 or 129, or PHYS 191 or 192; elementary Fortran, P1/I, or Pascal programming. Structured programming in Fortran or Pascal; use of secondary storage and program packages; numerical methods for advanced problems, error propagation, and computational efficiency; symbolic mathematics by computer. *Spring*. Thompson (Physics).
- 114 SYSTEMATIC PROGRAMMING (4). Prerequisite, COMP 14. How to write good programs; top-down programming and documentation, structured programming, control and data structures, use of secondary storage, efficiency, program correctness, and programming style, using Pascal. May not be taken for credit together with COMP 104, 105, 110 or 119. *Fall and spring*. Staff.
- 118 DATA PROCESSING TECHNIQUES (3). Prerequisite, COMP 14. Data processing as used in the social sciences and business. Advanced programming, file processing, and program packages. *Summer*. Staff.

- 119 INFORMATION SYSTEMS IN LANGUAGE RESEARCH (LIBS 103) (3). Prerequisite, COMP 14. Concepts of information and information processing as they relate to language research in the humanities and social sciences. Hardware and software systems for language research. Programming projects required. May not be taken for credit together with COMP 104, 105, 114. *Spring*. Staff.
- 120 COMPUTER ORGANIZATION (3). Prerequisite, COMP 114. Data representation, computer architecture and implementation, assembler language programming. *Spring and summer*. Staff.
- 121 DATA STRUCTURES (3). Prerequisites, MATH 81 and COMP 114. The analysis of data structures and their associated algorithms. Lists, stacks, queues, trees and graphs. Hashing overflow techniques. Sorting and Searching. *Fall*. Staff.
- 122 ALGORITHMS AND ANALYSIS (3). Prerequisites, COMP 121 and permission of the department (except for computer science graduate students). Formal specification and verification of programs. Techniques of algorithm analysis. Problem-solving paradigms. Survey of selected algorithms. *Fall*. Stanat, Plaisted.
- 135 BUSINESS DATA PROCESSING LABORATORY (3). Prerequisites, COMP 120, 121 and permission of department. Students analyze an existing administrative application or, given such analysis, design a new system; prepare detailed written report and formal presentation. Supporting lectures; system study techniques; business applications and equipment. *Fall*. Danziger.
- 145 SOFTWARE ENGINEERING LABORATORY (3). Prerequisites, COMP 120, 121 and permission of department. Organization and scheduling of software engineering projects, structured programming design. Each team will design, code and debug program components and synthesize them into a tested, documented program product. *Spring*. Brooks, Coggins.
- 151 NUMERICAL COMPUTING (3). Prerequisites, COMP 14, and 4 semesters of mathematics including calculus through MATH 32 and elementary linear algebra. Studies, through mathematical models, the behavior of computers in performing numerical tasks. Topics include efficiency, error generation and propagation, analysis of linear operators, and numerical computing strategies. *Fall and spring*. Pizer, Halton, Magó.
- 171 NATURAL LANGUAGE PROCESSING (3). Prerequisite, COMP 14. Statistical, syntactic and semantic models of natural language. Tools and techniques needed to implement language analysis and generation processes on the computer. *Fall, 1986 and alternate years*. Smith, Weiss.
- 172 INFORMATION RETRIEVAL (3). Prerequisite, COMP 14. Study of information retrieval and question-answering techniques, including document classification, retrieval and evaluation techniques, handling of large data collections, and the use of feedback. *Fall or spring*. Weiss, Losee.
- 181 MODELS OF LANGUAGES AND COMPUTATION (3). Prerequisites, MATH 81 and COMP 14, or permission of instructor. Introduction to the theory of computation. Boolean functions, finite automata, pushdown automata and Turing machines. Unsolvable problems. The Chomsky hierarchy of formal languages and their acceptors. Parsing. *Spring*. Plaisted, Weiss.
- 190 TOPICS IN COMPUTER SCIENCE (1-3). Prerequisite, permission of instructor. This course will have variable content. Staff.
- 212 INTRODUCTION TO OPERATING SYSTEMS (1.5). Prerequisites, COMP 120, 121, and permission of department (except computer science graduate students). Types of operating systems. Management of storage, processes, and devices. Scheduling protection. *Spring*. Snodgrass.
- 213 FILES AND DATABASES (1.5). Prerequisites, COMP 120, 121, MATH 81, and permission of department (except computer science graduate students). Placement of data on secondary storage. Sequential, inquiry, and mixed file structure. Database history, practice, models, and systems. *Fall*. Staff.

- 214 TRANSLATORS (1.5). Prerequisites, COMP 120, 121, and permission of department (except computer science graduate students). Strategies and issues of the translation of computer languages. Assemblers, languages, models, interpreters, phases of compilation, translator writing systems. *Spring*. Snodgrass.
- 216 DIGITAL LOGIC TECHNIQUES (1.5). Prerequisites, MATH 81 and COMP 120. Hardware realization of the functions of digital logic. Boolean logic, switching, building block circuits, space and time, MOS impact. *Fall*. Watanabe.
- 217 INTRODUCTION TO PROGRAMMING LANGUAGES (1.5). Prerequisites, COMP 121, and permission of department (except computer science graduate students). Concepts of higher level programming via specific languages. Data types, program blocks, control structures, procedures and functions, classes and coroutines, modules. Run-time implementation. *Fall*. Jayaraman.
- 220 MATHEMATICAL THEORY FOR COMPUTER SCIENCE (Variable. 2-5 each).
221 Open to Computer Science graduate students only. Modules of mathematics for use in Computer Science. Includes principles of analysis, probability, linear algebra, modern algebra, logic. *Fall and spring*. Staff.
- 222 PROGRAMMING LANGUAGES AND TECHNIQUES (Variable. 2-5 each). Open
223 to Computer Science graduate students only. Modules presenting programming tools. Includes programming and command languages, data representation, data structures, file organizations, searches, sorts. *Fall and spring*. Staff.
- 224 MATHEMATICAL MODELS IN COMPUTER SCIENCE (Variable. 2-5 each). Open
225 to Computer Science graduate students only. Modules developing mathematical models of computers, algorithms, and information in computers. Applications of these models. Includes theories of switching, automata, computability, formal languages, coding, information, numerical analysis. *Fall and spring*. Staff.
- 226 COMPUTER SYSTEMS (Variable. 2-5 each). Open to Computer Science graduate
227 students only. Modules on hardware and software making up computer systems. Includes device technology, computer architecture and implementation, data communications, systems evaluation, language processors, control programs, business data processing, software engineering. *Fall and spring*. Staff.
- 228 ADVANCED ALGORITHM ANALYSIS (3). Prerequisites, COMP 122 and 181. Design
and analysis of computer algorithms. Time and space complexity; absolute and asymptotic optimality. Algorithms for searching, sorting, sets, graphs, and pattern-matching. NP-complete problems and provably intractable problems. *Spring*. Brock, Stanat, Plaisted.
- 230 DATABASE SYSTEMS (3). Prerequisites, COMP 122 and 213. Database management
systems, implementation, and theory. Query languages, Query optimization, security, advanced physical storage methods and their analysis. *Spring*. Beard.
- 233 DISCRETE EVENT SIMULATION I (ORSA 233) (3). Prerequisites, ORSA 180, STAT
127 or equivalent and computer programming experience. Introduces student to modeling, programming and statistical concepts applicable to discrete event simulation on a digital computer. Emphasizes statistical analysis and interpretation of simulation output. Students will model program and run simulations. *Fall*. Fishman (ORSA).
- 234 DISCRETE EVENT SIMULATION II (ORSA 234) (3). Prerequisites, ORSA 233.
Continuation of ORSA 233. Describes considerations in the design of simulation experiments, random number generation, stochastic, variate generation and list processing. *Spring*. Fishman.
- 236 COMPUTER GRAPHICS (3). Prerequisites, COMP 120 and 121. Study of graphics
hardware, software, and applications. Data structures, graphics, languages, surface representations, pen-tracking, response time, and control programs. *Spring*. Fuchs, Brooks.
- 238 RASTER GRAPHICS (3). Prerequisites, COMP 236 and either COMP 261 or permis-
sion of the instructor. Hardware, software, and algorithms for raster devices such as video displays: framer buffers, multi-processor cellular systems, hidden-line/visible-

- surface processing, anti-rastering technique modeling of shadows, curved surfaces, natural textures. *Fall*. Fuchs, Whitted, Brooks.
- 240 COMPILER DESIGN (3). Prerequisites, COMP 181, 214, 217. Tools and techniques of compiler construction. Lexical, syntactic, and semantic analysis, code generation and optimization, errors and recovery. *Fall*. Jayaraman, Snodgrass.
- 241 ADVANCED COMPILER DESIGN (3). Prerequisites, COMP 181 and 240. Advanced topics in compiler construction: translator writing systems; attribute grammars; optimization strategies; error recovery; handling of advanced language features such as packages, generics, etc. *Offered on demand*. Jayaraman.
- 242 OPERATING SYSTEMS (3). Prerequisite, COMP 212, corequisite 261. Theory, structuring, and design of operating systems. Sequential, cooperating, deadlock, and communicating by processes. Storage management, performance evaluation, object-oriented and distributed systems, case studies. *Fall*. Snodgrass, Calingaert.
- 243 DISTRIBUTED SYSTEMS (3). Prerequisite, COMP 212, Corequisite, COMP 261. Operating Systems issues in distributed systems, network connected multiple processors. Topics include: introduction to networks, interprocessor communication primitives, network services, reliability and case studies of network operating systems. *Fall*. Brock.
- 244 PROGRAMMING LANGUAGES (3). Prerequisites, COMP 214, and 217. Semantics, application and implementation of several modern programming styles. Operational, axiomatic, denotational, and algebraic semantics. Programming with abstract data types. Functional, object-oriented, concurrent, and logic programming. *Spring*. Jayaraman, Magó.
- 245 FUNCTIONAL PROGRAMMING (3). Prerequisite, COMP 217. Programming with functional or applicative languages. Lambda calculus; combinators; higher-order functions; infinite objects. Least fixed points, semantics, evaluation orders. Sequential and parallel execution models. *Spring*. Magó, Jayaraman.
- 246 LOGIC PROGRAMMING (3). Prerequisite, COMP 217. Propositional calculus, Horn clauses, first-order logic, resolution. Prolog: operational semantics, relationship to resolution, denotational semantics, and non-logical features. Programming and applications. Selected advanced topics. *Fall*. Plaisted.
- 248 SEMANTICS AND PROGRAM CORRECTNESS (3). Prerequisite, COMP 244. Formal characterization of programs. Denotational semantics and fixed-point theories. Proof of program correctness and termination. Algebraic theories of abstract data types. Selected topics in the formalization of concurrent computation. *Offered on demand*. Brock, Stanat.
- 254 PICTURE PROCESSING AND PATTERN RECOGNITION (3). Prerequisites, probability, linear algebra, MATH 34, COMP 14. Theory and practice of picture coding, picture improvement, picture analysis, and pattern recognition as applied to pictures. *Spring*. Pizer, Coggins.
- 255 COMPUTER VISION (3). Prerequisite, COMP 254. Lecture and seminar on image display, restoration, enhancement, segmentation, and pattern recognition. *Alternate years*. Pizer, Coggins.
- 261 COMPUTER ARCHITECTURE AND IMPLEMENTATION (3). Prerequisite, COMP 120. Permission of the department (except for graduate students in computer science). Corequisite: COMP 121, 216, knowledge of digital logic techniques. Computer system architecture, illustrated by portions of various systems. Study of implementation through detailed examination of one computer. CPU structure and instruction sets, memory systems, control units, I/O systems. *Fall*. Magó.
- 265 ARCHITECTURE OF COMPUTERS (3). Prerequisite, COMP 261. Machine languages—syntax and semantics; data representation; naming and addressing; arithmetic and logical operations; control structures; concurrency; input-output systems and devices. Brooks.
- 267 ADVANCED COMPUTER IMPLEMENTATION (3). Prerequisites, COMP 261, knowledge of digital logic techniques. The application of digital logic to the design

- of computer hardware. Storage and switching technologies. Mechanisms for addressing, arithmetic, logic, input/output, and storage. Microprogrammed and hard-wired control. *Offered on demand.* Brooks.
- 268 VLSI SYSTEMS DESIGN (3). Prerequisites, COMP 261, knowledge of digital logic techniques. Introduction to the design, implementation and realization of very large scale integrated systems. Each student designs a complete digital circuit which will be fabricated and returned for testing and use. *Fall.* Hedlund, Tyagi.
- 269 ADVANCED DESIGN OF VLSI SYSTEMS (3). Prerequisite, COMP 268. Advanced topics in the design of digital MOS systems. Students design, implement and test a large custom integrated circuit. Projects emphasize the use of advanced computer aided design tools. *Spring.* Hedlund, Watanabe.
- 282 MECHANIZED MATHEMATICAL INFERENCE (3). Prerequisite, COMP 246. Natural deduction. Completeness of general resolution. Resolution strategies. Question answering. Problem representation. Abstraction. Introduction to equational systems and term rewriting. Specialized decision procedures. Non-resolution methods. Applications. Existing theorem provers. *Spring.* Plaisted.
- 286 DISCRETE OPTIMIZATION: ALGORITHMS AND COMPLEXITY (3). Prerequisites, ORSA 210, 215. Analysis of optimization problems with emphasis on combinatorial methods in terms of the complexity of solution algorithms. Topics include: polynomial algorithms, NP - completeness, ellipsoid method, Karmarkar's method, matching, traveling salesman problem.
- 288 INFORMATION THEORY (STAT 252) (3). Prerequisite, STAT 132; or corequisite, STAT 212. Transmission of information, entropy message ensembles, discrete sources, transmission channels, channel encoding and decoding for discrete channels. *Offered on demand.*
- 289 ERROR-CORRECTING CODES (STAT 253) (3). Prerequisite, Computer and Information Science 256. Linear codes and their error-correcting capabilities. Hamming codes. Reed-Muller codes. Cyclic codes. Bose-Chaudhuri codes. Burst error correction. Majority logic decoding. *Offered on demand.*
- 290 TOPICS IN COMPUTER SCIENCE (1-3). Prerequisite, permission of instructor. This course will have variable content. Staff.
- 291 PROFESSIONAL WRITING IN COMPUTER SCIENCE (3). Prerequisite, graduate major in computer science. Analysis of good and bad writing. Exercises in organization and composition. Each student will also write a thesis-quality short technical report on a previously approved project. *Spring.* Calingaert, Smith, Weiss.
- 321 TECHNICAL COMMUNICATION IN COMPUTER SCIENCE (1). Prerequisite, graduate major in computer science. Seminar on teaching, short oral presentations, and writing in computer science. *Alternate years.* Brooks.
- 322 SEMINAR IN PROFESSIONAL PRACTICE (1). Prerequisites, COMP 135 or 145; graduate major in computer science. The role and responsibilities of the computer scientist in a corporate environment and as a consultant. Professional ethics. *Alternate years.* Brooks.
- 323 SEMINAR IN RESEARCH (1). Prerequisite, graduate major in computer science. The purposes, strategies, and techniques for conducting research in computer science and related disciplines. *Fall.* Staff.
- 324 COMPUTERS AND SOCIETY (1). Prerequisite, graduate major in Computer Science. Seminar on social and economic effects of computers on such matters as privacy, employment, power shifts, rigidity, dehumanization, dependence, quality of life. *Spring.* Pizer, Weiss.
- 390 SEMINAR IN COMPUTER SCIENCE (1-3). Prerequisite, permission of instructor. Seminars in various topics offered by members of the faculty. *Fall.* Staff.

- 391 READING AND RESEARCH (1-3). Prerequisite, permission of instructor. Directed reading and research in selected advanced topics. *Fall and spring*. Staff.
- 393 MASTER'S THESIS (0-6). Prerequisite, permission of staff. *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (0-6). Prerequisite, permission of staff. *Fall and spring*. Staff.

SCHOOL OF DENTISTRY

BEN D. BARKER, *Dean*

Professors

BEN D. BARKER	(801)	Dean
RONALD DALE BAKER	(968)	Chairman, Oral & Maxillofacial Surgery
JAMES W. BAWDEN	(800)	Pediatric Dentistry, Research
JAMES BECK	(718)	Chairman, Dental Ecology
GUNNAR BERGENHOLTZ	(924)	Chairman, Endodontics
ERNEST J. BURKES, JR.	(971)	Chairman, Oral Diagnosis
JAMES J. CRAWFORD	(822)	Endodontics
MILES A. CRENSHAW	(859)	Pediatric Dentistry, Research
HENRY W. FIELDS, JR.	(992)	Pediatric Dentistry and Orthodontics
JACOB S. HANKER	(869)	Oral & Maxillofacial Surgery, Research
H. GARLAND HERSHEY	(901)	Orthodontics
GENE A. HOLLAND	(953)	Fixed Prosthodontics
L. H. HUTCHENS	(912)	Periodontics
JOHN R. JACOWAY	(970)	Oral Diagnosis
LEONARD G. JEWSON	(915)	Periodontics
MALCOLM JOHNSTON	(805)	Orthodontics
DAVID L. KOTH	(959)	Chairman, Fixed Prosthodontics
IRWIN JOEL LEEB	(921)	Endodontics
ROGER L. LUNDBLAD	(851)	Periodontics, Research
CECIL RHODES LUPTON	(963)	Oral & Maxillofacial Surgery
WALTER T. MCFALL, JR.	(914)	Periodontics
FRANK T. MCIVER	(993)	Pediatric Dentistry
JAMES BERNARD MACHEN	(909)	Pediatric Dentistry, Associate Dean
STEPHEN R. MATTESON	(973)	Oral Diagnosis
GERALD L. MECHANIC	(855)	Periodontics, Research
HENRY VON MURRAY	(954)	Fixed Prosthodontics
THEODORE RICHARD OLDENBURG	(994)	Pediatric Dentistry
WILLIAM ROBERT PROFFIT	(906)	Chairman, Orthodontics
THEODORE ROBERSON	(943)	Chairman, Operative
DAVID M. SIMPSON	(913)	Chairman, Periodontics
TROY BUNYON SLUDER, JR.	(945)	Operative
JOHN W. STAMM	(717)	Assistant Dean for Research and Graduate Studies
DUANE FRANCIS TAYLOR	(841)	Operative, Research
BILL C. TERRY	(961)	Oral & Maxillofacial Surgery
SVEIN U. TOVERUD	(813)	Oral Diagnosis
DEREK T. TURNER	(843)	Operative, Research
DONALD W. WARREN	(986)	Dental Ecology
WILLIAM P. WEBSTER	(987)	Dental Ecology
RAYMOND P. WHITE, JR.	(810)	Oral and Maxillofacial Surgery
MATTHEW THOMAS WOOD	(936)	Chairman, Removable Prosthodontics

Associate Professors

STEPHEN C. BAYNE	(714)	Operative
MARVIN J. BLOCK	(989)	Dental Ecology
JAMES C. COFFEY, JR.	(838)	Endodontics
DIANE H. DILLEY	(999)	Pediatric Dentistry

CLAUDE W. DRAKE	(981)	Dental Ecology
MARY C. GEORGE	(889)	Dental Auxiliary Teacher Education, Director of DATE
GEORGE W. GRECO	(910)	Periodontics
KENT W. HEALEY	(935)	Removable Prosthodontics
RONALD J. HUNT	(719)	Dental Ecology
JOYCE W. JENZANO	(708)	Dental Ecology
RICHARD D. JORDAN	(937)	Removable Prosthodontics
ROBERT P. KUSY	(874)	Orthodontics, Research
DOUGLAS R. MCARTHUR	(931)	Removable Prosthodontics
CHARLES L. MILONE	(988)	Dental Ecology
KATHLEEN E. MORR	(706)	Dental Ecology
DONALD R. NELSON	(932)	Removable Prosthodontics
ROY PEACH	(801)	Endodontics
DANIEL A. SHUGARS	(940)	Operative, Assistant Dean, Pre-Doctoral Education
RONALD P. STRAUSS	(980)	Dental Ecology
TIMOTHY A. TURVEY	(962)	Oral & Maxillofacial Surgery
WILLIAM F. VANN, JR.	(990)	Chairman, Pediatric Dentistry
E. LELAND WEBB	(957)	Fixed Prosthodontics

Assistant Professors

JAY A. ANDERSON	(716)	Oral and Maxillofacial Surgery
IKRAMUDDIN AUKHIL	(911)	Periodontics
CAROLYN BENTLEY	(978)	Oral Diagnosis
SUSAN J. DANIEL	(720)	Dental Ecology
CAROL R. DRINKARD	(997)	Pediatric Dentistry
JAMES M. GEORGE	(984)	Dental Ecology
JAN C. HOLLAND	(709)	Dental Ecology
MEL KANTOR	(975)	Oral Diagnosis
THOMAS F. LUNDEEN	(941)	Operative
SANDRA MADISON	(922)	Endodontics
WILLIAM MAIXNER	(930)	Removable Prosthodontics
GEORGE A. MARYNIUK	(952)	Fixed Prosthodontics
SALLY R. MAURIELLO	(707)	Dental Ecology
GLENN E. MINSLEY	(702)	Removable Prosthodontics
JOHN D. MORIARTY	(917)	Periodontics
DARLENE H. SAMS	(700)	Dental Ecology
REBECCA R. SCRUGGS	(701)	Dental Ecology
PAUL M. THOMAS	(966)	Orthodontics & Oral and Maxillofacial Surgery
MYRON R. TUCKER	(965)	Oral & Maxillofacial Surgery
JOAN F. TULLOCH	(904)	Orthodontics
DONALD A. TYNDALL	(972)	Oral Diagnosis
JOHN R. VAN VENROOY	(705)	Orthodontics

Clinical Associate Professors

R. DENBY LEWIS	Endodontics
JAMES T. WHITE	Removable Prosthodontics

Clinical Assistant Professors

DONNA WARREN	(710)	Dental Ecology
VICKI P. WHITE	(711)	Dental Ecology

Research Associate Professors

JAMES BADER	(712)	Dental Ecology
CEIB L. PHILLIPS	(821)	Orthodontics

Research Assistant Professor

GREGORY ESSICK	(713)	Removable Prosthodontics
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Professors Emeriti

DAVID P. DOBSON
 ROY L. LINDAHL
 SANDY COLE MARKS
 ROBERT J. SHANKLE
 MYRON S. SILVERMAN

Graduate instruction in the School of Dentistry is offered in oral biology, oral and maxillofacial surgery, oral radiology, orthodontics, pedodontics, periodontology, endodontics, prosthodontics, and dental auxiliary teacher education, and is designed to prepare dentists and auxiliaries for teaching, research, or for the specialty practice in the selected area. All dental specialty programs lead to the Master of Science degree and require the successful completion of oral and/or written comprehensive examinations, a research project and a thesis. Consideration has been given to the requirements as set forth by the Council on Dental Education of the American Dental Association as well as the respective specialty boards.

Graduates who possess an appropriate degree and who meet the requirements of the Graduate School will be considered for admission. For some programs scores on the Graduate Record Examination must be submitted in order to be considered for admission. The degree of Master of Science is offered in the several subject areas cited.

Enrollment for study in dental specialty programs requires a minimum period of residency of three years. The curricula have been designed to permit maximum flexibility in preparation for practice, teaching, or research, as well as to meet the educational requirements of the Specialty Boards.

In addition to the courses listed herein, an appreciable number of elective courses are offered to permit arrangements for a minor in another field and for special interests in teaching and research. The Degree requirements vary slightly with each program. Detailed curricula requirements may be obtained by writing the Office of Admissions, UNC School of Dentistry, CB# 7450, Chapel Hill, NC 27599-7450.

Tuition and Fees

Residents have a semester tuition fee of \$852.50 while the summer rate is \$534.70. Instruments, books, and laboratory fees are to be determined. Non-residents have a tuition fee of \$2824.50 per semester and \$2036.70 for an eight-week summer term. Tuition and fees are due at the time of registration.

Student loans are available on the same basis as for undergraduates. For additional information, write Office of Admissions, The University of North Carolina at Chapel Hill, School of Dentistry.

Oral Biology

The admission policy for graduate training in Oral Biology leading to the degree of Master of Science will follow the regular requirements for admission to the Graduate School. Admission for the purpose of completing requirements for this degree will be accomplished only after the proper application, transcripts of prior academic work and other credentials have been reviewed and approved by the Office of Admissions for the School of Dentistry, the Director of the Program in Oral Biology, and consultation with members of the working faculty of the Oral Biology Curriculum.

The Curriculum in Oral Biology is a program of research and study which requires instruction over a period of three academic years and is designed to accommodate the interests of the individual students. Considerable emphasis is given to research training under the direction of the staff of the Dental Research Center and a thesis must be completed which will meet the highest standards of the University. The Center offers excellent facilities for interdisciplinary research in a number of areas, including: collagen biochemistry, dental biomaterials, nemostasis mechanisms, mineralized tissue research, neuroscience/orofacial pain, normal and abnormal craniofacial development, periodontal ligament biology, velopharyngeal and speech abnormalities, and virology.

A limited amount of financial support may be available for qualified applicants. The program is open to applicants holding the Bachelor of Science degree, the D.D.S., or its equivalent degree.

Graduate Courses in Oral Biology

- 201 (OBIO) THE BIOCHEMISTRY AND PHYSIOLOGY OF CALCIFIED TISSUES (2). Prerequisite, approval of instructor. The objective of this course is to offer students an opportunity to review and discuss the current state of knowledge of the biology of calcified tissues. Conference thirty hours. Crenshaw; Staff.
- 202 (OBIO) BIOLOGICAL ELECTRON MICROSCOPY (2). Prerequisite, approval of instructor. The object of this course is to offer students an opportunity to review the fine structural and molecular organization of cells with emphasis on correlative biochemical, physiological and anatomical analysis. Conference thirty hours. Peach; Staff.

- 203 (OBIO) MATERIALS FOR BIOLOGICAL APPLICATIONS (1). Prerequisite, approval of instructor. This course summarizes current knowledge of materials commonly used in biological applications. Emphasis is placed on their chemical, mechanical, and structural characteristics, and the relationship between these factors and appropriate clinical applications. Taylor; Staff.
- 204 (OBIO) CONGENITAL MALFORMATIONS OF THE OROFACIAL REGION (1). Prerequisite, approval of instructor. Students interested in the etiology, growth mechanism and treatment of congenital clefts and associated anomalies will be acquainted with significant aspects of the deformities. Staff.
- 206 (OBIO) INTRODUCTORY ASPECTS OF PROTEIN CHEMISTRY (1). Prerequisite, ab permission of instructor. Consideration of selected aspects of protein chemistry with special attention given to problems associated with proteins found in hard tissues and saliva. *One lecture hour a week, fall and spring.* Lundblad.
- 207 (OBIO) SEMINAR IN SPEECH PHYSIOLOGY (2). Prerequisite, permission of instructor. Evaluation of recent research in areas of anatomy, physiology, growth and development, genetics and acoustics as they relate to the science of speech. *One lecture hour a week, fall and spring.* Warren.
- 208 (OBIO) DISCUSSION IN ORAL BIOLOGY (2). Prerequisite, approval of instructor. ab A series of seminars on topics relevant to research and scientific knowledge in the field of Oral Biology. Visiting scientists from other Research Centers in the country and abroad will participate in the discussion series. *One lecture hour a week, fall and spring.* Staff and visiting lecturers.
- 209 (OBIO) RESEARCH TECHNIQUES IN ORAL BIOLOGY (6). Prerequisite, approval ab of instructor. The course will familiarize participants with a selection of specialized research techniques employed in interdisciplinary basic science approaches to problems in oral biology. *Four lecture laboratory hours a week, spring and summer.* Crenshaw; Staff.
- 210 (OBIO) RESEARCH (15-5 per semester). Prerequisite, approval of staff. Student will ab pursue the literature and select a research project in Oral Biology which will be planned and conducted under direction of research staff. The project is intended to lead to a thesis to meet the requirements of a Master of Science degree. *Fifteen hours research a week, summer, fall and spring.* Staff.
- 212 (OBIO) CYTOCHEMISTRY AND HISTOCHEMISTRY (2). Prerequisite, Zoology 11 ab or equivalent. The complementary nature of cell-fraction cytochemistry and microscopic histochemical, cytochemical, and immunocytochemical method of demonstrating the subcellular localization of biomacromolecules and enzymes will be discussed. *One lecture hour a week, fall and spring.* Hanker; Staff.
- 222 (OBIO) SEMINAR IN STRUCTURAL AND HARD TISSUE PROTEINS (1). Prerequisite, approval of instructor. Significant developments pertaining to the chemistry of molecular biology of the structural proteins will be discussed. The biochemistry of these proteins will be correlated with their various functions. Critiques of current literature will be emphasized. *One lecture hour a week, spring semester.* Mechanic.
- 233 (OBIO) CURRENT TOPICS IN BASIC SCIENCES (3, 3). Prerequisites, none. Significant ab developments and trends in basic medical sciences which have applications in specialized dentistry are discussed. Recent publications taken from medical and dental scientific literature are discussed. *Three hours a week, fall and spring.* Lundblad; Staff.
- 235 (OBIO) IMMUNOLOGY OF THE ORAL CAVITY (1). Lectures and discussion on the nature of immune responses specifically related to diseases of the oral cavity. *One lecture hour a week, fall.*
- 269 (OBIO) MICROBIOLOGY OF THE ORAL CAVITY (1). Prerequisite, approval of ab instructors. Study of current research literature and performance of laboratory exercises relating to taxonomy and methods of studying microorganisms associated with oral tissues. *Two hours a week, summer.* Crawford.

393 (OBIO) MASTER'S THESIS (6). Prerequisite, 210abc Research. *Fifteen hours a week.*
ab Staff.

Oral and Maxillofacial Surgery

The graduate curriculum in Oral and Maxillofacial Surgery consists of a study of the basic biological sciences and clinical experience integrated with a progressively graduated four-year sequence of approved hospital experience. This flexible program is designed to: (1) prepare dentists for a career in teaching, research and/or practice in the specialty of Oral and Maxillofacial Surgery; (2) meet the requirements for approval by the Council on Dental Education of the American Dental Association; and (3) prepare candidates for certification by the American Board of Oral and Maxillofacial Surgery.

While the study of the comprehensive biological sciences will be integrated and stressed throughout the four years, the more formally structured courses will be emphasized during the first two years of residency. More time will be spent in seminars and independent study during the junior and senior residency years (third and fourth years). The latter allows flexibility for investigative study, and additional rotations through various hospital services, and for additional elective assignments to provide more indepth experience and knowledge as related to Oral and Maxillofacial Surgery.

All students will be required to complete the full four-year program including the prescribed formal courses, seminars, independent study and original research project; and will be encouraged to earn the degree of Master of Science in Dentistry (Oral and Maxillofacial Surgery) by submission of a thesis.

Optional courses of study for selected individuals in this program may include qualifying for an M.D. degree or a Ph.D. in a biologic science. This involves an extended period of time which is individualized for each qualified student pursuing these additional studies.

Admission to the Graduate School for the Study of Oral and Maxillofacial Surgery is accomplished only after the application, transcripts and other credentials are reviewed and approved by the appropriate committees, including the resident and intern committee.

- 207 (ANAT) REGIONAL ANATOMY (2 or more). Lecture, laboratory. Montgomery, Small.
212 (OMSU) ORAL AND MAXILLOFACIAL SURGERY—ADVANCED ORAL AND
abc MAXILLOFACIAL SURGERY (12). Terry; Staff (Dent. Sch. and N.C.M.H.).
214 (OMSU) ORAL AND MAXILLOFACIAL SURGERY—GENERAL ANESTHESIA
abc (6). (N.C.M.H.) Baker; staff.
215 (OMSU) ORAL AND MAXILLOFACIAL SURGERY—PHYSICAL DIAGNOSIS
abc (12) (N.C.M.H.) Terry; staff.
230 (OMSU) ORAL AND MAXILLOFACIAL SURGERY—BASIC SURGICAL SKILLS
(4). (N.C.M.H.). This course includes an experimental animal surgery laboratory portion
as well as lectures and demonstrations of surgical principles and techniques. Terry; staff.
240 (OMSU) ORAL AND MAXILLOFACIAL SURGERY RADIOLOGY (1). *Two seminar
hours a week.* Spring. Matteson.

- 252 (OMSU) BONE AND CALCIUM PHYSIOLOGY (4). *Summer*. Hanker and staff.
 301 (OMSU) RESEARCH (6). To be arranged.
 393 (OMSU) THESIS (3 or more).
 400 (OMSU) GENERAL REGISTRATION (0).

Oral Radiology

The advanced education program in Oral Radiology begins July 1 and extends for 3 years, leading to a Master of Science degree. The purpose of the program is to prepare qualified oral radiology specialists to function in institutions of higher dental education and research. The program will prepare individuals to participate in maxillofacial radiologic practice, will provide background information on radiation physics, radiation biology and protection, and will offer teacher training preparation. Each student will participate in an extensive research project.

Each graduate student and his faculty advisor will develop an original clinical or applied research project that is an integral part of the graduate program. A written thesis is required. The program meets the eligibility requirements of the American Board of Oral and Maxillofacial Radiology.

Applications should be submitted by April 1. Interviews are usually scheduled before final acceptance. The course of study begins July 1 each year.

Graduate Courses in Oral Radiology

- 162 (RADI) RADIOGRAPHIC IMAGES AND INSTRUMENTATION (4). *Fall*. Burns.
 202 (ORAD) ADVANCED ORAL RADIOLOGIC TECHNOLOGY (4). Seminars, Laboratory, and Clinical sessions to provide experience in advanced radiologic procedures. *Spring*. Kantor; staff.
 203 (ORAD) ADVANCED ORAL RADIOGRAPHIC DIAGNOSIS (3). Literature review, and seminars to present advanced radiologic diagnosis. *Fall*. Matteson; staff.
 204 (ORAD) ADVANCED RADIOLOGIC DIAGNOSIS (3). Literature review, seminars, and clinical experience in advanced radiologic diagnosis. *Summer*. Matteson; staff.
 205 (ORAD) PRINCIPLES FOR THERAPEUTIC AND ADVANCED DIAGNOSTIC RADIOLOGY (5). Literature review, seminars, and field trips in the application of radiologic procedures such as computerized tomography, magnetic resonance for diagnosis of Oral and Maxillofacial conditions. Also, the fundamentals of radiation biology are included. Tyndall; staff.
 206 (ORDI) ADVANCED ORAL RADIOLOGY (2). Lecture, seminars, and laboratories in advanced radiology topics. *Spring*, Matteson; staff.
 393 (ORAD) MASTER'S THESIS (3).

Core courses required

- 207 (ANAT) REGIONAL ANATOMY (3). *Summer*. Montgomery.
 262 (ORPA) HISTOLOGY AND HISTOPATHOLOGY (2). *Fall*. Burkes.
 263 (ORPA) HISTOLOGY AND HISTOPATHOLOGY (2). *Spring*. Burkes.
 161 (ENVR) ELEMENTS OF RADIOLOGICAL HYGIENE (2). *Summer*. Simon, Willhoit.
 240 (DNED) TEACHING SKILLS FOR DENTAL EDUCATION (2). *Summer*. Shugars.
 162 (EPID) EPIDEMIOLOGY OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH (3). *Spring*. Checkoway.

- 167 (ENVR) MEDICAL PHYSICS (2). *Fall*. Simon.
 (DECO) 215 Sci Writing and Eval. (1). *Fall*. Bader.
 (DECO) 220 Sci Computing/Lab (2). *Fall*. Hunt.
 (DECO) 205B Intermediate Biostatistics (2). *Spring*. Phillips.

Orthodontics

Admission for graduate study in orthodontics is made only after review and approval of a completed application by the department faculty and by the Graduate School. Application for entry into the program in July should be made by October 1st of the previous year. Interviews are scheduled in October and November. Admission decisions normally are made late in November.

The two-year curriculum in orthodontics is designed to prepare dentists for clinical practice in the specialty of orthodontics, and meets the educational requirements for later specialty board certification. All students participate in research in the department, and are encouraged to earn the Master of Science degree by completion of a thesis project. For those especially interested in an academic or research career, additional experience in these areas can be provided by an extension of the two-year program.

During the first year of the program, students participate in seminars selected to the principal didactic courses, discuss clinical topics in seminars, and begin patient care. As the program progresses, didactic seminars gradually are replaced by research participation while clinical seminars continue and the volume of patient care increases. All students must perform satisfactorily on oral and written comprehensive examinations to successfully complete the program.

Graduate Courses in Orthodontics

- 201 ORTHODONTIC TECHNIQUE (4). Introduction to orthodontic technique and procedures, for beginning orthodontic graduate students. *Fall, first year*. Tulloch; staff.
- 203 ORTHODONTIC DIAGNOSIS (2,2). Principles of orthodontic diagnosis and analysis of diagnostic records for orthodontic specialists. *Fall, spring*. Van Venrooy; staff.
- 204 INTRODUCTION TO CLINICAL ORTHODONTICS (2). Principles of clinical patient care for specialty practice in orthodontics. *Fall*. Tulloch; staff.
- 205 ADVANCED CLINICAL ORTHODONTICS (5,3,7,7,3). *Fall, spring, summer*. abcd Thomas; staff.
- 206 BIOMECHANICS (2). Mechanical principles in orthodontic force production and control; biological response to orthodontic force. *Fall*. Proffit.
- 207 APPLIED AND RADIOGRAPHIC ANATOMY (2). Osteology and applied surgical anatomy of face and jaws; introduction to cephalometric radiology. *Fall*. Johnston.
- 208 GROWTH AND DEVELOPMENT (4). Principles of growth and development, emphasizing dento-facial development from an evolutionary and molecular biology perspective as well as the traditional anatomic perspective. *Spring*. Fields; staff.
- 209 PREVENTIVE ORTHODONTICS (3,3,3). Principles of orthodontic intervention for abc young patients, for pedodontists. *Spring, summer, fall*. Fields.
- 210 CRANIOFACIAL ANOMALIES (2). The clinical management of craniofacial anomalies, including cleft lip and palate, and the associated interdisciplinary approach to treatment planning. *Fall*. Dille; staff.

- 213 PRINCIPLES OF ORTHODONTIC TREATMENT FOR ADULTS (2). Orthodontic treatment procedures for adults, for periodontic and prosthodontic graduate students. *Spring*. Van Venrooy.
- 215 ORAL-PHARYNGEAL FUNCTION (1). Maturation of oral and pharyngeal function, including speech, and its relation to dento-facial development. *Summer*. Proffit.
- 222 ENVIRONMENT OF SPECIALTY PRACTICE (3). Trends in health care delivery; organization and management of orthodontic specialty practice. *Fall*. Proffit; staff.
- 301 RESEARCH (2,1,2,3,3). *Arranged*.
- abcde
- 302 CURRENT TOPICS IN ORTHODONTICS (2,2). Seminars on pertinent orthodontic literature, for advance orthodontic students. *Fall, spring*. Proffit.
- ab
- 393 THESIS (3 or more).

Pediatric Dentistry

Admission to the Graduate School for training in Pediatric Dentistry requires application with submission of transcripts of prior academic work and letters of recommendation which are reviewed and approved by the Director of Graduate Education for the School of Dentistry and the department faculty. A personal interview is required.

The Department of Pediatric Dentistry offers a graduate program in Pediatric Dentistry leading to a Master of Science degree. All students completing the program must submit a thesis. The program length is 36 months, beginning July 1. Its goal is to prepare the student for a career in dental education or clinical practice. This program can be combined with other educational programs in the social sciences, basic sciences, or allied health professions leading to an additional master's degree, postdoctoral fellowship, institutional or individual Dentist-Scientist award, or a doctoral degree.

Emphasis is placed on a diversified educational experience which includes didactic, clinical, and research education through instruction in growth and development; radiology; limited treatment orthodontics; microbiology; pharmacology; anesthesia and pain control; genetic abnormalities; dentistry for the handicapped; hospital dentistry; dental developmental deformities; oral pathology; behavior management; biostatistics; research methodology; and scientific writing. Hospital training is gained through North Carolina Memorial Hospital and Lenox Baker Cerebral Palsy Hospital. Each student completes several experiences focused on developing and improving skills in scholarship and research. During the first year each student writes and submits for publication a case report. In the second year a review of the literature on a pertinent topic is written and submitted for publication. The third year is largely devoted to an original investigation that is planned and organized during the second year. This project provides a background in the scientific method and scientific writing. Research opportunities are available in a wide range of topics and can be undertaken in the School of Dentistry, the Dental Research Center, and the Research Triangle Park.

Stipends are available depending upon available resources.

Graduate Courses in Pediatric Dentistry

- 200 PEDIATRIC DIAGNOSIS & TREATMENT PLANNING (2,2,2,2,2,2). Prerequisite, abcdef DDS or DMD. Seminars conducted by residents, private practitioners and faculty of child patient cases from their practice. Focus will be on diagnosis and treatment planning or special features of the unusual or interesting child patient cases. *Fall, spring (first year); fall, spring (second year); fall, spring (third year)*. Fields & staff.
- 203 PRINCIPLES OF PEDIATRIC DENTISTRY (2,2,2,2). Diagnosis & treatment of abcdef routine pediatric dentistry cases as well as cases of special interest. Course includes development & growth of teeth, morphology of primary & young permanent teeth, preventive procedures, injuries to primary and young permanent teeth, operative dentistry, and other topics of special interest. *Fall, spring (first year); fall, spring (second year)*. Vann & staff.
- 204 ADVANCED CLINICAL PEDIATRIC DENTISTRY (1,3,3,3,3,5,5). Course permits abcdef the student to obtain practical clinical experience in all phases of Pediatric Dentistry fghi including dental treatment in the operating room of the hospital with general anesthesia. *Fall, spring, summer (first year); fall, spring, summer (second year); fall, spring (third year)*. Dilley & staff.
- 301 RESEARCH (3,3,3,5,5,5) The student is to pursue a qualified research project under abcdef the guidance of the staff following review of the pertinent literature and planning on the basis of sound experimental design. *Summer (first year); fall, spring, summer (second year); fall, spring (third year)*. Fields & staff.
- 393 MASTER THESIS (3) *Spring (second year)*.

Periodontology

The graduate program in Periodontology consists of a 36-month course of study leading to a Master of Science degree. The first two years are devoted primarily to the study of the biologic concepts and literature that relate to periodontology, as well as the acquisition of the clinical skills. A portion of the first two years will be devoted to research. The third year will involve a combination of teaching, research experience, and the successful completion of a thesis. Elective courses relating to areas of research interests are available.

The program is designed to prepare dentists to assume positions in academics and research as well as in the clinical practice of periodontics. Stipends are provided during the three years of study.

Students begin the program July 1. The number of students is limited to four each year.

Graduate Courses in Periodontology

- 250 (PERI) ADVANCED CLINICAL PERIODONTICS CLINICAL PRACTICE (9). 405 abc hours. *Fall, spring, summer*. Staff.
- 251 (PERI) ADVANCED CLINICAL PERIODONTICS CLINICAL PRACTICE (9). 405 abc hours. *Fall, spring, summer*. Staff.
- 266 (PERI) PERIODONTAL THERAPY (1,1,1). *Fall, spring, summer*. Simpson; staff. abc
- 268 (PERI) CASE ANALYSIS (10). *Fall, spring, summer, fall, spring*. Simpson; staff. abcde

- 270 (PERI) SEMINAR IN PERIODONTOLOGY (6). Review of literature. *Fall, spring, abc summer*. Simpson; staff.
- 271 (PERI) SEMINAR IN PERIODONTOLOGY (4). Review of literature. *Fall, spring, ab* Simpson; staff.
- 285 (PERI) OCCLUSION AND OCCLUSAL DYSHARMONIES (2). *Spring*. McFall.
- 301 (PERI) RESEARCH (5 each). Up to 1350 laboratory hours. *Arranged. Fall, spring, abcdef summer*. Staff.
- 393 (PERI) THESIS (3 or more).

Prosthodontics

The admission policy for graduate training in Prosthodontics follows the regular requirements for admission to the Graduate School. Admission to the Graduate School is granted only after the application, transcript of prior academic work, letters of reference, and other credentials are reviewed and approved by the appropriate committee. All applications, transcripts, and letters of reference should be mailed to the Dental Admissions Office, UNC School of Dentistry, Chapel Hill, N.C. 27599. All application materials should be submitted by November 1 for the following summer class beginning July 1. A personal interview is desirable.

The Graduate Program in Prosthodontics is currently a thirty-six month course of study in Fixed and Removable Prosthodontics and Maxillofacial Prosthetics leading to a Master of Science degree. The primary goals of the program are to prepare a student for clinical practice and/or a teaching and research career. The curriculum offers a broad educational experience in clinical, research, didactic, and teaching activities. By special arrangement, the program may be combined with a Dentist/Scientist Award Curriculum that leads to a doctoral degree. The program satisfies the formal training requirements of the American Board of Prosthodontics for certification examination in Fixed or Removable Prosthodontics.

Stipends are available at various levels throughout the entire course.

Graduate Courses in Prosthodontics

- 221 (PROS) EXTRAORAL PROSTHODONTICS (2,1). Review of literature and clinical ab treatment of patients having congenital or acquired maxillofacial defects. *Spring and summer (first year)*. Minsley and staff.
- 223 (PROS) EXTRAORAL PROSTHODONTICS (2,2,1). Review of literature and clinical abc treatment of patients having congenital or acquired maxillofacial defects. *Fall, spring, and summer (second year)*. Minsley and staff.
- 224 (PROS) ADVANCED CLINICAL PROSTHODONTICS (REMOVABLE) (2,2,1). The abc clinical management of patients requiring advanced technique in complete and removable partial denture treatment. *Fall, spring, summer (first year)*. Healey; staff.
- 230 INTRODUCTION TO PROSTHODONTIC LITERATURE (2, 2). A seminar designed ab to review early and classic prosthodontic literature common to fixed and removable prosthodontics. *Summer, fall (first year)*. Director and staff.
- 231 PROSTHODONTIC PRINCIPLES, DIAGNOSIS, AND TREATMENT PLANNING abc —FIXED AND REMOVABLE (2,2,2,2,2,2). Principles of diagnosis and treatment def relative to the prosthodontic patient will be covered in depth in this seminar series.

- g *Fall, spring (first year); summer, fall, spring (second year); summer, fall (third year).* Director and staff.
- 232 abc def ghi ADVANCED CLINICAL FIXED AND REMOVABLE PROSTHODONTICS (1,3,3,5,55,333). This clinical offering is designed to permit the graduate student to experience all phases of advanced patient management in fixed and removable prosthodontics. *Summer, fall, spring (first year); summer, fall spring (second year); summer, fall, spring (third year).* Director and staff.
- 233 abc de MAXILLOFACIAL PROSTHODONTIC PRINCIPLES, DIAGNOSIS, AND TREATMENT. (1,1,1,1,1). Principles of diagnosis and treatment relative to maxillofacial prosthodontic patients will be covered in depth in this seminar series. *Spring (first year); summer, fall, spring (second year); summer, fall (third year).* Minsley and staff.
- 234 abc def CLINICAL MAXILLOFACIAL PROSTHODONTICS (2,2,2,2,2,2). This clinical offering is designed to permit the graduate student to manage the comprehensive prosthodontic care of congenital and/or acquired maxillofacial defects in both the dental school and hospital environment. *Spring (first year); summer, fall, spring (second year); summer, fall (third year).* Minsley and staff.
- 235 abc defg RESEARCH (2,3,3,3,5,5,5). The graduate will pursue the literature and select a research project which will be planned and conducted under the direction of the appropriate graduate faculty. *Spring (first year); summer, fall, spring (second year); summer, fall, spring (third year).* Graduate Faculty.
- 393 MASTER THESIS (3 or more). Completion of thesis for Master of Science degree. *Spring (third year).* Graduate Faculty.

In addition to the courses listed above, there are core courses that are required in Anatomy, Microbiology, Pharmacology, Oral Pathology, Research Methodology, Scientific Writing, and Dental Education. Flexibility in the curriculum also allows opportunity for appropriate electives.

Endodontics

The Department of Endodontics offers a three-year program leading to a Master of Science degree. The program is designed to prepare candidates for careers in academics, research, or the clinical practice of endodontics and for certification by the American Board of Endodontics.

The Endodontics graduate program involves an integrated study of biological sciences as they pertain to endodontics; development of the clinical skills required in the broad area of the endodontic specialty; review of classic and current literature in endodontics; teaching experience; research design and methodology; and development and completion of a research project.

Enrollment is limited to three candidates each year. The course of study begins July 1.

Graduate Courses in Endodontics

- 210 (ENDO) ADVANCED CLINICAL ENDODONTICS (29). 870 hours of clinical practice. Staff. Required each semester.
- 211 (ENDO) ENDODONTICS SEMINAR AND CASE ANALYSIS (15.) 180 hours conference. Staff. Required each semester.
- 212 (ENDO) ENDODONTICS LITERATURE REVIEW SEMINAR (20). 270 hours. Staff. Required each semester.

- 220 (ENDO) RESEARCH (15). 675 hours of laboratory. Staff. Required each semester.
abcde
393 THESIS (3 or more). Third year.
400 GENERAL REGISTRATION (0).

CORE courses required:

- 207 (ANAT)
205 (DECO)
210-213 (ORDI)
220 (OMSU)
250-251 (OMSU)
235 (OBIO)
269 (OBIO)

Dental Auxiliary Teacher Education

The primary objective of the Dental Auxiliary Teacher Education Master of Science Program is to prepare well qualified teachers for dental assisting and dental hygiene programs. At the successful completion of this program, the student should be able to (1) give evidence of having acquired advanced knowledge and skills in two of the following areas of concentration: Dental Auxiliary Utilization, Dental Radiology, Science Basic to Dental Auxiliary Education, Oral Pathology, and Clinical Education, (2) develop the knowledge, skills and attitudes necessary in the conduct of dental auxiliary programs, (3) teach courses in more than one dental auxiliary field, (4) define their own problems from the present body of knowledge in dental auxiliary education, solve the problems, and present their work in a scholarly fashion.

Credit hour requirements vary and are based on the individual background of the student and on the areas of concentration selected by the student. Approximately 48–54 credits are required. Twenty credit hours are required in the core (including thesis or research) and six credit hours of electives in allied areas are also required. Up to 12 credit hours of education are required for those students who do not have a background in education. The length of the program is approximately two years. Minimum admissions requirements for the program include current licensure or certification by the appropriate agency representing each professional area, and a bachelor's degree from an accredited institution and graduation from a dental auxiliary program accredited by the Commission on Accreditation, American Dental Association. Work experience in dental auxiliary education or dental auxiliary practice is strongly recommended.

Applicants must have a grade point average of B or better in the professional undergraduate curriculum. Three letters of recommendation are required as well as completion of an admissions questionnaire by the applicant. An application to the University can be obtained by writing to the following address after September 1 for enrollment during the following Fall or Spring: Admissions Office, School of Dentistry 209H, The University of North Carolina at Chapel Hill, Chapel Hill, NC 27514. For further informa-

tion contact Director, Dental Auxiliary Teacher Education Program, School of Dentistry 209H, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27514, 919/966-2800.

The graduate required Core includes:

- 230 (DATE) LEADERSHIP AND ADMINISTRATION (2). *Fall.* George, White.
- 210 (DECO) RESEARCH AND METHODOLOGY (1). *Fall.* Phillips.
- 215 (DECO) SCIENTIFIC WRITING (2). *Fall.* Bader.
- 205 (DECO) DENTAL BIostatISTICS (2). *Spring.* Phillips.
- 160 (DATE) CURRENT ISSUES IN DENTAL AUXILIARY EDUCATION (2). *Summer, spring.* George.
- 237 (DATE) INTERNSHIP AND SEMINAR (Var.) *Spring.* White.
- 393 (DATE) THESIS OR DATE 301 RESEARCH (3). *Fall, spring.* Scruggs.

Courses required for each area of concentration include the following:

Dental Auxiliary Utilization

Prerequisite: DATE 15: Current Professional Skills, Clinical Section.

- 105 (HPAA) CONCEPTS OF HEALTH ADMINISTRATION (3). *Fall, spring.* Allen, Berry.
- 198E (DATE) PERSONNEL MANAGEMENT SEMINAR (2). *Spring.* George.
- 234 (DATE) DAU PROGRAM MANAGEMENT (4). *Spring.* Scruggs.
- 211 (HPAA) FINANCIAL MANAGEMENT OF HEALTH CARE ORGANIZATIONS (3). *Fall, summer.* Zelman, Loddengaard.

Dental Radiology

Prerequisites: DATE 15: Current Professional Skills, Dental Radiology Section; Physics 24 and 25; Calculus.

- 162 (RADI) INSTRUMENTATION AND IMAGING METHODS (4). *Spring.* Burns.
- 161 (ENVR) ELEMENTS OF RADIOLOGIC HYGIENE (2). *Spring, II summer session.* Stansbury, Watson, Willhoit.
- 233 (DATE) SEMINAR AND PRACTICUM IN DENTAL RADIOLOGY EDUCATION (4). *Fall.* White.

Biologic Sciences

- 102 (DENT) GROSS ANATOMY (5). *Fall.* Montgomery.
- 104 (DENT) MICROSCOPIC ANATOMY (3). *Fall.* Peach.
- 114 (DENT) PHYSIOLOGY (4). *Spring.* Glasser.
- 200 (DENT) BASIC PHARMACOLOGY (3). *Fall.* Toverud.
- 103 (DENT) BIOCHEMISTRY (5). *Fall.* Bell.
- 116 (DENT) ORAL BIOLOGY (4). *Spring.* Peach.

Oral Pathology

- 202 (DENT) ORAL MEDICINE (4). *Fall.* Jacoway.
- 214 (DENT) ORAL MEDICINE (4). *Spring.* Jacoway.
- 222 (DENT) PHYSICAL DIAGNOSIS (4). *Summer.* Jacoway.

Clinical or Laboratory Education

Prerequisite: DATE 15: Current Professional Skills, Clinical Section.

- 136 (DATE) CLINICAL AND LABORATORY TEACHING PRACTICUM (3). *Fall.* Daniel.
- 153 (DATE) INTRA-ORAL FUNCTIONS FOR DENTAL AUXILIARY EDUCATORS (3). *Spring.* Scruggs.
- 154 (DATE) ADVANCED INTRA-ORAL FUNCTIONS FOR DENTAL AUXILIARY EDUCATORS CLINICAL PRACTICE (3). *Fall.* Scruggs.
- 236 (DATE) ADVANCED PRACTICUM IN CLINICAL AND LABORATORY INSTRUCTION (4). *Spring.* Morr.

Other Graduate Courses Offered to Graduate Students in Dentistry

- 205 (DECO) DENTAL BIOSTATISTICS (2). *Spring.* Phillips.
- 210 (DECO) RESEARCH METHODOLOGY (1). *Fall.* Bader.
- 240 (DNED) TEACHING SKILLS FOR DENTAL EDUCATION (1). *Summer.* Shugars.
- 250 (DECO) ORAL FACIAL AND COMMUNICATIVE DISORDERS (3). *Summer, fall, abc and spring.* Dilley.
- 269 (OBIO) MICROBIOLOGY OF ORAL CAVITY (1). *Spring.* Crawford.
- 210 (ORDI) ADVANCED ORAL DIAGNOSIS AND TREATMENT PLANNING (2). *Two lecture hours a week, fall.* Simpson; staff.
- 211 (ORDI) ADVANCED ORAL DIAGNOSIS AND TREATMENT PLANNING: CASE ANALYSIS (2). *Two lecture hours a week, spring.* Nelson.
- 212 (ORDI) ADVANCED ORAL DIAGNOSIS AND TREATMENT PLANNING: SPECIAL TOPICS SEMINAR (2). *Two lecture hours a week, fall.* Greco.
- 213 (ORDI) ADVANCED ORAL DIAGNOSIS AND TREATMENT PLANNING: CASE ANALYSIS (2). *Two lecture hours a week, spring.* Nelson.
- 206 (ORDI) ADVANCED DENTAL RADIOLOGY (1). *Two lecture hours a week, summer.* Matteson.
- 225 (ORDI) INDEPENDENT STUDY IN ADVANCED DENTAL RADIOLOGY (3). *Two lecture and two seminar hours a week, fall or spring.* Matteson.
- 226 (ORDI) PROJECT IN DENTAL RADIOLOGY (3). *One lecture, two seminar and three laboratory hours a week.* Matteson.
- 220 (OMSU) APPLIED PHARMACOLOGY (1). *One lecture hour a week, spring.* Bays.
- 207 (ANAT) REGIONAL ANATOMY (3). *Three lecture hours a week, fall.* Montgomery.
- 250 (OMSU) CLINICAL APPLICATIONS IN ADVANCED PAIN AND ANXIETY CONTROL (2). *Two seminar hours a week, fall.* Anderson.
- 251 (OMSU) ADVANCED PAIN AND ANXIETY CONTROL (2). *Two seminar hours a week, spring.* Anderson.
- 260 (OMSU) ORAL AND MAXILLOFACIAL PATHOLOGY SEMINAR (1). *One seminar abc hour a week. Fall, spring and summer.* Burkes, Jacoway.

DEPARTMENT OF DRAMATIC ART

MILLY S. BARRANGER, *Chair*

Professors

MILLY S. BARRANGER	(21)	Dramatic Literature, Theory/Criticism and Theatre History
RUSSELL GRAVES	(3)	Shakespeare Studies, Theory/Criticism
ARTHUR L. HOUSMAN	(4)	Play Analysis, Directing

Associate Professors

PATRICIA R. BARNETT	(1)	Acting (Nonmajors), Makeup
ROBERTA A. OWEN	(2)	Costume Design and History
CAROL V. PENDERGRAST		Voice

Assistant Professor

CRAIG TURNER		Movement for the Actor
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Adjunct Professor

DAVID HAMMOND		Acting, Directing
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Lecturer

McKAY COBLE		Design
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Visiting Assistant Professors

CHRISTOPHER ANGERMAN		Acting, Directing
MARGARET HAHN		Theatre Management

Visiting Lecturers

RICHARD BEEBE		Playwriting
LAUREL CLAYSON		Costume
TOM NEVILLE		Technical Production
MICHAEL ROLLERI		Technical Production, Lighting

The Department of Dramatic Art offers professional training programs in acting, costume, and technical production leading to the Master of Fine Arts degree. Facilities for these programs include the historic PlayMakers Theatre, the production facilities of the Graham Memorial Building, and the Paul Green (thrust) Theatre.

It is the responsibility of each student to become familiar with the general regulations of the Graduate School and particularly with the dates indicated on the calendar for the academic year; this information is contained elsewhere in the Graduate School *Record*.

A limited number of graduate appointments is available in the department. Appointments are presently awarded in the areas of acting, technical theatre, costuming, and in support of the Introduction to Theatre courses

(DRAM 15 and 16). All appointments involve instructional or laboratory supervisory responsibility.

Master of Fine Arts

1. *Purpose:* Through disciplined classroom training and a progressive involvement in performance opportunities, students in the MFA programs are challenged to develop the skills and attitudes that will enable them to compete in the professional theatre. Stressing accomplishment in a wide range of performance styles, the programs complement the variety of theatrical experiences present in the PlayMakers Repertory Company, a professional full-season Equity Company and a member of The League of Resident Theatres and representative of other professional resident theatres. Within his/her area of specialization, the graduating student will be able to perform in a variety of roles or responsibilities with regional and university theatres.
2. *Prerequisites:* All applicants must meet admission requirements established by the Graduate School of The University of North Carolina at Chapel Hill. Each area of specialization within the department requires additional application materials. In the Costuming and Technical areas, applicants are required to submit portfolios. All acting candidates are required to audition. In addition to holding on-campus auditions, the department attends the national University/Resident Theatre Association auditions in New York and Chicago. All applicants are encouraged to apply as early as possible.
3. *Curriculum:* Each candidate will pursue a course of study in a conservatory environment. Classroom training will offer a variety of approaches, each designed to develop and refine the candidate's artistic and professional potential. Classroom work will be augmented by participation in the professional season of the PlayMakers Repertory Company. In addition to the PRC, students will find performance opportunities in departmental productions and studio projects.
4. *Evaluation:* At least once each semester, the faculty will formally evaluate the candidate's progress and make recommendations concerning his/her continuation in the program. Evaluations will be made on each individual on the basis of classroom and performance work. Letter grades (H, P, L, F) will be assigned for work in all courses.
5. *Admission:* Generally, only first-year applicants will be considered for admission. Candidates should check with the department for admission information pertaining to their specific area of specialization, i.e., acting, technical production, or costuming.
6. *Residency and Requirements:* All candidates will be in residence for three years, six consecutive semesters. The Departmental system of evaluation requires that the student be invited to continue in the second and then in the final year of the program. In the first two years, candidates will

carry twelve (12) credit hours per semester, and in their third year, six (6) credit hours per semester. In addition to sixty (60) credit hours, each area of specialization carries its own graduation requirements. Candidates are encouraged to ascertain individual requirements for graduation as soon as possible.

More detailed information can be obtained by addressing inquiries to: Director of Graduate Studies, Department of Dramatic Art, CB# 3230, 105 Graham Memorial, The University of North Carolina at Chapel Hill, North Carolina, 27599-3230.

Courses for Graduates and Advanced Undergraduates

- 100 TECHNICAL DIRECTION (3). Prerequisites, Dramatic Art 64, section II, or equivalent technical practice in theatre production. Also, permission of instructor. Study of the technical and engineering problems in production and standard theatrical drafting and construction conventions. *Fall*. Neville.
- 101 STAGE MANAGEMENT (3). A study of basic principles and practices of modern stage management. *Fall and spring*. Hammond.
- 150 SHAKESPEARE IN THE THEATRE (3). A study of the literary, stage history, and production problems of representative plays. *Spring*. Graves. (BA Perspective Credit).
- 155 PLAYWRITING (3). Permission of Department required. A practical course in writing for the stage with studio productions of selected works. May be repeated once for credit. (BA Perspective Credit) *Fall*. Staff.
- 157 PLAYWRITING (3). Prerequisite, at least one semester of Dramatic Art 155. A practical course in the writing of the stage play. *Spring*. Staff.
- 166 SCENE DESIGN (3). Prerequisite, permission of instructor required. General principles of visual design as applied to scenery for the theatre. Instruction in standard techniques of planning and rendering scene design. *Spring*. Coble.
- 167 COSTUME DESIGN I (3). Permission of instructor required. A study of the historical styles of dress as applied to costuming for the theatre. Introduction in standard techniques of planning and rendering costume design. (BA Perspective Credit) *Fall*. Owen.
- 168 LIGHTING DESIGN (3). Prerequisite, Dramatic Art 100 or equivalent training in drafting. General principles of lighting design as applied to the performing arts. Theory and instruction in standard techniques of lighting for the stage. *Fall*. Staff.
- 169 COSTUME DESIGN II (3). Prerequisite, Dramatic Art 167 and permission of instructor. Advanced study of costume design implementing the techniques and theory examined in Dramatic Art 167. *Spring. Alternate years*. Owen.
- 170 SURVEY OF COSTUME HISTORY (3). A survey of historic costume forms from ancient Egypt to the present time. *Fall. Alternate years*. Owen. (B.A. Perspective Credit).
- 172 SPECIAL TOPICS IN COSTUMING (3). Course includes subjects in the aesthetics of costume design and history as related to the organization and construction of theatrical costumes. *Spring. Alternate years*. Owen.
- 173 BEGINNING PATTERN MAKING (3). Permission of instructor. Instruction in beginning pattern making including drafting and draping as well as advanced construction techniques as applicable to stage costuming. *Fall*. Staff.
- 174 ADVANCED PATTERN MAKING (3). Permission of instructor. Advanced instruction in pattern making including dart manipulation and finishing techniques. *Spring*. Staff.
- 175 DECORATIVE ARTS AS A THEATRICAL RESOURCE (3). A study of decorative arts through history as the forms developed, and as they relate to particular periods in theatrical history. (Historical Perspective Credit) *upon demand*. Owen.

- 177 PRINCIPLES OF DESIGN (3). Studies and practicum in the principles of design applied to designing for the stage, with emphasis on the principles of unity between scenery, costumes and lighting. (BA Perspective Credit) *Fall*. Coble.
- 190 THEATRE MANAGEMENT (3). Practicum in theatre management procedures and business of the theatre involving box office, audience development, research, publicity, operational and contract procedures in regard to artists, technicians, managers and producers. Students actively engage in management areas of the PlayMakers Repertory Company and productions of the Department of Dramatic Art. Permission of instructor. *Fall and Spring*. Hahn.
- 192 SPECIAL TOPICS STUDIES (3). Open only to majors in the Department of Dramatic Art. Permission of the instructor required. Special group studies of a selected area of theatre and drama. *This course may be repeated once for credit. Fall and Spring*. Staff.
- 194 PROFESSIONAL THEATRE LABORATORY (3-12). Individual programs or internships in acting, directing, design, management, and playwriting under the guidance of professional practitioners in conjunction with the PlayMakers Repertory Company or of approved other professional theatre organizations. Locally supervised. Open only to advanced students with permission of Department Chairman required. *Offered as required*. Staff.

Courses for Graduates

- 200 SEMINAR IN PROFESSIONAL PRACTICE (1). Prerequisite, admission to the M.F.A. Program in Dramatic Art. An examination of professional theatre practice through contact with students, staff, faculty, and visiting artists in all areas of theatre. *Fall*. Neville.
- 220 ACTING I (3). Prerequisite, admission to the M.F.A. Acting program. Intensive professional training for the actor. *Must be taken Fall and Spring*. Hammond.
- 221 ACTING II (3). Prerequisite, admission to second year of M.F.A. Acting program. Advanced professional training for the actor. *Must be taken Fall and Spring*. Hammond.
- 222 VOICE I (3). Prerequisite, admission to M.F.A. Acting program. Development of the individual actor's voice and speech. *Must be taken Fall and Spring*. Pendergrast.
- 223 VOICE II (3). Prerequisite, admission to second year of M.F.A. Acting program. Expansion of the individual's vocal versatility in performance. *Must be taken Fall and Spring*. Pendergrast.
- 224 MOVEMENT I (3). Prerequisite, admission to M.F.A. Acting program. Development of the actor's body as an expressive instrument. *Must be taken Fall and Spring*. Turner.
- 225 MOVEMENT II (3). Prerequisite, admission to second year of M.F.A. Acting program. Advanced projects in movement. Special sessions in tumbling and stage combat. *Must be taken Fall and Spring*. Turner.
- 226 REHEARSAL & PERFORMANCE I (1-6). Prerequisite, admission to the M.F.A. Acting program. Rehearsal and performance of special ensemble projects. *Must be taken Fall and Spring. May be repeated for credit*. Hammond, staff.
- 227 REHEARSAL & PERFORMANCE II (1-6). Prerequisite, admission to second year of M.F.A. Acting program. Practical application of techniques in rehearsal and performance in studio and mainstage production. *Must be taken Fall and Spring. May be repeated for credit*. Hammond, staff.

- 228 ACTING PRACTICUM I (6-12). Prerequisite, admission into the third year of the M.F.A. Acting Program. Intense practicum as a member of the PlayMakers Repertory acting company. Preparation and presentation of assigned projects and work in Departmental productions. Work in Voice and Movement as scheduled. *Fall*. Hammond, staff.
- 229 ACTING PRACTICUM II (6-12). Prerequisite, admission into the third year of the M.F.A. Acting Program. Intense practicum as a member of the PlayMakers Repertory acting company. Preparation and presentation of assigned projects and work in Departmental productions. Work in Voice and Movement as scheduled. *Spring*. Hammond, staff.
- 231 SEMINAR IN DRAMATIC LITERATURE (3). Prerequisite, admission to the M.F.A. program in any area. An examination of the literature of the theatre in terms of dramatic construction, theory and interpretation. *May be repeated for credit*. Staff.
- 240 COSTUME LABORATORY I (3). Prerequisite, admission to M.F.A. Costume program. Practical work in the Costume shop. *Must be taken Fall and Spring*. Staff.
- 241 COSTUME LABORATORY II (3). Prerequisite, admission to second year of M.F.A. Costume program. Advanced practical work in the Costume shop. *Must be taken Fall and Spring*. Staff.
- 242 COSTUME CONSTRUCTION I (3). Prerequisites, D.A. 192 and admission into the M.F.A. Costume program. Dart manipulation. *Spring*. Staff.
- 243 COSTUME CONSTRUCTION II (3). Prerequisites, D.A. 242 and admission into the second year of M.F.A. Costume program. Construction of costumes from Egyptian through thirteenth century. *Fall*. Staff.
- 244 COSTUME CONSTRUCTION III (3). Prerequisite, D.A. 243. Construction of costumes from fourteenth through nineteenth centuries. *Spring*. Staff.
- 245 ADVANCED COSTUME DESIGN I (3). Prerequisite, admission to second year of M.F.A. Costume program. Projects explore rendering techniques through assigned plays and periods. *Fall*. Owen.
- 246 ADVANCED COSTUME DESIGN II (3). Prerequisite, D.A. 245. Further exploration of complicated design assignments through history, continuing to refine rendering techniques. *Spring*. Owen.
- 247 COSTUME LABORATORY III (3). Prerequisite, admission to the third year of the M.F.A. Costume program. Advanced practical work in the Costume shop. *Must be taken Fall and Spring*. Staff.
- 249 COSTUME PROGRAM INTERNSHIP (6-12). Intensive practicum in Costume Design and construction, with tutorial and class assignments on an individual basis as required. *Must be taken Fall and Spring. May be repeated for credit*. Owen.
- 250 ADVANCED TECHNICAL DIRECTION (3). Prerequisite, admission to second year of the M.F.A. Technical Production Program. An advanced study of the management, technical, and engineering problems involved in theatrical production. *Fall*. Neville.
- 251 M.F.A. TECHNICAL THEATRE PRACTICUM I (3-6). Prerequisite, admission into M.F.A. Tech program. Practical work in Scene shop. *Must be taken Fall and Spring*. Neville.
- 252 M.F.A./TECH PRACTICUM II (3-6). Prerequisite, D.A. 251 and admission to second year of M.F.A. Tech program. Advanced practical work in Scene shop. *Must be taken Fall and Spring*. Neville.
- 259 TECH INTERNSHIP (6-12). Intensive practicum in production projects for Departmental and PRC productions, with independent studies as assigned on an individual basis. *May be repeated for credit*. Neville.
- 260 TECHNICAL PLANNING & PRODUCTION (3-6). Prerequisite, admission into the third year of the M.F.A. Technical Production Program. Intensive practicum in production projects for Departmental and PlayMakers Repertory Company productions. *Must be taken Fall and Spring*. Neville.

- 262 **ADVANCED LIGHTING DESIGN (3).** This course acquaints the student with professional practice in lighting design through lecture by faculty and visiting professionals, and evaluation of lighting designs executed by students and critiqued by professionals. Permission of instructor required. *Spring.* Staff.
- 393 **THESIS (1-6).** Staff.
- 400 **GENERAL REGISTRATION (0).**

CURRICULUM IN ECOLOGY

SETH R. REICE, *Chairman*

Professors

HOWARD E. ALDRICH	(12)	Ecological Analysis of Trade Associations
RICHARD N. ANDREWS	(32)	Environmental Policy and Planning, Impact Assessment
J. ALAN FEDUCCIA	(3)	Ecology and Evolution of Vertebrates
NELSON G. HAIRSTON	(6)	Population and Community Ecology
CHARLES E. JENNER	(5)	Aquatic Ecology, Marine Zoology
JOHN D. KASARDA	(9)	Human Ecology, Urban Sociology
RICHARD J. KOPEC	(11)	Bioclimatology, Climate, Computer Mapping
EDWARD J. KUENZLER	(7)	Marine and Wetlands Ecology, Nutrient Cycling, Estuarine Pollution
HELMUT C. MUELLER	(13)	Ecological Behavior, Avian Predation
CHARLES H. PETERSON	(29)	Marine Ecology, Intertidal Communities
ALAN E. STIVEN	(19)	Population and Community Ecology, Ecological Genetics
CHARLES M. WEISS	(20)	Limnology of Impoundments and Water Quality
R. HAVEN WILEY	(21)	Behavioral Ecology of Vertebrates, Avian and Primate Social Behavior
RICHARD A. YARNELL	(23)	Environmental Anthropology, Human Culture

Associate Professors

JOHN W. FLORIN	(33)	Population and Medical Geography
ROBERT K. PEET	(26)	Plant Community and Population Ecology, Biogeography
FREDERIC K. PFAENDER	(27)	Environmental Microbiology, Estuarine Pollution
SETH R. REICE	(16)	Community and Ecosystems Ecology, Stream Ecology, Detritus Processing
PETER J. ROBINSON	(17)	Meteorology, Radiation Exchange, Energy Balances
STEPHEN J. WALSH	(2)	Remote Sensing, Geographical Information Systems, Physical Geography, Resource Management
PETER S. WHITE	(15)	Plant Community Ecology and Conservation Biology
BRUCE P. WINTERHALDER	(30)	Human and Cultural Ecology, Foraging and Hunting Strategies; Andes

Assistant Professors

MARK E. HAY	(34)	Marine Ecology, Herbivory, Algal Ecology
VAL H. SMITH	(35)	Aquatic Ecology, Limnology, Stream Ecology

Professors Emeriti

ELIZABETH A. MCMAHAN
ALBERT E. RADFORD

Using the resources of many departments, the graduate Curriculum in Ecology provides both broad and specialized training in Ecology. Whereas degree programs with a strong ecology component may be arranged in Biology, Environmental Sciences and Engineering, Sociology, Anthropology, and others, the Curriculum in Ecology, by combining many approaches and methods, provides balanced general ecological training, including preparation for the study and management of systems of nature and man. Degrees available in the Ecology Curriculum are the Master of Science, the Master of Arts, and the Doctor of Philosophy.

For the ecology degrees, course work is required in the following fields: *biosciences* including behavior and physiology, population biology, and community and ecosystem ecology; *sociosciences* including cities and migration, human population dynamics, and social organization; *geosciences* including the atmospheric, terrestrial and aquatic sciences.

Preparation for careers in ecology also requires firm grounding in mathematics, computer science, the physical and chemical sciences, statistics, and systems analysis and experimental methods. Undergraduate preparation may include a major in a biological science, social science, or in environmental science.

Facilities available for special study include a state of the art IBM Token Ring Network for computing, the North Carolina Botanical Garden and Mason Farm Biological Reserve, the Institute of Marine Sciences at Morehead City, Highlands Biological Station in the mountains, University Lake, Jordan Lake, Duke Forest, greenhouses, and ecological equipment administered by the supporting departments. Strong ecological faculties and research programs are available in sister institutions at N.C. State University and Duke University and members of these faculties may serve on the students' committees. The University of North Carolina is a member of the Organization of Tropical Studies which provides opportunities for field study in Costa Rica and other tropical areas.

Requirements for Admission

For admission to the Curriculum in Ecology, an undergraduate degree is required in a natural science such as physics, chemistry, biology, bacteriology, botany, zoology, geology; a social science such as anthropology, sociology, or economics; or a mathematical area such as statistics, mathematics, or systems analysis; an engineering area; or environmental science. Students are advised to develop a broad undergraduate science major with as many as possible of the following courses: calculus; computer science; general

physics; analytical, organic, and physical chemistry; general botany and zoology; geology; anthropology; sociology; invertebrate zoology or paleontology; general ecology; physiology; and statistics. Application for admission and graduate appointments accompanied by credentials and Graduate Record Examination scores should be submitted by January 1.

Degree Requirements

Doctor of Philosophy

The Ph.D. program for a student is supervised by a faculty advisory committee drawn from the graduate faculty in ecology and may include faculty from N.C. State University or Duke University. The requirements for the major for the Ph.D. degree are determined by the student's advisory committee and normally include the following: (a) at least two courses or equivalent training in each of the three core areas listed below. Some recommended courses are indicated. Substitutions from UNC or other universities in the Research Triangle area may be arranged by petition; (b) two approved research skill courses; (c) one semester registration in each of ECOL 199 and ECOL 201. Supervised learning experiences approved by the student's advisory committee in at least three environments appropriate to the student's interests are also recommended. Courses, research expeditions, oceanographic cruises, and extended field trips are examples of organized work in which guidance and instruction are given. Students attending OTS should register for ECOL 202. Requirements for the dissertation, written and oral examinations, admission to candidacy, residency, and final examinations are as provided in the regulations for the Graduate School. Foreign language competence is at the discretion of the student's advisory committee. A semester of teaching experience equivalent to six laboratory contact hours per week is also required.

Master of Arts

The Master of Arts degree program is similar to the doctoral program except that (a) two of the three core areas must be represented in the graduate major, (b) one skill course must be elected, (c) one semester's registration in each of ECOL 199 and 201, and (d) an organized learning experience is recommended in one environment other than those in the immediate Chapel Hill area. Requirements for the thesis, admission to candidacy, residence, and final examinations are provided in the regulations of the Graduate School.

Master of Science

Requirements for the Master of Science are the same as those for the Master of Arts except a Master of Science paper is prepared (ECOL 203)

in place of the Master of Arts thesis and one semester's registration of field work is recommended (ECOL 202).

Minor in Ecology

Graduate majors in other programs who wish to declare an Ecology minor may do so by taking ECOL 201 and additional approved ecology courses necessary to meet the requirements of the Graduate School. A member of the faculty of the Ecology Curriculum appointed by the Chairman of the Curriculum must be represented on the student's advisory committee.

Ecology Core Areas

(Detailed descriptions will be found under the department which offers each course.)

BIOSCIENCE

Behavior and Physiology: Anth 116, Biol 120, Biol 124, Biol 150, Biol 151, Biol 223

Population Biology: Biol 116, Biol 158, Biol 185, Biol 243

Community and Systems: Biol 142, Biol 143, Biol 146, Biol 184, Biol 186, Biol 235, Biol 243, Envir 137, Envir 235

SOCIOSCIENCE

Cities and Migration: Anth 167, Geog 151, Plan 106, Plan 111, Soci 114, Soci 287

Human Population Dynamics: Anth 255, Bios 170, Econ 165, Geog 150, Soci 132

Social and Cultural Organization: Anth 117, Anth 139, Plan 233, Soci 218

GEOSCIENCE

Atmospheric: Envir 249, Geog 110, Geog 112, Geog 115

Terrestrial: Geog 117

Aquatic: Biol 126, Envir 132, Envir 134, Envir 232, Masc 104, Masc 122, Plan 234

Remote Sensing and Geographic Information Systems: Geog 177, Geog 191, Geog 277

Courses in the Ecology Curriculum

- 199 CURRENT ISSUES IN ECOLOGY (3). Prerequisite, previous coursework in Ecology and permission of instructor required. Topics will vary, but will focus on interdisciplinary problems facing man and/or environment. Staff.
- 201 SEMINAR IN ECOLOGY (2). Topics and problems in ecological research. May be taken more than once. *Two hours a week.* Staff.
- 202 FIELD EXPERIENCE IN ECOLOGY (2). Organized field work in remote environments with a faculty instructor as approved by student's supervisory committee. May be taken more than once. Staff.
- 203 MASTER OF SCIENCE PAPER (3). *Fall or spring.* Staff.
- 250 SPECIAL TOPICS IN ECOLOGY (2-4). Prerequisite, permission of instructor. *Fall and spring.* Staff.
- 300 RESEARCH IN ECOLOGY (2 or more). *Fall or spring.* Staff.
- 393 MASTER OF ARTS THESIS (3-6). *Fall or spring.* Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall or spring.* Staff.
- 400 GENERAL REGISTRATION (0).

Ecological courses in other departments that are considered appropriate for the major in the Ecology Curriculum:

Anthropology

- 117 Evolutionary Perspectives on Human Adaptation and Behavior (3). *Fall*. Winterhalder.
- 201 Sociocultural Theory and Ethnography (3). Staff.
- 203 Evolution and Ecology (3). Staff.
- 139 Environmental Anthropology (3). *Fall*. Yarnell.
- 165 Economic Anthropology (3). *Fall*. Staff.
- 255 Seminar in Cultural Ecology and Population (3). *Spring*. Staff.
- 266 Seminar in Ethnobotany (3). *Spring*. Yarnell.

Biology

- 109 Introduction to Hydrobiology (4). *Spring*. Jenner.
- 116 Population Biology (3). *Spring*. Stiven.
- 126 Oceanography (3). *Fall*. Staff.
- 140 Biological Oceanography (4). *Summer*. Staff.
- 141S Special Problems in Marine Biology (3-6). *Summer*. Staff.
- 142 Plant Ecology (4). *Fall*. Peet.
- 143 Ecological Plant Geography (3). *Fall*. Peet.
- 145 Hypothesis Testing in Ecology (3). *Spring*. Hairston.
- 146 Marine Ecology (3). *Spring*. Peterson.
- 147 Field Ecology (4). *Fall*. Reice.
- 148 Freshwater Ecology (3). *Fall or spring*. Smith.
- 149 Ecosystem Structure and Function (3). *Fall or spring*. Smith.
- 150 Animal Societies and Communication (3). *Spring*. Wiley.
- 151 Behavioral Ecology (3). *Spring*. Mueller.
- 158 Evolutionary Patterns (3). *Spring*. Hairston.
- 184 Conservation Biology (3). *Spring*.
- 185 Population Ecology (3). *Spring*. Stiven.
- 186 Systems Ecology (3). *Spring*. Reice.
- 213 Advanced Marine Ecology (3). *Spring*. Jenner.
- 247 Field Plant Geography (2). *Spring*. Peet.

Biostatistics

- 170 Demographic Techniques I (3). *Fall*. Staff.
- 271 Demographic Techniques II (3). *Spring*. Suchindran.
- 277 Mathematical Models in Demography (3). *Spring*. Suchindran.

City and Regional Planning

- 219 Environmental Systems Analysis (3). *Fall*. Moreau.
- 233 Natural Resource Law and Policy (Envr 283) (3). Heath, Campbell.
- 234 Water Resources Planning and Policy Analysis (Envr 284) (3). *Spring*. Moreau.
- 235 Land Use Planning (3). *Spring*. Kaiser.

Economics

- 111 Resource and Environmental Economics (3). Staff.
- 165 Economics of Population (3). *Fall*. Turchi.
- 265 Economics and Population (3). *Spring*. Turchi.

Environmental Sciences and Engineering

- 111 Introduction to Environmental Policy (3). *Fall*. Shiffman.
- 132 Limnology and Water Pollution (3). Weiss.
- 137 Ecology of Wetlands (4). *Fall*. Kuenzler.
- 153 American Environmental Policy (3). *Spring*. Andrews.
- 211 Methods in Environmental Management (3). *Fall*. Shiffman.
- 217 Systems Analysis in Environmental Planning (3). *Fall*. Staff.
- 219 Environmental Systems Analysis (3). *Fall*. Moreau.
- 232 Special Topics in Aquatic Biology (2). *Spring*. Kuenzler, Weiss.
- 233 Microbial Ecology (4). *Fall*. Pfaender.
- 235 Ecology of Phytoplankton (4). *Spring*. Kuenzler.
- 246 Air Pollution, Measuring, Monitoring and Survey (3). *Spring*. Fox, Jeffries.
- 253 Environmental Policy Analysis (3). *Fall*. Andrews.

Epidemiology

- 160 Principles of Epidemiology (3). Staff.
- 161 Epidemiology in Population Dynamics and Family Planning Programs (2). *Fall*. Staff.

Geography

- 110 Meteorology (3). *Fall*. Robinson, Kopec.
- 112 Micrometeorology (3). *Spring*. Robinson.
- 115 Climatology (3). *Spring*. Kopec, Robinson.
- 132 The World's Food Supply (3). *Fall*. Hawley, Meade.
- 148 Fundamental Concepts of Human Geography (3). *Spring*. Florin, Browning.
- 150 Population Geography (3). *Spring*. Florin, Birdsall, Meade.
- 156 Natural Resources (3). *Spring*. Hawley.
- 171 Cartography (3). *Fall and spring*. Kopec.
- 173 Computer Cartography (3). Walsh.
- 177 Remote Sensing (3). *Spring or fall*. Hawley, Walsh.
- 178 Interpretation of Aerial Photo (3). *Spring*. Hawley.
- 191 Geographical Information Systems (3). Walsh.
- 210 Advanced Physical Geography (3). *Fall*. Kopec and staff.
- 277 Advanced Remote Sensing (3). Walsh.
- 290 Spatial Analysis and Computer Modeling (3). Gesler, staff.

Sociology

- 113 Social Organization in Ecological Perspective (3). Kasarda, Nielsen.
- 114 The City and Urbanization (3). Kasarda.
- 171 Urban Public Policy (3). Kasarda.
- 212 Demography: Theory, Substance, Techniques, Part I. (3). Staff.
- 213 Demography: Theory, Substance, Techniques, Part II. (3). Staff.
- 218 Human Ecology (3). Kasarda.
- 287 Migration and Population Distribution (3). Uhlenberg.

DEPARTMENT OF ECONOMICS

STANLEY W. BLACK, *Chairman*

Professors

JOHN S. AKIN	(1)	Public Finance, Human Resources
DENNIS R. APPELYARD	(2)	International Economics
ARTHUR BENAIVE	(3)	Macroeconomic Theory
STANLEY W. BLACK	(53)	International Monetary Theory
WILLIAM A. DARITY, JR.	(54)	Economic Development, Monetary Theory
JAMES W. FRIEDMAN	(60)	Microeconomic Theory
RICHARD T. FROYEN	(7)	Macroeconomics, Monetary Policy
ROBERT E. GALLMAN	(8)	Economic History
DAVID K. GUILKEY	(39)	Econometrics
JAMES C. INGRAM	(10)	International Economics
C. A. KNOX LOVELL	(18)	Microeconomic Theory
DAVID MCFARLAND	(19)	Industrial Organization
JAMES L. MURPHY	(21)	Econometrics
STEVEN S. ROSEFIELDE	(26)	Comparative Economic Systems
MICHAEL K. SALEMI	(38)	Macroeconomics, Monetary Economics
VINCENT J. TARASCIO	(30)	History of Economic Thought
ROGER N. WAUD	(32)	Macroeconomic Theory, Monetary Theory

Associate Professors

ALFRED J. FIELD, JR.	(6)	Economic Development
THOMAS J. KNIESNER	(13)	Labor Economics
THOMAS J. ORSAGH	(22)	Economic History, Economics of Crime
JOHN F. STEWART	(36)	Industrial Organization
HELEN V. TAUCHEN	(40)	Microeconomic Theory
BOONE A. TURCHI	(31)	Demography
JAMES A. WILDE	(34)	Public Finance

Assistant Professors

DAVID M. BLAU	(61)	Labor Economics
PATRICK J. CONWAY	(56)	Economic Development
ROBERT H. LEE	(55)	Health Economics, Public Finance
MARK W. STEGMAN		Microeconomic Theory

Professors Emeriti

JAMES C. D. BLAINE
PAUL N. GUTHRIE
CLIFTON H. KREPS
RALPH W. PFOUTS
CORYDON P. SPRUILL

The Department of Economics offers programs leading to the degrees of Master of Science and Doctor of Philosophy. The Department of Economics is located adjacent to the School of Business Administration in

a separate quadrangle of the University campus, in four buildings originally designed especially for their joint use.

The three-million-volume Davis Library includes substantial collections in economics, for both research and instructional purposes. The Business Administration and Social Sciences Division of the Davis Library is organized to serve the library needs of students and faculty of the Department of Economics and School of Business Administration. This Division contains over 550 current scholarly, trade, and other journals in economics and business, as well as a selected collection of important books, plus important business services. The Davis Library is a depository of the publications of the federal government and the United Nations. These collections, along with the unique collection of state publications, constitute basic research materials of special value to economics. Through mutual cooperative arrangements, the collections of the Duke University Library are also available to faculty and graduate students in the Department of Economics. The Department of Economics offers excellent computer facilities. A personal computer lab and remote terminal facilities for the main computer center are available in the Economics building.

In collaboration with the Southern Economic Association, The University of North Carolina at Chapel Hill publishes *The Southern Economic Journal*, one of the leading professional journals in the field. Articles are published in all areas of economics.

Master of Science

The Master of Science program requires Economics 200, 202 and 210, one course in econometrics, two courses in a major field and three electives. All courses except the electives must be at the 200 level. Courses are to be selected in consultation with and with the approval of the Director of Graduate Studies. In addition to coursework, the 30 credit-hour program includes a research paper or a master's thesis.

Doctor of Philosophy

Students seeking the doctorate in Economics must offer a minimum of 16 courses distributed as follows:

The Fundamentals of Economics. The following eight courses or their equivalent are required: Economics 200, 201, 202, 203, 210, 235, 251, and 271.

The Areas of Concentration. The student must select two areas of concentration from among the following fields:

Comparative Economic Systems
Econometrics
Economic Development
Economic History

International Economics
Monetary and Financial
Economics
Labor Economics

Microeconomic Theory
 History of Economic Thought
 Industrial Organization

Population Economics
 Public Finance

At least three courses must be taken in the major field of concentration and two courses in the minor field.

Supporting Courses. The remaining courses will be supporting courses chosen by the student in consultation with the Director of Graduate Studies in Economics. The courses should be chosen to give greater background and scope to the areas of concentration and may be selected from within the Department of Economics as well as from other departments in the University.

Experience in Research and Teaching. As part of the requirements for the degree each candidate is expected to perform at least two semesters of service in teaching and research.

Foreign Languages—Research Skill. Additionally, the candidate must either demonstrate competence in one foreign language or fulfill a research skill requirement. The research skill may be chosen from among mathematics, statistics, or computer science. The skill requirement is satisfied by successful completion of two courses approved by the Director of Graduate Studies in Economics.

Fellowships and Assistantships

Teaching and non-teaching fellowships and a number of assistantships and instructorships are available to graduate students in economics. Detailed information regarding these fellowships, assistantships and instructorships may be obtained from the Director of Graduate Studies in Economics.

Courses for Graduates and Advanced Undergraduates

Note: Economic, 10, or equivalent, with grade of C or better, is a prerequisite to all courses in Economics listed below.

- 100 MICROECONOMICS: THEORY AND APPLICATION (3). Analysis of the ways in which consumers and business firms interact in a market economy. *Fall and spring.* Staff.
- 101 INTERMEDIATE THEORY: PRICE AND DISTRIBUTION (3). Prerequisites, Economics 10 and Mathematics 22 or equivalent. The determination of prices and the distribution of income in a market system. *Fall and spring.* Staff.
- 111 RESOURCE AND ENVIRONMENTAL ECONOMICS (3). Prerequisite, Economics 100 or 101 or permission of the instructor. Overview of the economic theory and analytical tools involved in understanding environmental and resource problems. Focus on economic issues involved in: air and water pollution; natural environments; exhaustible resources and energy. *Fall and spring.* Staff.
- 120 LOCATION AND SPACE ECONOMY (3). Prerequisite, Economics 100 or 101 or permission of the instructor. The course is designed to provide the student with an understanding of the effects of space on economic and social activity. *Fall.* Staff.

- 122 URBAN ECONOMICS (City and Regional Planning 122) (3). Prerequisite, Economics 100 or 101 or permission of the instructor. The course will explore the urban problems facing us today: unorganized growth, disparate land uses, fiscal crisis, and ghetto, poverty, employment, housing transportation inadequacies and crime. *Fall or spring*. Staff.
- 130 MONEY, THE FINANCIAL SYSTEM, AND THE ECONOMY (3). Analysis of the role of money in the economy, its creation and management, institutional setting, policy implications, and interrelationships with other variables in determining the level of economic activity. Students may not receive credit for both Economics 130 and 132 or for both Economics 130 and 185. *Fall and spring*. Staff.
- 132 INTERMEDIATE THEORY: MONEY, INCOME AND EMPLOYMENT (3). An introduction to contemporary macroeconomic concepts and analysis. Topics include the level, fluctuations, and growth of national income, and monetary and fiscal policies designed to achieve economic goals. *Fall and spring*. Staff.
- 135 ECONOMIC HISTORY OF THE UNITED STATES (3). Main features of the American economy: colonial times to the present. *Fall and spring*. Gallman.
- 137 REVISIONIST ECONOMIC HISTORY (3). A critical evaluation of recent controversies in economic history, concentrating on methods but attending as well to the main re-interpretations offered by economics historians. *Spring*. Gallman.
- 138 ECONOMIC DEVELOPMENT OF THE UNITED STATES (3). Prerequisites, Economics 101 and 132. Students may receive credit for either Economics 135 or Economics 138 but not for both. This course parallels Economics 135 but is designed for students with a higher level of theoretical preparation. Gallman.
- 140 INTRODUCTION TO PUBLIC FINANCE (Political Science 191) (3). Principles and practices of the budgetary activities of American governments—federal, state, and local. Students may not receive credit for both Econ 140 and 141. Akin, Wilde, Lee.
- 141 ANALYSIS OF PUBLIC FINANCE (3). Prerequisite, Economics 100 or 101. Application of economic analysis to the taxing and spending functions of government. Students may not receive credit for both Econ 140 and 141. *Fall and spring*. Akin, Wilde.
- 142 ADVANCED TOPICS IN PUBLIC FINANCE (3). Prerequisite, Economics 140 or 141. Selected topics in taxation, public expenditures and governmental transfer programs. *Fall*. Akin, Wilde, Allen.
- 145 PUBLIC POLICY TOWARD BUSINESS (3). Prerequisite, Economics 100. Industry structure and its relation to performance; market imperfections; description and analysis of antitrust and regulation. Students may not receive credit for both Econ 145 and 147. *Fall and spring*. McFarland, Stegeman, Stewart.
- 147 INDUSTRIAL ORGANIZATION (3). Prerequisite, Economics 101. Theoretical and empirical development of structure-conduct-performance relationships in the industrial sector; description and analysis of U.S. industry. Students may not receive credit for both Econ 145 and 147. McFarland, Stegeman, Stewart.
- 148 ADVANCED TOPICS IN INDUSTRIAL ORGANIZATION AND SOCIAL CONTROL (3). Prerequisite, Economics 145 or 147. Theory of market failure and its relationship to antitrust and regulatory policy; exploration of empirical literature of industrial organization; current issues in social control. McFarland, Stewart.
- 150 INTRODUCTION TO HEALTH ECONOMICS (3). Prerequisite, Economics 100 or 101. An economic analysis of the production and distribution of health care. *Fall or spring*. Lee.
- 151 TRANSPORTATION ECONOMICS (3). Application of economic principles to transportation topics such as pricing and regulation, the public provision of transport services, the relationship between transport cost and location. *Fall or spring*. Tauchen.
- 158 HEALTH ECONOMICS: PROBLEMS AND POLICY (3). Economic analysis applied to problems and public policy in health care. *Fall or spring*. Lee.

- 159 HISTORY OF ECONOMIC DOCTRINES (3). A survey of the fundamental forms of economic thought from the scholastics through Keynes. *Fall or spring*. McFarland, Tarascio.
- 160 EUROPEAN ECONOMIC INTEGRATION (3). Prerequisite, Economics 100 or 101 or permission of instructor. Economic and political aspects of European economic integration, the EC customs union, barriers to integration, convergence vs. divergence of inflation rates and income levels, enlargement of the EC. *Spring*. Black.
- 161 INTERNATIONAL ECONOMICS (3). Prerequisite, Economics 100 or 101. An introduction to international trade, the balance of payments, and related issues of foreign economic policy. *Fall and spring*. Appleyard, Ingram, Black, Conway.
- 162 TOPICS IN INTERNATIONAL ECONOMICS (3). Prerequisite, Economics 161. Analysis and interpretation of selected problems and policy issues. Content varies, but attention is given to such topics as trade barriers, trade patterns, floating exchange rates, and international monetary policy. Appleyard, Conway, Ingram, Black.
- 163 ECONOMIC DEVELOPMENT (3). Prerequisite, Economics 100 or 101 or permission of instructor. An introduction to the economic characteristics and problems of the less developed countries and to theories and policies applicable to the developing economy. *Fall and spring*. Field, Conway, Darity.
- 165 ECONOMIC OF POPULATION (3). Analysis of economic-demographic interrelations including demographic analysis, population and economic growth and development, economic models of fertility and migration, and population policy. *Fall or spring*. Turchi.
- 166 CRIME AND CRIMINAL JUSTICE: AN ECONOMIC APPROACH (3). Prerequisite, Economics 10 or permission of the instructor. The application of economic theory and methodology to the determination of criminal behavior and the societal response to that behavior. *Spring*. Orsagh.
- 167 CRIME AND MICROECONOMIC DECISION-MAKING (3). Criminal victimization of business firms and public agencies. Optimizing behavior: theory and practice for private business firms and criminal justice system. Emphasizes application of theory to real-world situations. *Fall*. Orsagh.
- 168 THE SOVIET ECONOMY: PLANNING AND SOCIALISM (3). The institutional structure of the Soviet economy, its socialist character and evolution, analysis of Soviet planning practice, the Soviet growth achievement, comparative U.S.-Soviet performance and current reforms. *Fall or spring*. Rosefield.
- 170 ECONOMIC APPLICATIONS OF STATISTICAL ANALYSIS (3). Prerequisite, Economics 70 or equivalent. Statistical methods in the construction, estimation, testing, and application of linear economic models; computer programs and interpretation of their output in empirical analysis of common economic theories. *Fall or spring*. Guilkey, Murphy, Witte, Lee, Steiner.
- 181 TOPICS IN MICROECONOMIC THEORY (3). Prerequisite, Economics 100 or 101. A treatment of topics in microeconomic theory not normally covered in Economics 100 or Economics 101. Friedman, Stegeman.
- 182 TOPICS IN MACROECONOMIC THEORY (3). Prerequisite, Economics 130 or 132. This course will emphasize theoretical and empirical topics such as growth, labor search, Phillips curves, stagflation, and optimal government policy. Salemi.
- 185 FINANCIAL MARKETS AND ECONOMIC FLUCTUATIONS (3). Prerequisite, Economics 132. An examination of financial institutions and markets, their role in economic conditions and the use of macroeconomic policies in affecting those conditions. *Fall and spring*. Staff.
- 188 MICROECONOMIC THEORY (3). Prerequisite, graduate standing in Business Administration or permission of the instructor. Utility and demand theory of the firm; perfect and imperfect competition; applications and welfare economics. *Spring*. Staff.

- 189 MACROECONOMIC THEORY (3). Prerequisite, graduate standing in Business Administration or permission of the instructor. Determination of national income, interest rates, and the price level. *Fall*. Staff.
- 190 THE ECONOMICS OF LABOR RELATIONS. Prerequisite, Economics 100 or 101 (3). An economic analysis of workplace issues, including worker quits, layoffs and unemployment, discrimination and affirmative action, and the setting of pay, fringe benefits and working conditions. Students may not receive credit for both Economics 190 and 194. *Fall and spring*. Blau, Kniesner, Lovell.
- 193 HISTORY OF THE LABOR MOVEMENT (3). A history of the labor movement in the United States, with special reference to its economic significance. *Fall*. Gallman.
- 194 LABOR ECONOMICS (3). Prerequisite, Economics 101. An introduction to the field of labor economics with emphasis on how the interactions between firms and workers influence wages, employment, unemployment, and inflation. Students may not receive credit for both Econ 194 and 190. *Fall and spring*. Kniesner, Blau.
- 195 TOPICS IN LABOR ECONOMICS (3). Prerequisite, Economics 194. A theoretical and empirical analysis of current social problems involving individuals and their jobs. Included are such topics as poverty, discrimination, and working conditions. Students may not receive credit for both Econ 195 and 192. *Fall*. Kniesner, Blau.
- 199 SEMINAR IN ECONOMICS (3). Detailed examination of selected problems in economics and a critical analysis of pertinent theories. *Fall and spring*. Staff.

Courses for Graduates

Graduate standing in Economics or permission of the Director of Graduate Studies in Economics is required for all courses numbered 200 or above.

- 200 ADVANCED MICROECONOMIC THEORY I (3). Prerequisite, Economics 101 or equivalent. Theory of utility and demand; brief review of perfect competition; theories of imperfect competition. *Fall*. Lovell, Friedman.
- 201 ADVANCED MICROECONOMIC THEORY II (3). Prerequisite, Economics 200 or equivalent. Advanced theory of utility and demand; continuation of imperfect competition; brief treatment of methodology; of input-output methods and of welfare economics. *Spring*. Lovell, Tauchen.
- 202 ADVANCED MACROECONOMIC THEORY I (3). Prerequisite, Economics 132 or equivalent. Keynesian and classical equilibrium models; the neo-Keynesian synthesis; monetarist and other alternative analytic frameworks. *Spring*. Froyen, Salemi, Waud, Black.
- 203 ADVANCED MACROECONOMIC THEORY II (3). Prerequisite, Economics 202 or equivalent. Growth models, general equilibrium approach to monetary theory; input-output; disequilibrium theory; extensions of Keynesian and classical models. *Fall*. Benavie, Salemi, Waud.
- 207 GENERAL ECONOMIC THEORY (3). Prerequisite, graduate standing in a department other than Economics. Theory of demand, production, market structures and economic welfare, national income accounts and theory of national income determination, unemployment, inflation. *Spring*. Staff.
- 210 BASIC QUANTITATIVE TECHNIQUES (3). Topics from linear algebra, calculus, linear and nonlinear programming, and the theory of difference and differential equations with applications to economics. *Fall*. Lovell, Tauchen, Stegeman.
- 221 GAME THEORY (3). Prerequisite, Economics 200, 201, or permission of the instructor. Topics in game theory with emphasis on those results of special interest for economics: n-person noncooperative games, multiperiod games, and cooperative games including the core, bargaining models, and value solutions. *Spring*. Friedman.

- 222 PRODUCTION THEORY AND MODELLING (3). Prerequisites, Economics 200, 201. Topics in production theory and the modelling of producer behavior, using duality theory and focusing on static and dynamic models, alternative behavioral objectives and constraints, and functional forms. *Fall or spring*. Lovell.
- 223 THE THEORY OF UTILITY AND DEMAND (3). Prerequisite, Economics 200. Intended to treat topics not covered in Economics 200. Topics to be covered include the effects of perception thresholds on utility theory, orderings as basis of choice and prospect theory. *Fall or spring*. Staff.
- 224 DYNAMIC MODELS IN MICROECONOMICS (3). Prerequisite, Economics 200, 201. Discussion of microeconomic issues in which the dynamic structure has an essential role. Presentation of dynamic models appropriate for examining the economic issues. *Fall or spring*. Staff.
- 227 ADVANCED OPTIMIZATION TECHNIQUES IN ECONOMIC MODELS (3). Prerequisite, Economics 210 or equivalent. Convex programming, duality theory, control theory, and other optimization procedures applied to economic models. *Spring*. Staff.
- 235 GENERAL ECONOMIC HISTORY (3). Pre-industrial societies, early stages in industrial growth, and growth of the world economy in the nineteenth century. *Fall*. Gallman.
- 236 MODERN ECONOMIC HISTORY (3). Prerequisite, Economics 235 or permission of the instructor. Economic change in modern Western societies. Comparative study of growth in Europe and North America. *Spring*. Gallman.
- 240 ADVANCED PUBLIC FINANCE: EXPENDITURE (3). Analysis of market failure and reasons for public spending, cost-benefit analysis and program budgeting, public decision-making, redistribution and fiscal equity, intergovernmental transfers. *Spring*. Akin, Wilde, Lee.
- 241 ADVANCED PUBLIC FINANCE: REVENUES (3). Prerequisite, Economics 240 or permission of instructor. Criteria for judging tax structures, incidence and impact of taxation, user charges and debt finance, intergovernmental coordination, and macroeconomic effects. *Fall*. Akin, Wilde.
- 242 URBAN AND SPATIAL ECONOMICS (3). Prerequisite, permission of the instructor. The economics of space and location plus selected topics in urban problems. There will be an emphasis on the public sector and public policy in the problem portion of the course. *Fall or spring*. Akin.
- 245 ADVANCED BUSINESS ORGANIZATION AND SOCIAL CONTROL (3). Prerequisite, permission of the instructor. Extensive readings in the literature are required. Emphasis is placed upon the role of economic analysis in dealing with problems in this field. (Alternate years.) *Spring*. Stewart.
- 246 TRANSPORTATION PROBLEMS AND POLICIES (3). A course designed to develop an understanding of the major problems affecting the American transportation system and of the need to formulate effective transportation policies. *Fall*. Tauchen.
- 247 DYNAMICS OF TRANSPORTATION (3). Prerequisite, permission of the instructor. The role of transportation in providing mobility in developing mature economies. *Spring*. Tauchen.
- 248 ECONOMIC REGULATION OF INDUSTRY (3). Economic regulation in theory and practice. Principles of optimal regulation are developed, and regulatory performance in various industries is appraised. *Fall*. Stewart, Tauchen.
- 250 HEALTH ECONOMICS (3). Prerequisite, equivalent of Economics 188. Demand analysis, manpower planning and location models, health indexes, production functions, health and the labor force, the structure of the health services market, hospitals and the non-profit firm, and cost-benefit analysis. *Spring*. Lee.
- 251 HISTORY OF ECONOMIC THOUGHT I (3). A survey of the development of economic thought from the seventeenth century to the present, with particular emphasis on doctrines reflected in modern economic theory. *Spring*. Tarascio.
- 252 HISTORY OF ECONOMIC THOUGHT II (3). A study of economic doctrines from the nineteenth century to the present in a methodological perspective. *Fall*. Tarascio.

- 253 SOCIALIST ECONOMIC THOUGHT IN HISTORICAL PERSPECTIVE (3). A systematic study of the development of socialist economic theory from Owen to Cohn-Bendit, emphasizing Marx, Russian Marxism, and contemporary Marxist economic theory. *Spring*. Rosefielde.
- 261 THEORY OF INTERNATIONAL TRADE (3). Prerequisite, graduate standing in economics or permission of the instructor. The theory of international values; comparative advantage and the gains from trade; commercial policy. *Fall or spring*. Appleyard.
- 262 INTERNATIONAL MONETARY ECONOMICS (3). Prerequisite, graduate standing in economics or permission of the instructor. Analysis of the international monetary system; exchange rates; the process of adjustment in the balance of payments. *Fall or spring*. Black.
- 263 ECONOMIC DEVELOPMENT: THEORY AND POLICY (3). Prerequisite, permission of the instructor. Intensive study of the development processes and problems of the less developed countries, with emphasis upon theories of growth and development, internal and external policies, and planning strategies. *Fall or spring*. Field, Darity, Conway.
- 264 SELECTED TOPICS IN ECONOMIC DEVELOPMENT AND DEVELOPMENT PLANNING (3). Prerequisite, Economics 263 or equivalent. Examination of various topics in economic development of the less developed countries, with special emphasis on the role of development planning. *Fall or spring*. Field, Darity, Conway.
- 265 ECONOMICS AND POPULATION (3). Prerequisite, graduate standing in economics or permission of the instructor. Analysis of economic-demographic interrelationships including: population and economic development; population, environmental decay and zero-population growth; models of fertility, migration, and spatial organization; population policy. *Spring*. Turchi.
- 267 COMPARATIVE ECONOMIC SYSTEMS (3). This course focuses on alternative theories of U.S. capitalism, French indicative planning, Yugoslavian worker-managed market socialism, Soviet central planning, and the Chinese worker-controlled decentralized planning model. *Fall*. Rosefielde.
- 271 FUNDAMENTALS OF STATISTICAL THEORY (3). Review of probability theory; estimation; tests of hypotheses; regression and analysis of variance. Emphasis is on economic data and applications. *Fall*. Guilkey, Murphy.
- 272 ECONOMETRICS (3). Prerequisite, Economics 271 or equivalent. One semester coverage of basic econometrics. Topics include: regression under ideal and non-ideal conditions; special models, including simultaneous equations models; and applications and econometric computer programs. *Spring*. Guilkey, Murphy.
- 273 ADVANCED ECONOMETRICS I (3). Prerequisites, Economics 271 and Mathematics 147 or equivalent. Economics 273 and 274 constitute a two-semester coverage of econometrics with some theoretical emphasis; 273 covers mainly single equation estimation and related problems. *Fall*. Guilkey, Murphy.
- 274 ADVANCED ECONOMETRICS II (3). Prerequisite, Economics 273. A continuation of Economics 273, covering identification and estimation in simultaneous equations, and special topics. *Spring*. Guilkey, Murphy.
- 281 MONETARY THEORY (3). Examination of theory and evidence on money demand, money supply, and portfolio analysis. Barter versus monetary economics, portfolio school, monetarism, monetary theories of interest rate determination. *Fall*. Froyen, Waud, Black.
- 282 MONETARY POLICY (3). Prerequisite, Economics 202 or permission of the instructor. Optimal policy under uncertainty, financial intermediation and monetary control, channels of monetary influence, monetary policy and inflation, rules versus authority. *Spring*. Froyen, Waud.
- 285 ANALYSIS OF ECONOMIC FLUCTUATIONS (3). Nature of economic fluctuations. Business cycle theory. Economic stabilization and growth. *Spring*. Froyen.

- 291 LABOR ECONOMICS I (3). Prerequisite, Economics 200 or permission of instructor. An analysis of the short and long run aspects of supply and demand of labor, including empirical analysis contracting the labor force behavior of males, females, blacks, and whites. Topics include the microeconomic effects of marriage, fertility, and mobility on labor supply, as well as the macroeconomic effects of unemployment on inflation. *Fall or spring*. Kneisner, Blau.
- 292 LABOR-MANAGEMENT RELATIONS (Business Administration 292) (3). An advanced study of the procedure, subject matter and legal framework of collective bargaining. *Spring*. Staff.
- 294 LABOR ECONOMICS II (3). Life cycle analysis of supply and demand for labor as a determinant of individual wages. Topics include an analysis of discrimination, union power, and governmental manpower policies on the distribution of earnings across the population. *Fall or spring*. Kneisner, Blau.
- 300 SEMINAR IN ECONOMICS THEORY I (3). Prerequisites, Economics 200 and 201. Seminar study of advanced topics in microeconomic theory. *Spring*. Lovell, Friedman, Stegeman.
- 301 SEMINAR IN ECONOMIC THEORY II (3). Prerequisites, Economics 202 and 203. Seminar on advanced topics in macroeconomic theory. *Fall*. Benavie, Waud, Salemi.
- 302 SEMINAR IN MATHEMATICAL ECONOMICS (3). Prerequisite, permission of the instructor. Advanced topics in mathematical and quantitative economics. *Spring*. Staff.
- 335 SEMINAR IN ECONOMIC HISTORY (9). Relation of economic history to economics; history of work in the field. Current problems and techniques of study and research. *Fall or spring*. Gallman.
- 341 RESEARCH IN PUBLIC FINANCE (3). Prerequisite, permission of the instructor. Open to qualified graduate students who wish to make intensive studies in particular fields of public finance. Conference hours subject to arrangement. Written reports are normally required. *Fall or spring*. Wilde, Akin.
- 351 SEMINAR IN THE HISTORY OF ECONOMIC THOUGHT (3). Prerequisite, permission of the instructor. Advanced study of economic analysis beyond the scope of Economics 251 and 252. *Fall or spring*. Tarascio.
- 361 SEMINAR IN INTERNATIONAL ECONOMICS (3). Prerequisite, Economics 261 and 262 or equivalent. A directed reading and research course. *Fall or spring*. Appleyard, Black.
- 363 SEMINAR IN ECONOMIC DEVELOPMENT (3). Prerequisite, Economics 262 or equivalent. Directed reading and research on selected problems in economic development. *Fall or spring*. Field, Darity, Conway.
- 365 SEMINAR IN POPULATION (3). Prerequisite, graduate standing in economics. For advanced population students, this course addresses the newest and most advanced economic demography literature. *Fall*. Turchi.
- 371 RESEARCH IN ECONOMETRICS (93). Prerequisite, Economics 273 and 274. Seminar on special topics in econometrics. *Spring*. Staff.
- 381 SEMINAR IN MONETARY ECONOMICS (3). Prerequisite, permission of the instructor. Advanced study of theoretical and applied topics in monetary economics. *Fall or spring*. Waud.
- 386 SEMINAR IN PORTFOLIO MANAGEMENT (Business Administration 386) (3). Prerequisite, permission of the instructor. Development, testing, and economic effects of models for determining the selection of assets. *Spring*. Staff.
- 388 SEMINAR IN FINANCIAL MARKETS (Business Administration 388) (3). Prerequisite, permission of the instructor. Intensive study of market characteristics and interrelationships, market price and yield determination, impact of monetary and regulatory policies, and effect of market structure on performance. *Fall or spring*. Staff.
- 391 SEMINAR IN LABOR (3). Prerequisite, permission of the instructor. This course offers mature students an opportunity to carry their investigations of significant matter beyond the limits of the formal course offerings. *Fall or spring*. Kniesner, Blau.

- 393 MASTER'S THESIS (3 or more). *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Staff.
- 396 SEMINAR IN SOVIET ECONOMICS (3). Prerequisite, permission of the instructor. Studies of selected problems of the Soviet economy and related aspects of Soviet economic thought. Seminar members are expected to present reports on assigned research topics. *Fall*. Rosefield.
- 399 SEMINAR. Prerequisite, permission of the instructor. Individual research in a special field under direction of a member of the Department. *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

SCHOOL OF EDUCATION

FRANK BROWN, *Dean*

Professors

J. HUNTER BALLEW	(070)	Mathematics Education; Curriculum and Instruction
JOHN C. BRANTLEY	(090)	School Psychology; Interpersonal Perception; Psycho-educational Assessment
DUANE BROWN	(095)	Elementary School Counseling; Center Development; Behavioral Consultation
FRANK BROWN	(657)	Policy Studies; School Law; Leadership and Administration
RICHARD H. COOP	(120)	Educational Psychology; Cognitive Development; Adolescent Development
BARBARA D. DAY	(140)	Early Childhood Education
JOHN P. GALASSI	(182)	Counseling Psychology; Behavior Therapy; Counseling College Students and Adults
JAMES J. GALLAGHER	(187)	Child Development; The Gifted Child; Public Policy in Education
R. STERLING HENNIS, JR.	(220)	English Education; Curriculum and Instruction
PAUL B. HOUNSHELL	(240)	Science Education; Curriculum and Instruction
RICHARD C. HUNTER	(684)	School Administration
DAVID L. LILLIE	(290)	Early Childhood Education; Parent Involvement; Individualized Instruction
JAMES D. MCKINNEY	(315)	School Psychology; Cognitive Development; Exceptional Children
JAMES L. MORRISON	(335)	Sociology of Higher Education
WILLIAM S. PALMER	(345)	Reading and Language Arts
JAMES L. PAUL	(350)	Emotional Disturbance; Advocacy; Technical Assistance
RICHARD C. PHILLIPS	(390)	Social Studies and Social Foundations
WALTER B. PRYZWANSKY	(410)	School of Psychology; Consultation; Learning Disabilities
RUNE J. SIMEONSSON	(481)	Social/Cognitive Development; Child Development Research; Psychological Assessment
DONALD J. STEDMAN	(500)	Program Planning and Evaluation; Child Development
GARY B. STUCK	(515)	Educational Psychology; Learning; Evaluation
WILLIAM B. WARE	(581)	Educational Statistics; Research Design Analysis
BARBARA H. WASIK	(580)	Child Psychology; Social, Emotional, and Cognitive Development; Behavior Modification

EUGENE R. WATSON	(590)	Adult and Higher Education
KINNARD P. WHITE	(600)	Educational Psychology; Measurement and Evaluation
RONALD WIEGERINK	(612)	Educational Administration and Supervision; Special Education
RALPH E. WILEMAN, JR.	(620)	Educational Media and Instructional Design

Associate Professors

LINDA BROOKS	(427)	Counseling Psychology; Carter Development; Sex-Fair Counseling
WILLIAM I. BURKE	(100)	Curriculum and Instruction
JAMES W. CUNNINGHAM	(123)	Reading and Language Arts
DAVID D. DILL	(142)	Management of Higher Education
JILL FITZGERALD	(414)	Reading and Language Arts
JULIO R. GEORGE	(186)	Educational Administration and Supervision
WALLACE H. HANNUM	(417)	Instructional Design; Theories of Instruction; Computer Applications
RICHARD A. KING	(668)	Educational Finance; School Law; Management Technology
GEORGE W. NOBLIT	(418)	Educational Administration and Supervision
DWIGHT C. RHYNE	(448)	Adult and Higher Education; Comparative Education
DALE SCHUNK	(696)	Educational Psychology
DIXIE LEE SPEIGEL	(491)	Reading and Language Arts
GERALD UNKS	(570)	Social Foundations of Education
ROBERTA WOOLEVER	(625)	Intermediate Education

Assistant Professors

RICHARD A. BRICE	(092)	Early Childhood Education
JUDITH L. MEECE	(682)	Human Development
DWIGHT ROGERS	(695)	Early Childhood Education
ANN C. SCHULTE	(660)	School Psychology

Lecturer

JOSEPH J. SPARLING	(495)	Child Development
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Adjunct Associate Professors

CLEVELAND HAMMONDS	(687)	Organizational and Psychological Studies
JOHN N. PYECHA	(411)	Educational Psychology; Measurement and Evaluation; Management Information Systems
RALPH D. WENGER	(582)	School Psychology

Adjunct Assistant Professors

NELLIE T. HARDY	(671)	Adult and Higher Education
HENRY W. MAJESTIC	(683)	Educational Psychology
SHANNON VAN WEY	(666)	Counseling Psychology
SALLY A. WARD	(679)	Educational Psychology

Clinical Professors

DONALD A. BOULTON	(087)	Student Personnel; Higher Education
DAVID R. GOLDFIELD	(688)	Organizational and Psychological Studies
ROBERT A. PITILLO	(677)	Educational Administration
ROBERT SAKATA	(452)	Counseling Psychology; Evaluation and Measurement; Rehabilitation Psychology
FRANK T. STRITTER	(510)	Adult and Higher Education
FARRIS W. WOMACK	(655)	Higher Education

Clinical Associate Professors

JOHN W. EDGERLY	(651)	Counseling Psychology
CHARLES P. FRIEDMAN	(168)	Higher Education; Medical Education
HENRY T. FRIERSON, JR.	(170)	Educational Psychology
THELMA HARMS	(205)	Early Childhood Education
KENNETH G. JENS	(246)	Severely Handicapped; Special Education Administration; Infant and Preschool Education
VINETTA C. JONES	(674)	Educational Psychology
JAMES E. LYONS	(676)	Educational Administration
PAMELA S. MAYER	(659)	Gifted and Talented; Administration
WILLIAM C. MCGAGHIE	(420)	Educational Psychology

Clinical Assistant Professors

DONALD B. BAILEY, JR.	(419)	Early Childhood; Severely Handicapped Mainstreaming
STUART B. BETHUNE	(669)	Institutional Development
THOMAS B. CLARK	(693)	Educational Psychology
BETTY C. EPANCHIN	(150)	Emotional Disturbance
CHARLES A. HONEYCUTT	(686)	Curriculum and Instruction
NANCY C. JORDAN	(690)	Special Education
BOBBIE B. LUBKER	(300)	Language Development; Epidemiology of Communication Disorders
TIMOTHY SANFORD	(421)	Institutional Research, Higher Education
PATRICIA F. WEISS	(662)	Gifted and Talented

Professors Emeriti

NORTON BEACH	ROBERT NEILL SCOTT
CARL F. BROWN	WILLIAM C. SELF
SAMUEL M. HOLTON	WILLIAM G. SLATTERY
ROBERTA H. JACKSON	ROY E. SOMMERFELD
ANNIE LEE JONES	DONALD G. TARBET
ARNOLD K. KING	THELMA G. THURSTONE
MARY TURNER LANE	NEAL H. TRACY

The School of Education is now involved in a review of its curriculum and no changes have been finalized. The publisher has attempted to present accurate information, as of the printing date. However, this information does not establish a contractual relationship and the School reserves the right to alter any statement when review is complete.

The School of Education, in keeping with the general goals of The University of North Carolina at Chapel Hill, embraces a three-fold mission of teaching, research and service. With these purposes in mind, the graduate programs of the School are designed to meet the needs of professional educators who seek to further their knowledge, understanding, and skills relating to educational processes. It is recognized that these professionals vary in their career orientations. Some are employed in or wish to become employed in educational institutions and others in agencies and organizations performing non-instructional educational functions.

The research mission involves continuing inquiry into the development of knowledge of the teaching-learning process, human development, the organization of schools and educational agencies, the historical and philosophical bases for educational institutions, and the processes of program development and implementation.

The service mission provides both public and private institutions and agencies with the benefits of research and consultation, thereby enhancing their capabilities to satisfy their educational objectives.

The teaching mission involves the faculty and graduate students in applying the knowledge base in field settings and translating it in course work.

Administratively, the School is headed by Dean Frank Brown. He is assisted by Associate Dean William I. Burke, who is responsible for academic administration, and Associate Dean Richard H. Coop, who is responsible for academic planning and development. Organizationally, the School of Education is divided into two divisions. Graduate teacher education programs are administered by the Associate Dean for Academic Administration. All other graduate programs are supervised by these divisions.

Division of Organizational and Psychological Studies, John C. Brantley, Chairperson—The Division of Organizational and Psychological Studies (OPS) has as its basic mission the generation of knowledge, the preparation of professionals, and the provision of services crucial to organizational and psychological issues within the field of education. Toward these ends, the Division focuses on relationships between individual and organizational development. Of particular interest are the policies, institutional contexts, and skills that will promote learning and development in individuals, groups, and organizations.

The Division offers master's and doctoral programs in Adult and Higher Education, Counseling Psychology, Educational Administration and School Psychology, as well as a master's degree program in School Counseling. Certificate programs are also available in school administration.

Division of Teaching and Learning, Barbara D. Day, Chairperson—The Division of Teaching and Learning (T&L) has as its basic mission the following: to conduct preparation programs that are anchored in state-of-the-art knowledge of professional practice for educational professionals; to engage

the faculty and students in critical analysis of current educational theory and practice; to develop, implement, and construct alternative models of educational programs and practices; and to collaborate with other schools, departments, and agencies in inquiry, professional preparation, staff development, dissemination of knowledge that center on problems and issues affecting the quality of education in North Carolina.

Specifically, the Division encompasses: teacher education (undergraduate and graduate); curriculum and instruction graduate study focusing on the study of teaching, curriculum content and development, and the nature of instructional leadership at the master's, advanced certificate for Curriculum/Instructional Specialist, and doctoral levels (Master's includes: content courses, such as English, mathematics, natural sciences, and social studies; skills areas, such as reading, educational media, and instructional design; and grade levels, such as early childhood, intermediate, and middle grades. The Ph.D. is offered in curriculum and instruction); educational psychology at the doctorate and master's levels; doctoral program in social foundations; special education graduate study (master's, advanced certificate, and doctorate) preparing educators in roles and responsibilities necessary for educating handicapped children.

DEGREE PROGRAMS

The School of Education offers the following master's degrees: (1) the Master of Arts in Teaching (M.A.T.) with majors in English, French, German, Latin, mathematics, music, natural sciences, physical education, social studies, Spanish, and speech; (2) the Master of Arts (M.A.) designed for students in adult and higher education, counseling, curriculum and instruction, educational media and instructional design, educational psychology, educational administration and supervision, school psychology, and special education; (3) the Master of Education (M.Ed.) designed for students in the same areas as the Master of Arts and also for students in early childhood education, intermediate education, middle grades education, and reading and the language arts.

There are two doctoral degrees offered in education by the graduate school: (1) the Doctor of Philosophy (Ph.D.) with a major in adult and higher education, counseling psychology, curriculum and instruction, educational psychology, educational administration and supervision, school psychology, social foundations, and special education; and (2) the Doctor of Education (Ed.D.) for students in educational administration and supervision.

CERTIFICATION

The School of Education is responsible for recommending its graduates to the North Carolina State Department of Public Instruction for certification as teachers, administrators, and other specialized school personnel.

School of Education degree programs may lead to the levels and areas of certification in North Carolina which are shown below.

The School of Education is also responsible for recommending for certification candidates from the following degree programs at the University: the Division of Speech and Hearing Sciences, the School of Library Science, and the School of Social Work.

In addition, post-baccalaureate students may enter the School of Education as nondegree students to complete requirements for certification in the areas listed below. For more information, see the School of Education's *Bulletin*, available in 103 Peabody Hall.

Class G (master's level)

Curriculum-Instruction Specialist	Mentally Retarded
Early Childhood	Middle Grades
Emotionally Handicapped	Music
English	Natural Sciences
French	Reading and Language Arts
Academically Gifted	School Administration
German	School Counseling
Physical Education	Severely & Profoundly
Latin	Handicapped
Learning Disabled	Social Studies
Mathematics	Spanish
Media Coordinator	Speech
Intermediate Elementary	Speech-Language Impaired

Class AG (advanced level)

Curriculum-Instruction Specialist	School Administrator
Emotionally Handicapped	School Psychologist
Learning Disabled	School Social Worker
Mentally Retarded	Severely & Profoundly
	Handicapped

Class G (doctorate level)

Curriculum and Instruction Specialist
School Administrator
School Psychologist

Information about certification can be obtained from the Office for Academic Administration, 103 Peabody Hall.

DEGREE REQUIREMENTS

Requirements for the Master of Arts and Doctor of Philosophy degrees are noted elsewhere in the *Record*. In addition to these two degrees, the

School of Education offers through the Graduate School the Master of Education, the Master of Arts in Teaching, and the Doctor of Education. The requirements for these degrees are as follows:

Master of Education

The following requirements represent the *minimum* required for all Master of Education degrees:

1. A bachelor's degree from an accredited institution.
2. A minimum of 30 semester hours in advanced course work is required. If the student selects a minor field, typically 21 to 24 hours are taken in the School of Education and six to nine hours are taken in the department of the minor.
3. At least two full semesters of residence and completion of 30 semester hours of credit to meet residence requirements.
4. All work credited toward the degree must be completed within five years.
5. A major in the School of Education.
6. A written comprehensive examination in the field of the major.
7. The option of submitting a thesis as 3 to 6 semester hours in the major field, in which case there is a final oral examination on the thesis.
8. Application for admission to candidacy for the master's degree, the degree application card, to be filed no later than the date specified in The Graduate School Calendar of Events.

Master of Arts in Teaching

The Master of Arts in Teaching degree program is designed for individuals desiring graduate training in teaching the secondary content areas of English, French, German, Latin, mathematics, natural sciences, social studies, Spanish, or speech, and the K-12 special subject areas of physical education and music. The program provides opportunities for individuals to expand in depth and breadth their content specialization while gaining additional understanding of curriculum and instruction at the secondary education level.

To be admitted to the M.A.T. program, applicants must hold a teaching certificate or agree to complete additional coursework required for certification prior to receiving the M.A.T. degree. Applicants to the M.A.T. program who do not hold certification must have the equivalent of an undergraduate major in the chosen content area, a grade point average of 3.4 during the last two years of undergraduate study, and GRE scores of 1150 (verbal + quantitative); to be considered. Persons with a major in the content area who do not meet these admission requirements may be considered for the nondegree Teacher Certification Program to complete initial certification requirements before applying to the M.A.T. program (see "Certification

Programs” later in this section). Individuals admitted to the M.A.T. program without certification must begin the program in the second summer session and continue on a full-time basis during the next academic year. Previously certified teachers may apply to begin the M.A.T. program in any academic term or summer session, and are allowed to complete requirements on a part-time basis if desired.

The course sequence for the M.A.T. degree program varies from one content specialty to another and with each individual area within the specialty. Each program is designed by the student and the adviser, based on the student’s background, needs, and interests. The degree requires a minimum of 33 semester hours of graduate course work including an internship in the area of specialization. Of the 33 semester hours, 18 must be in the area of the student’s specialty and 12 in education, and 3 in education or the subject major. In addition, each student must complete successfully a comprehensive examination, scheduled after the course work has been completed or during the semester in which the final courses are taken. The examination covers content and education and is scheduled and administered by the School of Education.

Required courses in education include: EDCI 200; one from EDCI 187, EDCI 240, EDCI 245, EDCI 246, EDCI 247, EDCI 283 and EDCI 287; one from EDFO 220, EDFO 222, EDFO 223, EDFO 241, EDFO 242, EDSP 286; and one from EDFO 201, EDFO 202 and EDSP 130.

Doctor of Education

Requirements for the Doctor of Education are as follows:

1. A bachelor’s degree from an accredited institution.
2. Three years of successful teaching and/or administrative experience.
3. A minimum residence of four semesters of graduate study, with at least two semesters of continuous residence at this University.
4. All work credited toward this degree must be completed within an eight-year period following the date of admission.
5. Competence in the conduct of applied research and evaluation. A minimum of 15 semester hours must be taken to meet the requirements of the research and evaluation sequence, including EDFO 180 and EDFO 285.
6. A minimum of 24 semester hours in the major area of concentration in educational administration, including the core courses.
7. A minimum of 15 semester hours in a minor developed from related studies in the School of Education or departments outside the School of Education.
8. A written examination in the major and minor areas of concentration.
9. A doctoral oral examination reviewing the entire field of study.
10. A dissertation

11. A final oral examination including the defense of the dissertation.
12. Application for admission to candidacy and the degree application card submitted by the deadline listed in the Calendar of Events for the semester in which the student expects to graduate. Applications must be resubmitted if candidate fails to graduate at the expected time.

OTHER MASTER'S PROGRAMS IN EDUCATION

Master's Programs in Adult and Higher Education

The program of studies leading towards the Master of Education or Master of Arts with specialization in adult and higher education is designed for the specialist in or supervisor of adult learning experiences. In addition to qualifying for the planning and implementation of courses and conferences in educational institutions, some graduates enter industry as training and development specialists.

Degree candidates are expected to complete a minimum of 37 hours of coursework unless they have had equivalent experiences or courses that can be substituted for some of the program expectations. There is no requirement for previous undergraduate coursework in education. Required courses for the major area of concentration are EDSP 291, EDSP 293, EDSP 295, EDCI 250, EDCI 251, and EDCI 252, and from educational foundations EDFO 180 or EDFO 285 and one foundations elective. In addition, students with advice from their adviser will select from four to seven courses supportive of their vocational objective.

Master's Programs in Counseling

The Master of Education and Master of Arts programs with specialization in counseling require a minimum of 52 semester hours of graduate course work. The programs are accredited by the Council for Accreditation of Counseling and Related Educational Programs of the American Association for Counseling and Development. The programs are designed to prepare counselors for employment in elementary, middle, junior, and senior high schools as well as community colleges and technical schools. Students are not required to hold a teaching certificate to be admitted. Students may enter the programs during the first summer session but not in the fall or spring semesters. The programs require an academic year and two full summers for completion.

Required courses for those seeking certification as school counselors in North Carolina include EDFO 180, EDSP 200, EDSP 201, EDSP 203, EDSP 202, EDSP 204, EDSP 206, EDSP 205, EDSP 207, EDSP 210, EDSP 223, and EDSP 209 taken in the sequence listed. Those not seeking school counselor certification would not be required to take EDSP 200, EDSP 223 and EDSP 209. Students will also select three electives with the approval of their adviser; one of the electives must be in the area of human development.

Master's Program in Curriculum and Instruction

The Master of Arts in curriculum and instruction is available for students pursuing careers in the development of curricula in particular subject fields. It is expected that applicants will have completed prior education and experience in their field, and will have assumed or expect to assume responsibility for planning and developing educational programs. The program is organized around the following areas: curriculum design and development; instruction; measurement and evaluation; organizational development; and a specialization area.

Master's Program in Early Childhood Education

The Master of Education with specialization in early childhood education prepares individuals for teaching young children and/or to be a curriculum specialist in programs for young children. To be admitted, individuals must be certified in either the early childhood or intermediate area, or they must complete the courses required for initial certification.

Students are expected to complete EDCI 120, EDCI 121, EDFO 101, or EDFO 201, and EDCI 321. In addition, students must select 4 courses to provide for concentrated study in one or more of the instructional areas of the school curriculum (reading, language arts, mathematics, social studies, science, the arts, physical education and health). Two of these courses must be Curriculum and Instruction courses (EDCI 230, 231, 235, 236, 237, etc.). The remaining two courses may be additional Curriculum and Instruction courses, or may be chosen from related fields in departments or schools other than the School of Education (anthropology, sociology, English, speech, mathematics, art, music, etc.). Two elective courses related to educational foundations, subject content, curriculum, and instruction are selected to complete the 30 hour program. The program must include at least two courses taken in departments other than the School of Education.

Master's Programs in Educational Administration and Supervision

The Master of Education and Master of Arts in Educational Administration and Supervision provide preparation for practice as a school administrator. In planning the program of studies, students may satisfy the academic requirements for Level I certification by the North Carolina Department of Public Instruction as a school administrator.

Course requirements in the major include EDSP 288, EDSP 291, EDSP 293, EDSP 295, and six to nine hours of electives in school administration. Students are expected to pursue a minor area of concentration in areas outside of the school of education or in other specialties within the School of Education, to consist of 9-12 semester hours. Those pursuing the M.Ed. will take EDFO 180 and EDSP 390.

Master's Programs in Educational Media and Instructional Design

The program of study leading to an M.A. or M.Ed. degree prepares educational personnel to assume positions in a variety of settings that require skills in instructional development. Graduates of this program have competencies in the following areas: needs assessment, job analysis, instructional design, design and development of instructional materials in a wide range of media formats, and the management and evaluation of such efforts.

Twelve courses (36 hours) are the minimum requirement for graduation. Eight of these twelve are core courses designed to achieve a common set of competencies for all program students. These eight courses are typically EDCI 111, EDCI 113, EDCI 115, EDCI 211, EDCI 252, EDCI 306, EDFO 106 and EDFO 201.

In addition, students are encouraged to develop skills in at least one of four specialized areas: public education, higher and adult education, business and industrial training, and health professions education. The four courses required to achieve this specialization include courses such as EDCI 200, EDCI 140, EDCI 251, EDCI 303 or other electives.

Master's Programs in Educational Psychology

The Master's program with specialization in educational psychology is designed to prepare people to work in educational agencies such as public schools, state departments, and research institutes. The program of study leads to either the M.A. or M.Ed. degree. Persons who desire to pursue the Ph.D. degree in educational psychology are encouraged to enroll in the M.A. track to gain the research experience provided by the master's thesis.

Although most students in the educational psychology program are admitted as full-time students, part-time study is possible. Part-time students are encouraged to plan a program leading to completion of the master's degree within two or three years.

Students are expected to enter the program with course work in child and adolescent psychology and general educational psychology. Students admitted without these courses should plan to take EDFO 100 and EDFO 101, which are considered prerequisites and do not count toward the 30 semester hour requirement for the degree.

Required courses are EDFO 180, EDFO 201, EDFO 202, EDFO 206, and EDFO 280. Students also must take one elective course from the area of learning and one from the area of development. Other courses are chosen to build a foundation of essential knowledge and skills in educational psychology.

Master's Program in Intermediate Education

The Master of Education in intermediate education prepares individuals primarily for teaching in grades 4 through 6, either in self-contained classrooms or in content-organized classrooms. To be admitted, individuals must be certified in intermediate education. However, individuals lacking intermediate certification will be considered for admission with the provision that they complete courses required for initial intermediate certification.

Course patterns are developed by students with their advisers. Students are expected to complete EDCI 200 or EDCI 202, EDFO 101 or EDFO 201, and EDCI 306. In addition, they should select three electives from graduate courses in the School of Education. One of these electives should be in a curriculum area taught in the elementary school.

Students will also select a minor of four courses from offerings by departments outside the School of Education. These may come from the same department or from two separate departments. In the second option the student would take two courses in each area.

Master's Program in Middle Grades Education

The master's degree program in middle grades education prepares individuals for teaching in middle schools and junior high schools (grades 6 through 9) in content specialties. To be admitted, a candidate must be certified in the middle grades or a secondary teaching specialty.

The course pattern includes 15 semester hours of coursework divided between two academic concentrations representing content areas in which students expect to teach: EDCI 200, EDCI 306, a course in the Investigations and Trends in one of the content area concentrations that the teacher expects to teach, one course from EDFO 220, EDFO 223, EDFO 241, EDFO 242 or EDSP 286, and one from EDFO 201, EDFO 202, or EDSP 130, and one elective in professional education or one of the content specialties.

Master's Program in Reading and Language Arts

The Master of Education specialization in reading and language arts is designed to prepare individuals to become teachers of students from a broad range of areas and cultural backgrounds and to become teachers of reading and language arts. To be admitted, a candidate must have the equivalent of North Carolina Class A certification in either elementary or secondary education.

The course pattern for the Reading and Language Arts program requires a sequence of six courses: EDCI 230, EDCI 231, EDCI 232, EDCI 233, EDCI 330, EDCI 303 and one non-credit supervision practicum. In addition, two courses in the School of Education are to be selected. At least two other courses are required from either inside or outside the School of Education.

Master's Programs in School Psychology

The school psychology master's programs (M.Ed. or M.A.) prepare individuals to work in schools and other educational agencies. Children are seen as the focus of a school psychologist's attention, and, as such, the school psychologist must be prepared to deal with those environments encompassing the child, including peer groups, classrooms, schools, and the family. Graduates are employed in school settings, mental health clinics, state agencies, and research organizations. Completion of the program leads to certification in North Carolina as a Class G School Psychologist and eligibility for certification in most other states.

The master's program is a 60-hour, two-year program, designed to cover content and skills in the professional areas of assessment, intervention, consultation and professional development. Concurrent field experiences across all four academic semesters are required. Students should enter the program with undergraduate course work in personality theory, abnormal psychology, statistics, learning theory, and developmental psychology. Deficiencies must be satisfied before enrollment.

Course schedules are worked out with program advisers. Required courses are EDSP 221 (3 sections), EDSP 222 (3 sections), EDFO 180, EDSP 227, EDSP 322, EDSP 223, EDFO 280, EDSP 228 (6 sections), EDSP 226. Several of these are repeated for credit. In addition, two electives are needed.

Master's Program in Special Education

The special education master's program is designed to prepare master teachers who have the skills to work directly with exceptional children and to serve in consultative roles with regular educators, parents and allied professionals.

The master's program requires a minimum of 30 semester hours of graduate study including two semesters of an internship. The majority of entering students seek advanced certification in one or more categorical areas of handicapping conditions. It is not necessary for students to have a teaching certificate to enter the master's program; however, if a certificate has not previously been earned, an additional 18 hours of education courses are typically required. These prerequisite courses do not count toward the graduate degree and should be taken prior to entering the master's degree program.

Students enrolled on a full-time basis, working for a Master of Education (M.Ed.) degree, typically complete degree and certification requirements in one year and one summer session, unless prerequisites are required. The Master of Arts in Education (M.A.) is available to students who wish to complete a thesis and/or who wish to take an individualized program of study. Employed educators who are enrolled as part-time students complete the program within approximately two years. Program planning is focused on a cross-categorical course sequence designed to develop a generic special

education knowledge base necessary for working with any exceptional child. The individual student then plans further study choosing one or two emphasis areas: academic or developmental. The academic emphasis area prepares students to work with mildly to moderately handicapped school-age children and includes competencies leading to advanced certification in mental retardation, learning disabilities, and/or emotional handicaps. The developmental emphasis area prepares students to work with pre-school handicapped infants or children and/or youth with severe multiple handicaps, and prepares the student for appropriate advanced certification.

Students who do not have certifications in elementary or special education will take the following courses: EDFO 100, EDFO 120 or EDFO 223, EDCI 231, EDCI 237 and EDSP 340. A minimum of twelve hours of this credit must be completed by the end of the fall semester of the first year of graduate study.

Core requirements for the master's degree for all special education emphases are EDSP 143, EDSP 179, EDSP 231, EDSP 242, and EDSP 247.

Students pursuing certification in Learning Disabilities (LD) will take EDSP 322, EDSP 340 (6 hours), EDCI 232, and EDCI 233. Those wishing both Learning Disability and Emotional and Mentally Handicapped certification (LD/EMH) will also take EDSP 135 and an additional EDSP 340.

Students wishing certification to teach the Emotionally Handicapped (EH) will take EDSP 237, EDSP 238, EDSP 340 (6 hours) and an appropriate elective. Those students pursuing the developmental track will take EDSP 135, EDSP 179, EDSP 224 and EDSP 340 (6 hours).

DOCTORAL PROGRAMS IN EDUCATION

Doctoral Program in Adult and Higher Education

The doctoral program with an emphasis in adult and higher education (Ph.D.) is primarily concerned with preparing educational leaders, researchers, faculty and professional staff for positions relating to post-secondary education. These professionals may serve in traditional institutions of higher education and their supporting or coordinating agencies, in programs of adult and continuing education, or in nontraditional settings such as hospitals, government, industry, and other organizations where educational activities are conducted.

The doctoral program offers particular strengths in the areas of management, planning and organizational development.

The course requirements in the area of the major concentration include EDSP 288, EDSP 291, EDSP 293, EDSP 295 and four courses selected from EDCI 208, EDCI 250, EDCI 251, EDCI 252, EDCI 260, EDCI 261, EDCI 351, and EDCI 360. A program of study is worked out by the student with his adviser and doctoral committee based on his professional objectives.

Doctoral Program in Counseling Psychology

The Ph.D. program in counseling psychology, fully accredited by the American Psychological Association, is based on the counselor-investigator preparation model and emphasizes the training of professionals in counseling and research. Students in the program are prepared to provide direct services to individuals with developmental and/or adjustment concerns. It is assumed that applicants are dedicated to the systematic application of the principles of psychology and the scientific method to the discipline of counseling psychology.

Applicants may be admitted into the program after they have completed either their undergraduate work or a master's program in an area related to counseling psychology. Students entering the program with an undergraduate degree will complete the equivalent of approximately 3½ years of full-time coursework followed by a predoctoral internship and doctoral dissertation research.

Course work includes at least 15 semester hours of generic psychology, including history and systems of psychology, and courses in individual, biological, cognitive-affective, and the social bases of behavior, as well as extensive work in counseling and scientific investigation.

As part of their counseling training, students will complete a minimum of three semesters of basic supervised practicum. Practicum experiences are available in a variety of settings in Chapel Hill and the surrounding communities.

Doctoral Program in Curriculum and Instruction

The doctoral programs, with emphasis in curriculum and instruction, are designed to develop expertise and leadership talent in the general area of curriculum and instruction and a specialty in one of these three areas: design, implementation, and evaluation.

Applicants will be selected for admission on the basis of their potential for outstanding contributions to education in the area of curriculum and instruction. They should hold a master's degree in a program in the field of education.

In meeting the requirements listed above for the Ph.D., degree students will be advised to take appropriate courses in the humanistic and behavioral foundations of education, EDCI 209, EDCI 210, EDCI 297 or EDFO 380, EDSP 297 or EDFO 288, and a research apprenticeship in the area of specialization. The student's course program will be planned and supervised in conjunction with the student's adviser and doctoral committee.

Doctoral Programs in Educational Administration and Supervision

The doctoral programs in educational administration and supervision (Ed.D. and Ph.D.) focus on the needs of the practitioner, the college teacher, and the research specialist. They prepare persons who will serve on central office staffs of schools, on state department staffs, and in related organiza-

tional structures. In planning the program of studies, students may satisfy the academic requirements for Levels II and III certification by the North Carolina Department of Public Instruction as a school administrator.

All students pursuing the doctorate in educational administration will take a minimum of 24 semester hours in administration including EDSP 288, EDSP 291, EDSP 293, and EDSP 295, a minimum of 15 hours in a minor area of concentration related to the major, the research sequence and appropriate electives as recommended by the student's adviser and doctoral committee.

Students wishing to qualify for positions in the administration of special programs may qualify for the Ed.D. Such students should have had three years of experience in some phase of human services. They would take EDSP 291, EDSP 293, EDSP 288, EDSP 295, EDSP 285, EDSP 233, EDSP 234, EDSP 345 (6 hours), 3-6 additional electives in administration selected in consultation with their adviser and doctoral committee, and the research sequence.

Doctoral Program in Educational Psychology

The Ph.D. program in educational psychology is designed to prepare college and university teachers and educational researchers. Most of the recent graduates are employed by colleges and universities, teaching in schools of education or working as evaluators/researchers in the allied health field (e.g., schools of medicine).

Most students admitted into the Ph.D. program in educational psychology have already completed a master's degree program and have a background in education and/or psychology. Fellowships and/or assistantships are available to support most doctoral students during their programs. Doctoral students in educational psychology are expected to become involved in both teaching and research activities while they are completing their programs. A wide variety of research, training, and teaching activities are available.

All Ph.D. students in educational psychology must complete EDFO 201, EDFO 302, EDFO 202, EDFO 301, EDFO 206, EDFO 303, EDFO 180, EDFO 280, EDFO 285, EDFO 380, EDFO 394, EDFO 390, and EDFO 305. The remainder of the student's Ph.D. program will be determined by the doctoral committee in a formal meeting with the student.

Doctoral Program in Social Foundations

The doctoral program in social foundations (Ph.D.) has three areas of emphasis: history of education, philosophy of education, and educational sociology. The program prepares individuals in both teaching and research for college and university settings. Students typically enter the program with a master's degree in education, history, sociology, anthropology, economics or philosophy. Students admitted without a master's degree are expected to obtain a master's degree or its equivalent as part of the doctoral

program. Course work is planned by the student with the adviser and doctoral committee in keeping with the student's area of emphasis.

Students are expected to include in their program EDFO 220, EDFO 222, EDFO 223, EDFO 241, EDFO 242 and the appropriate program courses for the area of emphasis which they wish to pursue.

The research sequence includes EDFO 285, EDFO 180, EDFO 280, EDFO 206, and EDFO 323, EDFO 324, or EDFO 341. The appropriate research courses in the areas of emphasis are substituted for the advanced statistics and design course.

Doctoral Program in Special Education

The Ph.D. program in special education provides leadership personnel with expertise in research, development, training, and service delivery for exceptional children and youth. Emphasis is placed on development of competencies in special education foundations, research and development, program evaluation, and teaching and training in special education. Students are provided with program flexibility in order to structure training experiences according to their future goals.

Admissions criteria include a master's degree in special education or a related field and preferably experience in working with exceptional populations. In addition to core courses, required seminars, and electives, students complete internships related to professional development. Examples of internship experiences include teaching preservice and inservice courses, conducting special institutes, working as an assistant on a major research project, working in state and federal agencies, and providing technical assistance.

The program of studies generally covers a three-year period. The first two years are comprised of course work, internship experiences, and a required research apprenticeship. The third year is devoted typically to the completion of written exams and the preparation of a dissertation.

The special education core for the Ph.D. includes EDSP 242, EDSP 233 and EDSP 234. The research sequence includes EDFO 285, EDFO 181, EDFO 280, EDFO 380, EDFO 204, and EDSP 342. Elective courses are selected from a wide area in consultation with the student's adviser and doctoral committee. This may include a formal minor of not less than five courses.

Doctoral Program in School Psychology

The Ph.D. program, fully accredited by the American Psychological Association, is designed to prepare professional school psychologists whose training includes a basic core of knowledge and experience in both scientific and practical aspects of the profession, with available options selected to facilitate either an academic or an applied career. Graduates of the program should be capable of assuming leadership positions in local, state, and national settings, community service, and in university settings.

Concurrent field-based experiences are coordinated with course work across the first three years of academic work. Experiences are planned so that the student obtains increasingly more complex skills. Placement of students is made in the surrounding school systems and in other appropriate settings.

In addition to the courses listed for master's students, doctoral students take advanced seminars and appropriate electives. Students are encouraged to plan a program of study not to exceed four years from initiation of study to the earning of the degree. A predoctoral internship is required.

Courses included in the program are EDSP 221 (4 sections), EDSP 222 (3 sections), EDSP 223 (2 sections), EDSP 226, EDSP 322, EDFO 180, EDFO 285, EDFO 280, EDFO 380, Evaluation, EDSP 227, EDSP 228 (6 sections), EDSP 229, EDSP 320, five required foundations electives, a Research Apprenticeship, and dissertation credits.

CERTIFICATION PROGRAMS

In addition to its graduate degrees, the School of Education provides the teacher certification program through the Evening College for postbaccalaureate students who want to qualify for certification in teaching, administration, and other specialized school personnel areas. Certification programs are available in various teaching areas, Academically Gifted Education, School Administration, Curriculum-Instructional Specialist, and School Media Coordinator. Teaching certificates may be obtained on the Class A (bachelor's) or Class G (master's) levels. The graduate level Administrator and Curriculum-Instructional Specialist certificates are generally designated as Level I, Level II, and Level III. Level I certification closely parallels requirements for the master's degree with a major in the same area. Level II is based on Level I requirements and requires additional coursework and experience. Level III closely parallels requirements for the doctorate.

Requests for information concerning the Teacher Certification Program, certification requirements and procedures, and applications should be addressed to the Office for Academic Administration.

Teacher Certification Programs

Candidates for initial (Class A) teacher certification must hold at least a bachelor's degree and be admitted to the Teacher Certification Program by the School of Education. Admission to the Evening College alone does not guarantee admission to the Teacher Certification Program; admission to the program is competitive, due to space restrictions. Specific course requirements for individual students are determined by the School of Education after an evaluation of the student's previous coursework and experience. In general, the student must complete appropriate coursework in the teaching area, social and psychological foundations of education, teaching methods, and a student teaching practicum to receive a recommen-

dation for certification from this institution. The National Teacher Examination is also required for North Carolina certification.

Candidates for Class G certification must hold a master's degree and Class A certification or the equivalent, and complete graduate-level coursework in the teaching area and professional education as determined by the School of Education to meet state standards.

Certified teachers who wish to complete coursework for additional teaching areas should also apply to the Teacher Certification Program. Course requirements will be determined by the School of Education after consideration of the student's prior teaching experience and coursework.

Academically Gifted

Candidates for certification in Academically Gifted must have at least a bachelor's degree, Class A certification, and one year of teaching experience. The following courses are required: EDSP 132, EDSP 345A, EDFO 106, and EDCI 306 or 321 or EDSP 345 (internship or independent study). Certified teachers may apply to the Teacher Certification Program to complete certification requirements only, or may apply to the Graduate School to complete requirements for Academically Gifted certification in conjunction with a master's degree program in a teaching field.

Administrative Certificate Programs

Candidates for Level I certification in administration must hold a master's degree and be qualified to obtain a North Carolina Class A or Class G teaching certificate. They should then complete approximately 30 semester hours of graduate studies distributed as follow: EDSP 288, EDSP 291, EDSP 293, EDSP 295, EDFO 180, EDCI 200, an elective in educational administration, an elective in curriculum and instruction, an elective from social or psychological foundations of education; EDSP 390 (Internship); and a written examination in educational administration.

Candidates for the Sixth Year Certificate in Administration (Level II) must hold a master's degree from an accredited institution and have completed approximately 60 semester hours of graduate study distributed as follows: EDSP 288, EDSP 291, EDSP 293, EDSP 295, EDSP 296, EDSP 298 and six hours of electives in administration; 15 semester hours of course work in the graduate program in education or in other graduate departments subject to the approval of the adviser; EDFO 180 and EDFO 285; EDCI 200, one elective in curriculum and instruction, and one elective from social or psychological foundations of education; EDFO 391 (field study or supervised internship), and a written comprehensive examination in educational administration. (This requirement may be met if the student took written examinations required for the M.A., the M.Ed., or the Level I certificate in administration). A minimum of two full semesters of study

or its equivalent residency is required. All coursework credited for the Two Year Certificate must be completed in a period of five years.

Candidates for Level III certification must hold a doctoral degree with at least four semesters of graduate study and two semesters of continuous residence at this institution. Coursework should include the following: EDSP 288, EDSP 291, EDSP 293, EDSP 295, EDSP 296, EDSP 298 and six hours of electives in administration; 15 semester hours of coursework in the graduate program in education or in other graduate departments subject to the approval of the adviser; EDFO 180, EDFO 285, and nine hours of electives from the research area; EDCI 200, an elective from curriculum, and an elective from social or psychological foundations of education; and a doctoral dissertation appropriate to school administration. All coursework should be completed within an eight year period.

Curriculum-Instructional Specialist

Candidates for Level I certification as a Curriculum and Instruction Specialist should have a master's degree with emphasis in one of the following areas: early childhood education, intermediate education, middle grade education, reading and the language arts, school administration, special education, English, mathematics, science, social studies, music, art, the romance languages, German, Latin, or physical education. They should meet the following, or approved substitute, course requirements: EDFO 242, EDCI 200, EDCI 115, EDFO 106, EDCI 306 (Practicum, Level I), EDFO 201, and EDCI 294. They should complete a written comprehensive examination.

Candidates for Level II certification as a Curriculum and Instruction Specialist should have met the requirements for Level I and have the following courses or their equivalent: EDSP 396, EDSP 290 or EDSP 295, EDFO 285, EDCI 111 or EDCI 115, EDCI 306 (Practicum: Level II), EDFO 202, and four additional graduate courses in the area of specialization (e.g., mathematics, English, or academic concentrations related to elementary curriculum).

Candidates for Level III certification as a Curriculum and Instruction Specialist should have met the requirements for Level II certification, should hold the doctorate, and should complete the following or approved substitute courses: EDFO 288 or EDFO 180, EDCI 297, or EDSP 297, EDSP 284 or 250, EDCI 306, EDFO 220 or EDFO 222, and four courses in the area of specialization (e.g., mathematics, English, or academic areas related to the elementary curriculum).

COURSE OFFERINGS

Course offerings are categorized by content areas. Courses numbered 100 to 199 are open to qualified advanced undergraduate students and to

graduate students. Courses numbered 200 and above are open only to graduate students.

Many of the graduate courses in education are available in one or both of the two terms of the summer session. See the catalogue of the Summer Session for details.

Curriculum and Instruction

- EDCI AUDIOVISUAL INSTRUCTION: TECHNIQUES AND MATERIALS (3). Presents
111 the techniques and methods for using the appropriate educational media and supporting resources in instructional situations. *Fall, spring and summer.* Wileman, Trohanis.
- EDCI INTRODUCTION TO INSTRUCTIONAL MATERIALS PRODUCTION (RTVMP
113 113) (3). The planning and production of two and three dimensional instructional materials, such as television graphics, slides, overhead transparencies, manipulative tactile materials and animated motion pictures. One lecture, two laboratories per week. *Fall and spring.* Wileman.
- EDCI PRINCIPLES OF INSTRUCTIONAL DESIGN (3). Prerequisite, EDUC 71, EDUC
115 72, or EDFO 100. The design and production of instructional materials incorporating goal analysis, learning task analysis, behavioral objectives, entry behavior, criterion tests, instructional strategies, design planning and formative evaluation. *Fall.* Hannum.
- EDCI EARLY CHILDHOOD EDUCATION (3). Considers the development of early child-
120 hood education, growth and development characteristics of young children, and the organization and administration of programs and services for young children. *Fall and summer.* Day, Brice.
- EDCI THE CURRICULUM OF EARLY CHILDHOOD EDUCATION (3). Relates the
121 objectives of early childhood education to curricula in language development, science, social living, numbers, music, art, and dramatic play. *Spring and summer.* Day, Brice.
- EDCI EDUCATIONAL TELEVISION PRODUCTION AND INSTRUCTION (RTVMP
140 140) (3). Prerequisite, permission of the department. Topics include current uses of television, techniques of television teaching, production techniques, special visual considerations, potential of various instructional forms, and evaluation methodology. Two lecture and two laboratory hours per week. *Fall.* Staff.
- EDCI POPULATION EDUCATION: PROGRAMS AND ISSUES (3). A survey of current
183 and historical studies related to population and population education with attention to issues, curriculum development, and teaching materials. *As demand warrants.* Smallegan.
- EDCI SEX EDUCATION IN THE SCHOOL CURRICULUM (3). A survey of current and
184 historical studies related to sexuality and population, with attention to sex-related problems of man. Emphasis is given to materials and methodology for teaching in the area. *As demand warrants.* Staff.
- EDCI MUSIC IN THE PUBLIC SCHOOLS, K-12 (Music 186) (3). A study of the goals,
186 historical development, and present curriculum practices in music education at all levels of public schooling. *Spring.* Bostley (Music Department).
- EDCI ADVANCED CHORAL METHODS AND VOCAL DEVELOPMENT PROCE-
187 DURES FOR SECONDARY SCHOOL MUSIC (3). Seminar and workshop in pedagogical procedures in choral art and musical development. *As demand warrants.* Music Department Staff.
- EDCI THE TEACHING OF APPLIED MUSIC: VOCAL (Music 188) (3). Physiological
188 and acoustical analysis of the singing act; phonics and phonetics as applicable to singing English and foreign languages, and vocal exercises and techniques suitable for classroom and choral rehearsal. *As demand warrants.* Bostley (Music Department).
- EDCI INDEPENDENT STUDY IN CURRICULUM AND INSTRUCTION (1-3). May be
199 repeated for a maximum of six hours of credit. Prerequisite, permission of the in-

structor. Readings and research under the direction of a member of the division. *Fall and spring*. Staff.

EDCI INTRODUCTION TO CURRICULUM (3). Open to graduate students in education
200 or by permission of the instructor. A survey of the nature of curriculum development and contemporary changes as they relate to social aims, learner characteristics, and social problems. *Fall, spring and summer*. Burke, Hennis, Hounshell.

EDCI ELEMENTARY EDUCATION IN THE UNITED STATES (3). A survey of the major
202 features of Elementary Education, including curriculum determinants in the past and present, organization, structure, and methods of instruction in language arts, social studies, mathematics, science, and the arts. *Fall*. Lane.

EDCI THE JUNIOR HIGH SCHOOL (3). A survey of the function and features of the
204 curriculum of a school for young adolescents. *As demand warrants*. Staff.

EDCI SECONDARY EDUCATION IN THE UNITED STATES (3). The American high
206 school, its history, evolving development, structure, purposes and functions. *As demand warrants*. Staff.

EDCI CURRICULUM IN HIGHER EDUCATION (3). Prerequisite, EDCI 261 or equivalent,
208 or permission of the instructor. This category is a discussion of the major philosophies of curriculum as applied to higher education, a development of considerations appropriate in curriculum planning, and an examination of existing curricular programs. *Spring*. Stritter.

EDCI CURRICULUM THEORY (3). An advanced course that relates curriculum develop-
209 ment to relevant theories and research in humanistic and behavioral studies. *Spring*. Burke, Hennis.

EDCI INSTRUCTIONAL THEORIES (3). Prerequisites, a prior course on learning and
210 permission of the instructor. Examines the nature and application of various theories of instruction to instructional goals, individual differences, teaching strategies, sequencing, motivation, and assessment. *Spring and summer*. Hannum.

EDCI INSTRUCTIONAL SYSTEMS DEVELOPMENT (3). Delineates strategies for develop-
211 ing instructional systems, including needs assessment, job analysis, goal setting, use of criterion tests, delivery systems, project management, and evaluation of learners and programs. *Spring*. Hannum.

EDCI ORGANIZATION AND SUPERVISION OF PROGRAMS FOR YOUNG CHILDREN
220 (3). A course concerned with organizational structures of schools for young children; focuses on students, staff, physical plant, school services, public relations, and curriculum. Required of early childhood majors assuming supervisory roles. *As demand warrants*. Day, Brice.

EDCI PRINCIPLES AND METHODS IN PARENT EDUCATION AND INVOLVEMENT
223 (3). Prerequisites, basic knowledge of child development and permission of the instructor. Principles, theories, models, and methods for work with parents and families in educational settings, with relevant research and practical applications. *As demand warrants*. Staff.

EDCI TEACHING WRITING AND THE OTHER LANGUAGE ARTS IN THE ELEMEN-
230 TARY SCHOOL (3). A consideration of the objectives, methods and materials of instruction, issues, trends, and research related to oral language, written expression, listening skills, and reading. *Fall, spring and summer*. Fitzgerald, Palmer, Cunningham, Spiegel.

EDCI THE TEACHING OF READING (3). This survey course in developmental and correc-
231 tive reading instruction considers objectives, methods, materials, issues, trends, and bibliography. *Fall, spring and summer*. Fitzgerald, Palmer, Cunningham, Spiegel.

EDCI DIAGNOSIS AND TREATMENT OF READING DIFFICULTIES (3). Prerequisites,
232 EDCI 231 and permission of the instructor. Considers causes of reading disability; observation procedures; standardized, informal, and psycholinguistic diagnostic testing; report writing; and methods and materials of instruction. *Fall and summer*. Fitzgerald, Palmer, Cunningham, Spiegel.

- EDCI PRACTICUM IN DIAGNOSIS AND TREATMENT OF READING DIFFICULTIES
233 (3). Prerequisite, EDCI 232. A supervised clinical or laboratory practicum with reading disability cases. *Spring and summer*. Fitzgerald, Palmer, Cunningham, Spiegel.
- EDCI THE SOCIAL STUDIES IN THE ELEMENTARY SCHOOL (3). A study of the
235 objectives, structure, curriculum, research and experimental programs in the teaching of the social studies in the elementary school. *Fall*. Lane.
- EDCI NATURAL SCIENCE IN THE ELEMENTARY SCHOOL (3). An examination of
236 programs and materials for elementary school science, K-6, with activities to assist teachers in organizing and operating science programs in these classrooms. *Fall and spring*. Hounshell.
- EDCI MATHEMATICS IN THE ELEMENTARY SCHOOL (3). An examination of pro-
237 grams, materials, and issues in teaching elementary school mathematics, K-6. *Spring and summer*. Ballew.
- EDCI INVESTIGATIONS AND TRENDS IN THE TEACHING OF ENGLISH (3). Pre-
240 requisite, Class A English certificate or equivalent. An advanced course designed to examine research, current experimental practices, and the effects of language theories upon the purposes, structure, and program of the language arts. *Summer*. Hennis.
- EDCI INVESTIGATIONS AND TRENDS IN THE TEACHING OF SOCIAL STUDIES.
245 Prerequisite, Class A social studies certificate or equivalent or permission of the instructor. An advanced course designed to examine research and the effects of educational theories upon the objectives, structures, and curriculum of the social studies. *As demand warrants*. Phillips, Unks.
- EDCI INVESTIGATIONS AND TRENDS IN THE TEACHING OF SCIENCE (3). Pre-
246 requisites, a North Carolina Class A certificate or its equivalent and permission of the instructor. Current trends in the teaching of science, with emphasis on experimental programs in science and research in science education. *Spring and summer*. Hounshell.
- EDCI INVESTIGATIONS AND TRENDS IN THE TEACHING OF MATHEMATICS (3).
247 Prerequisite, a North Carolina Class A certificate or its equivalent, or permission of the instructor. Current trends in the teaching of mathematics, with emphasis on research findings and experimental programs. *Summer*. Ballew.
- EDCI ADULT EDUCATION: A GENERAL SURVEY (3). Prerequisite, permission of the
250 instructor. The history, philosophy, and organizational patterns of adult education. *Fall*.
- EDCI PROGRAM PLANNING IN ADULT EDUCATION (3). Prerequisite, permission of
251 the instructor. Design, evaluation and appraisal of programs, courses, and classes for adult community groups; business and industrial groups; governmental and voluntary agencies; and continuing higher education. *Spring*.
- EDCI GROUP PROCESS AND BEHAVIORAL CHANGE (3). Prerequisite, permission of
252 the instructor. Examination of research findings in small group interaction and of their application in the study of task and socioemotional aspects of group functioning, including an introduction to sensitivity training and other experiential methods. *Fall, spring and summer*. Watson.
- EDCI THE TWO-YEAR COLLEGE (3). History, philosophy, objectives, curriculum status,
260 and trends in the development of the two-year college. *Fall*. Morrison.
- EDCI HIGHER EDUCATION IN THE UNITED STATES (3). The history and present status
261 of the organization, administration, and curriculum of higher education. *Fall*. Dill, Sanford.
- EDCI TEACHER EDUCATION IN THE UNITED STATES (3). A study of the research
263 relating to teacher effectiveness and programs for the preparation of teachers. Designed for students planning to work in teacher education. *As demand warrants*. Burke.
- EDCI COLLEGE TEACHING (3). For graduate students in any academic department who
265 plan teaching careers. An introduction to the planning of courses and educational programs for college students. Emphasis is on a systematic approach to developing, implementing, and evaluating instruction. *Fall*. Stritter.

- EDCI ORGANIZATION AND ADMINISTRATION OF HIGHER EDUCATION (3). The
268 theory and practice of the administration of public and private institutions of higher
education, including the two- and four-year colleges and universities. *As demand war-
rants*. Morrison.
- EDCI INVESTIGATIONS AND TRENDS IN THE TEACHING OF FOREIGN LAN-
283 GUAGES (3). Prerequisite, Class A Foreign Language Certificate. An advanced course
designed to study current trends and issues in foreign language education and to examine
research in the field. Honeycutt.
- EDCI INVESTIGATIONS AND TRENDS IN MUSIC EDUCATION (3). Traces the philo-
287 sophical development of music education from the turn of the twentieth century. *Spring*.
Staff (of the music department).
- EDCI SUPERVISION AND INSTRUCTION (3). An examination of the history, nature, and
294 purposes of educational supervision with an emphasis on the role of the supervisor
in the improvement of teaching, curriculum development, and staff development. *Fall
and spring*.
- EDCI RESEARCH IN CURRICULUM AND INSTRUCTION (3). Prerequisites, EDFO 180,
297 281, 285, EDCI 200, 209, 210, or permission of the instructor. Review and interpretation
of existing research in the area of curriculum and instruction, including an exploration
of areas of needed research. *Spring of even-numbered years*. Fitzgerald.
- EDCI PROBLEMS IN CURRICULUM AND INSTRUCTION (3-6). May be repeated for
303 credit. Prerequisites, two courses in graduate education. Provides an opportunity for
advanced students to do independent study in the area under supervision (Sections
include early childhood, intermediate, parent education, secondary/subject, adult/
higher, media, reading, and general.) *Fall and spring*. Curriculum and Instruction staff.
- EDCI PRACTICUM IN CURRICULUM AND INSTRUCTION (3-6). Practicum experiences
306 may include projects, field studies or internships with any one of a number of agencies
concerned with education. (Sections include early childhood, intermediate, parent
education, secondary/subject, adult/higher, media, reading, and general.) *Fall, spring
and summer*. Curriculum and Instruction Staff.
- EDCI PRACTICUM IN TEACHING EARLY CHILDHOOD EDUCATION (3). Prerequi-
321 sites, EDCI 120 and 121. Supervised observation and teaching internship experiences
in programs for young children. *Fall, spring and summer*. Day, Brice.
- EDCI PRACTICUM IN SUPERVISION AND ADMINISTRATION OF EARLY CHILD-
322 HOOD EDUCATION (3). Prerequisites, EDCI 120 and 121 and to be taken with or
after EDCI 321. A supervised internship experience in an administrative or a supervisory
role in programs for young children. *Fall, spring and summer*. Day, Brice.
- EDCI INVESTIGATIONS IN READING AND WRITING (3). Prerequisites, EDCI 230 and
330 231 or permission of the instructor. Reviews recent studies in the teaching of reading
and writing and draws implications. *Spring*. Palmer, Cunningham, Spiegel, Fitzgerald.
- EDCI GROUP AND ORGANIZATIONAL DEVELOPMENT CONSULTATION (3). Pre-
351 requisites, EDCI 252 and permission of the instructor. Application of behavioral
research to the development of advanced skills in group diagnosis and the design of
training exercises for continuing groups. *Spring*. Watson.
- EDCI INTERNSHIP IN HIGHER AND ADULT EDUCATION (1-9). Prerequisite, permission
360 of the instructor. Provides apprenticeship training in administration, teaching, or
research. Credit tailored to the specific experience. *Fall*. Staff.
- EDCI PROBLEMS IN HIGHER AND ADULT EDUCATION (3). Prerequisite, permission
365 of the instructor. Provides opportunity for advanced doctoral students to study specific
problems in higher and adult education under staff supervisors. *Fall, spring, and sum-
mer*. Staff.
- EDCI EDUCATION WORKSHOPS (3 or 6). Open by special permission to a limited number
380 of qualified graduate students who have specific interests or problems that are adapted
to staff and local resources available. *As demand warrants*. Staff.

Educational Foundations

- EDFO 100 PSYCHOLOGICAL FOUNDATIONS OF EDUCATION (3). Describes the nature and relevance of educational psychology; sources and interpretation of educational and psychological data; components of teacher-learning situations, evaluation, and reporting. *Summer*. Staff.
- EDFO 101 PSYCHOLOGY OF CHILDHOOD AND ADOLESCENCE (3). Theories of child and adolescent development plus research findings which aid in the understanding of human behavior and development. *Fall and summer*. Coop.
- EDFO 103 PSYCHOLOGY OF ADULT LEARNING INTERACTION OF VALUES, PERSONALITY, AND COGNITION (3). Studies the interaction of personality, motivation, values, attitudes, and cognition of students from late adolescence through middle age. *Fall*. Frierson.
- EDFO 106 EDUCATIONAL MEASUREMENT AND EVALUATION (3). Identifies the basic concepts in measurement and evaluation, describes the role of evaluation in curriculum construction and revision, and describes the development and use of teaching constructed tests. Not a part of the doctoral research sequence. *Fall and summer*. Brantley, Stuck, Ware, White.
- EDFO 108 MENTAL HYGIENE IN TEACHING (3). Prerequisite, introductory courses in psychology and education. The role of the teacher in the socialization and development of emotional health in children as accompanying academic development. *As demand warrants*. Staff.
- EDFO 115 MINORITY CHILDREN: PSYCHOLOGICAL AND COGNITIVE DEVELOPMENT (Afro-American Studies 115) (3). An analysis of research, theory, and programs regarding the social and cognitive development of minority children. *As demand warrants*.
- EDFO 120 SOCIAL FOUNDATIONS OF AMERICAN EDUCATION (3). A study of the historical developments, philosophical theories, and social forces influencing American education. *Fall, spring, and summer*. Unks.
- EDFO 121 SEMINAR IN SOCIAL FOUNDATIONS OF EDUCATION (1). Topics in the social and philosophical context of American public education. *Two seminar hours a week. Fall*.
- EDFO 122 SEMINAR IN SOCIAL FOUNDATIONS OF EDUCATION (1). Topics in the social and philosophical context of American public education. *Two seminar hours a week. Fall*.
- EDFO 180 STATISTICAL ANALYSIS OF EDUCATIONAL DATA I (4). Descriptive and inferential statistics for educational research, including an introduction to fundamentals of research design and computer data analysis. *Fall, spring, and summer*. Ware, White, Fitzgerald.
- EDFO 190 EDUCATIONAL APPLICATIONS OF MICROCOMPUTERS (3). Prerequisite, permission of the instructor. An introduction to educational applications of microcomputers, including BASIC Programming and an overview of CAI, CMI, word processing, soft-ware evaluation, and teacher utility programs. *Spring and summer*. Stuck, Ware.
- EDFO 199 INDEPENDENT STUDY IN HUMAN DEVELOPMENT AND PSYCHOLOGICAL SERVICES (1-3). May be repeated for a maximum of six hours of credit. Prerequisite, permission of the instructor. Reading and research under the direction of a member of the division whose interests coincide with those of the student. *Spring*. Staff.
- EDFO 201 PSYCHOLOGY OF LEARNING IN THE SCHOOL (3). Prerequisite, Education 71 or equivalent. A study of learning in the school setting, with emphasis on fundamental concepts, issues, evaluation of materials and experiences. *Fall and summer*. Stuck.

- EDFO 202 THEORIES AND RESEARCH IN HUMAN DEVELOPMENT (3). Prerequisite, permission of the instructor. An advanced level course in human development covering the basic theories and the research bases for instructional decisions. *Spring*. Coop.
- EDFO 206 APPLIED MEASUREMENT THEORY FOR EDUCATION (3). Prerequisite, EDFO 180. An examination of the logic and theory of educational measurement. Practical applications of measurement to the construction and use of a variety of educational measurement devices. *Fall*. Ware, White.
- EDFO 207 THEORY AND USE OF INDIVIDUAL INTELLIGENCE TESTS (3). A study of individual intelligence testing with emphasis on clinical experience with the Stanford-Binet and Wechsler scales. Prerequisite, permission of the instructor. *As demand warrants*. Staff.
- EDFO 220 PHILOSOPHY OF MODERN EDUCATION (3). A comparative study of the current philosophies of education with particular attention to their impact on solutions offered to problems currently recognized in American education. *Spring*.
- EDFO 222 ETHICAL ISSUES IN EDUCATION (3). Identifies issues arising in the professional activities of education personnel in the context of systematic consideration of the nature of ethical choice. *Spring*.
- EDFO 223 EDUCATIONAL SOCIOLOGY (3). An application of sociological theory and research to problems of concern to educators. *Fall and summer*. Noblit.
- EDFO 224 SOCIAL CHANGE AND EDUCATION (3). Analyzes social change within a theoretical framework and describes its probable impact on education. Considers the role of the school in the development of human capital. *Spring*. Phillips.
- EDFO 228 THE SCHOOL IN AN URBAN SETTING (3). This course is designed as a seminar to explore the implications of urbanization for educational agencies. Particular attention will be given to public schools. *As demand warrants*. Noblit.
- EDFO 241 EUROPEAN FOUNDATIONS OF MODERN EDUCATION (3). A survey of the social forces influencing the development of western education in Europe from ancient times until the beginning of the twentieth century. *Fall of even numbered years*. Phillips.
- EDFO 242 SOCIAL AND EDUCATIONAL HISTORY OF THE UNITED STATES (3). A survey of the social forces influencing the development of American education from the period of colonization to the early years of the twentieth century. *Fall of odd numbered years*. Phillips.
- EDFO 245 COMPARATIVE EDUCATION (3). A study of education in other cultural settings with implications for the student of American education. *As demand warrants*. Holton, Rhyne.
- EDFO 280 STATISTICAL ANALYSIS OF EDUCATIONAL DATA II (4). Prerequisite, EDFO 180, EDFO 285, or equivalent. A linear model approach to the analysis of data collected in educational settings. Topics include multiple regression, analysis of variance, and analysis of covariance, using computer packages. *Spring and summer*. Ware.
- EDFO 285 LOGIC OF INQUIRY (3). Introduction to the rationale and procedure of scientific investigation as applied in education. Emphasis placed on conceptual issues in the research process, including introductory methods of analysis and presentation. *Fall, spring, and summer*. White, Morrison.
- EDFO 288 PROGRAM EVALUATION IN EDUCATION (3). Prerequisites, EDFO 180 and 285. Emphasizes those aspects of program evaluation that are different from statistical research. *Fall and spring*. Friedman, Morrison.
- EDFO 297 FIELD TECHNIQUES IN EDUCATIONAL RESEARCH (3). Prerequisites, EDFO 180, EDFO 285. An introduction to field research methods and analysis of qualitative data that focuses on the application of these techniques in evaluation and policy research. *Spring*. Noblit.
- EDFO 301 SEMINAR IN HUMAN DEVELOPMENT AND INDIVIDUAL DIFFERENCES (3). Prerequisite, at least one course in human development at the graduate level,

- or permission of instructor. Analyzes research data and theoretical positions pertaining to individual differences in human development in the educational setting. *As demand warrants.* Coop.
- EDFO SEMINAR IN HUMAN LEARNING AND COGNITION (3). Prerequisite, one
302 or preferably two courses in educational and developmental psychology. Studies theoretical aspects of and practical implications of psychologies of learning. *Spring.* Stuck.
- EDFO PROBLEMS IN EDUCATIONAL MEASUREMENT (3). May be repeated for
303 credit. Prerequisites, EDFO 180 and EDFO 206 and permission of the instructor. Provides an opportunity for advanced doctoral students to study a particular problem area in educational measurement under the supervision of a faculty mentor. *Fall and spring.* Staff.
- EDFO PROBLEMS IN EDUCATIONAL PSYCHOLOGY (3-6). Prerequisite, permission
305 of instructor. Study and development of original investigations in the area of educational psychology. *Fall and spring.* Staff.
- EDFO SEMINAR IN EDUCATIONAL PHILOSOPHY (3-6). Repeat for credit. Topics
321 in educational philosophy to be determined by the students with the instructor. *As demand warrants.*
- EDFO PROBLEMS IN THE PHILOSOPHICAL FOUNDATIONS OF EDUCATION (3
323 or more). Prerequisites, EDFO 220 or equivalent. Provides an opportunity for advanced doctoral students to do independent study under supervision. *As demand warrants.*
- EDFO PROBLEMS IN THE SOCIOLOGICAL FOUNDATIONS OF EDUCATION (3
324 or more). Prerequisite, EDFO 223 or equivalent. Provides an opportunity for advanced doctoral students to do independent study under supervision. *As demand warrants.* Noblit.
- EDFO PROBLEMS IN THE ANTHROPOLOGICAL FOUNDATIONS OF EDUCATION
325 (3 or more). Prerequisite, permission of the instructor. Provides an opportunity for advanced doctoral students to do independent study under supervision. *As demand warrants.* Staff.
- EDFO PROBLEMS IN HISTORY OF EDUCATION (3 or more). Prerequisites, EDFO
341 241 and 242 or equivalents. Provides an opportunity for advanced doctoral students to do independent study under supervision. *As demands warrants.* Phillips, Unks.
- EDFO PROBLEMS IN COMPARATIVE EDUCATION (3 or more). Prerequisites, EDFO
342 245 or equivalent. Provides an opportunity for advanced doctoral students to do independent study under supervision. *As demand warrants.* Rhyne.
- EDFO STATISTICAL ANALYSIS OF EDUCATIONAL DATA III (3). Prerequisites, EDFO
380 180, EDFO 280, EDFO 285. An extension of the general linear model to analysis of educational data with multiple dependent variables; with computer applications. *Fall and summer.* Ware.
- EDFO DOCTORAL RESEARCH SEMINAR (3). Prerequisites, two courses in graduate
385 education and permission of instructor. Provides opportunity for group development and evaluation of research in a particular area of concern. *Fall and spring.* Members of the graduate faculty.
- EDFO SEMINAR IN EDUCATION (3). Prerequisites, two courses in graduate education
390 and permission of instructor. Provides for seminar treatment of appropriate topics. *As demand warrants.* Members of the graduate faculty.
- EDFO MASTER'S THESIS (3 or more). *Fall, spring and summer.* Members of the graduate
393 faculty.
- EDFO DOCTORAL DISSERTATION (3 or more). *Fall, spring and summer.* Members of
394 the graduate faculty.
- EDFO GENERAL REGISTRATION (0).
400

Specialized Professional Education

- EDSP INTRODUCTION TO SCHOOL PSYCHOLOGY (3). A course designed to provide
120 the student with an introduction to concepts and methods involved in school psychology.
As demand warrants. Staff.
- EDSP INTRODUCTION TO EXCEPTIONAL CHILDREN (3). A comprehensive survey
130 of giftedness and of various handicapping conditions—mental retardation, emotional
disturbance, learning disabilities, speech impairment, deafness, blindness, orthopedic
impairment, and neurological impairment. *Fall, spring, and summer.*
- EDSP THE GIFTED CHILD IN SCHOOL AND SOCIETY (3). The nature of giftedness
132 and creativity; characteristics of gifted and creative children; approaches to encouraging
the development and utilization of their abilities. *Spring and summer.* Gallagher.
- EDSP PSYCHOLOGY OF MENTAL RETARDATION (3). Study of the research related
135 to the psychological and sociological aspects of educationally handicapping conditions
and of the children who manifest those conditions. *Fall and summer.*
- EDSP METHODS OF TEACHING SPEECH TO THE HEARING-IMPAIRED (SPHS 203)
141 (3). Reviews general principles of speech development, the underlying problems in speech
acquisition by moderately to profoundly hearing-impaired individuals, deviant spoken
language, and the practical and theoretical aspects of evaluating and establishing speech.
As demand warrants. Staff.
- EDSP INTRODUCTION TO COMMUNICATION DISORDER (SPHS 183) (3). Explores
143 the etiology, epidemiology, assessment, and educational implications of speech and
language disorders. *Fall, spring, and summer.* Lubker.
- EDSP FOUNDATIONS OF PHONOLOGICAL AND VOICE DEVIATIONS (SPHS 184)
144 (3). Prerequisite, SPHS 130 or its equivalent. First semester of a two-course offering
in evaluation, analysis and measurement (assessment), modification of behaviors,
breakdown of process in speech disorders, with emphasis on voice and articulation
disorders. *As demand warrants.* Staff.
- EDSP PHONETICS (3). The recognition, analysis, production, and transcription of the sounds
145 of the English language using the international phonetic alphabet. *As demand war-
rants.* Staff.
- EDSP MANAGEMENT OF LEARNING ENVIRONMENTS (3). Emphasis on affective
179 behavior management and applied behavior analysis techniques for intervening in the
environments of exceptional children to increase learning. *Fall.* Bailey, Epanchin, Jens.
- EDSP INTRODUCTION TO SCHOOL COUNSELING (3). Prerequisite, graduate standing.
200 Philosophical bases of public personnel services with emphasis upon elementary and
secondary school guidance programs. *Summer.* Brown.
- EDSP THEORIES OF COUNSELING (3). Prerequisite, permission of the instructor. Current
201 theories of counseling with emphasis on theory as a means of conceptualizing behavior
change in the counseling process. *Summer.* Galassi.
- EDSP CAREER DEVELOPMENT AND COUNSELING (3). Major theories of career
202 development are examined. The use and appraisal of student information in career
counseling are major topics. *Fall.* Brown.
- EDSP PRE-PRACTICUM IN COUNSELING (3). Prerequisites, EDSP 201 (may be taken
203 concurrently) and permission of the instructor. Interviewing techniques developed at
specified levels of competence through role playing and video and audio feedback.
Summer. Galassi.
- EDSP TESTS AND MEASUREMENTS (3). Prerequisite, EDSP 200. Basic concepts in
204 measurement and their application in the use and interpretation of tests. The student
may be required to purchase tests. *Fall.* Brooks.
- EDSP GROUP COUNSELING PROCEDURES (3). Prerequisite, permission of the instruc-
205 tor. Application of counseling theory and research to the organization and implementa-
tion of group counseling. *Fall.* Brown.

- EDSP PRACTICUM IN COUNSELING (3-6). Prerequisites, EDSP 201 and 203. Development of individual counseling skills in an apprenticeship in a specific institutional setting. *Fall*. Brooks, Brown, Galassi.
- EDSP INTERNSHIP IN COUNSELING AND CONSULTATION (3-6). Prerequisites, EDSP 201 and 303. Counseling and consultation activities under supervision in appropriate placements providing for the development of competency in individual counseling, group counseling, and consultation. *Spring*. Brooks, Brown, Galassi.
- EDSP ISSUES IN ORGANIZING GUIDANCE SERVICES (3). Prerequisite, 18 hours in counseling courses. Emphasis on organizing guidance services to meet such problems as those related to the special needs of women, minority groups, and the drug problem. *Summer*. Brown.
- EDSP CROSS-CULTURAL COUNSELING (3-6). Prerequisite, permission of the instructor. 210 An exploration of the cognitive and affective considerations of counseling in culturally different social systems. This includes ways to incorporate specific sociocultural dimensions into the counseling process. *Spring*. Staff.
- EDSP PROFESSIONAL ISSUES IN COUNSELING PSYCHOLOGY (1-3). May be repeated 212 for a maximum of six hours credit. Prerequisites, graduate standing in counseling psychology and permission of the instructor. Includes attention to ethics, licensure, political action, writing for publication, professional involvement, and other relevant issues. *Fall and spring*. Brooks, Galassi, Brown.
- EDSP PSYCHO-EDUCATIONAL ASSESSMENT (1-3). May be repeated for credit. Prerequisite, permission of the instructor. A sequence of courses addressing knowledge and skills in techniques of observation, interviewing, assessment of environment, intelligence, achievement, perceptual motor skills and interpersonal perceptions. *Fall and spring*. Brantley, Brooks, Schulte, Simeonsson.
- EDSP BEHAVIORAL INTERVENTION IN COUNSELING AND SCHOOL PSYCHOLOGY 222 (3). May be repeated for credit. Prerequisite, permission of the instructor. Topics covered include behavior management and therapy, and individual and group therapy. (The school psychology sections include consideration of theoretical interventions beyond those of a behavioral perspective.) *Fall and spring*. Galassi, Schulte, Simeonsson, Wasik.
- EDSP SCHOOL CONSULTATION METHODS (3-12). May be repeated for credit. Examines 223 various models of consultation, the role of the consultative model in the schools and related agencies and utilizes role playing and experience in the school. *Spring*. Pryzwansky, Schulte.
- EDSP WORKING WITH PARENTS AND FAMILIES OF HANDICAPPED CHILDREN 224 (3). Considers trends, research, sociological and psychological issues, intervention procedures, and interaction with families of handicapped children. Field experiences with families of handicapped children provided. *Spring and summer*. Lillie.
- EDSP THE PROBLEM OF MALADJUSTMENT AMONG CHILDREN (3). The etiology 225 and behavioral characteristics of the major forms of maladjustment in children as they relate to intervention and alternatives. *As demand warrants*. Staff.
- EDSP SEMINAR IN APPLIED INVESTIGATIONS (3). Prerequisite, permission of the instructor. Designed to provide opportunities to explore in depth specific areas of research interest in counseling and school psychology. *Fall and summer*. Brooks, Galassi, Wasik.
- EDSP SEMINAR IN PROFESSIONAL SCHOOL PSYCHOLOGY (2-3). May be repeated 227 for credit. Deals with the goals and roles of school psychology, ethical concerns, privileged information, certification and licensing, and other relevant areas. *Fall*. Brantley, Pryzwansky.
- EDSP EXTERNSHIPS IN SCHOOL PSYCHOLOGY (1-6). May be repeated for credit. Prerequisite, permission of the instructor. Supervised observation and participation in school psychological services in schools and school-related field facilities. *Fall and spring*. Brantley, Pryzwansky, Schulte, Simeonsson, Wasik, Wenger.
- EDSP DOCTORAL SEMINAR IN PROFESSIONAL SCHOOL PSYCHOLOGY (3). Prerequisites, appropriate courses and permission of the instructor. Considers advanced

- topics in the field of school psychology such as professional issues, standards and ethics, and interdisciplinary relations. *Fall*. Brantley, Pryzwansky.
- EDSP TEACHING THE HANDICAPPED CHILD (3). May be repeated for credit. Emphasis
231 is on classroom educational procedures, including methods, curriculum, and materials for teaching pupils in the public schools who are handicapped by learning problems. *Fall or spring*. Jens, Lillie, Bailey.
- EDSP MULTIDISCIPLINARY APPROACHES TO EXCEPTIONALITY I (3). Focuses on
233 the theory and research related to the biomedical and psychological aspects of exceptional-ity. *Fall*. Simeonsson, Staff.
- EDSP MULTIDISCIPLINARY APPROACHES TO EXCEPTIONALITY II (3). Focuses
234 on the theory and research related to the sociological, legal, and educational aspects of exceptional-ity. *Spring*. Wiegerink.
- EDSP INTRODUCTION TO THE EDUCATION OF EMOTIONALLY DISTURBED
237 CHILDREN (3). The education of emotionally disturbed children, including history, philosophical issues, alternative conceptions of emotional disturbance, management, educational programming, and types of programs and professional roles. *Fall and summer*. Epanchin, Paul.
- EDSP TEACHING THE EMOTIONALLY DISTURBED CHILD (3). Prerequisite, EDSP
238 237. An examination of management and educational planning and programming for emotionally disturbed children, the role of the teacher, and the establishment of programs. *Spring and summer*. Epanchin.
- EDSP EXCEPTIONAL CHILD DEVELOPMENT (3). Emphasis is on developmental devia-
242 tion exhibited by exceptional children in cognitive, language, social, and affective development. *Spring*. Simeonsson.
- EDSP AUDIOLOGY (SPHS 123) (3). Theory and practice of the measurement of hearing,
243 causative factors in hearing loss, evaluation of audiometric results, and demonstration and participation in clinical program in audiology. *As demand warrants*. Staff.
- EDSP FOUNDATIONS OF NEUROLOGICAL AND FLUENCY DEVIATIONS (SPHS 244)
244 (3). Prerequisite, EDSP 144. A continuation of a two-course offering as described under 144 with emphasis on stuttering and organic disorders of speech. *As demand warrants*. Staff.
- EDSP ADVANCED THEORY AND PRACTICE IN EDUCATING THE SPEECH HANDI-
245 CAPPED (3). *Summer*. Visiting faculty.
- EDSP EDUCATIONAL EVALUATION OF HANDICAPPED CHILDREN (3). Study and
247 practice in the use of both formal and informal diagnostic assessment and observa-tional techniques appropriate for the teacher of children with learning problems. *Fall and/or spring*. Bailey, Jens, Lillie.
- EDSP CURRICULUM DEVELOPMENT IN SPECIAL EDUCATION (3). Designed to help
248 the student put diagnostic and assessment procedures into practice in the classroom. Includes development of I.E.P.s, a thorough understanding of legislative mandates directed toward special education populations and development of evaluation tech-niques for accountability. *As demand warrants*. Lillie.
- EDSP PROGRAM PLANNING, POLICY ANALYSIS, AND EVALUATION OF SPECIAL
250 POPULATIONS (3). Prerequisite, permission of the instructor. An introduction to program planning, policy analysis, and program evaluation as related to special educa-tion issues. *Fall*. Gallagher.
- EDSP HIGHER EDUCATION AND THE LAW (3). Prerequisite, EDSP 291. The study
265 of law related to post-secondary education. Topical areas and primary issues include: university as legal entity; legal status of college and university administrators; rights and responsibilities of students, faculty, and employees; discrimination and affirmative action; federal/state regulation; and other related issues. *Spring*. Brown, King.
- EDSP PLANNING, IMPLEMENTING, AND ASSESSING SCHOOL IMPROVEMENTS
284 ON FEDERAL, STATE, AND LOCAL LEVELS (3). Prerequisites, EDSP 286, 288, 291, 293, 295. Examines the division of governmental responsibility for school improve-

- ments, and approaches to planning, implementing and assessing improvements. *Spring*. Staff.
- EDSP ADMINISTRATION OF SPECIAL SERVICES (3). An overview of special programs
285 and special services that operate in the nation's schools. Focus is on the interaction of federal, state, and local policies. *Fall*. Wiegerink.
- EDSP SCHOOL REFORM (3). Examines historical attempts in educational reform and
286 critically analyzes different types of reform, reform processes, and impediments and consequences of reform attempts. *As demand warrants*. Staff.
- EDSP SCHOOLS AND COMMUNITIES (3). Examines values, processes, and approaches
287 to school-community relations. Focus is on analyzing various attempts at school-community linkages and not on public relations. *Fall*. Staff.
- EDSP POLITICS IN EDUCATION (3). Focuses on political issues, processes, and problems
288 that influence decision- and policy-making in elementary, secondary, and higher education. *Fall*. George.
- EDSP SCHOOL BUSINESS MANAGEMENT AND TECHNOLOGY (3). Prerequisite,
289 EDSP 293 or 296. Budget development and administration, facility planning and maintenance, purchasing and inventory control, personnel compensation, data processing and other topics. Skills in financial management enhanced through applications of technology. *Spring*. King.
- EDSP SCHOOL ORGANIZATION AND MANAGEMENT (3). An introduction to the or-
290 ganizational choices, relationships, and management practices in the schools (K-12 or K-14). *Fall*. George.
- EDSP STRUCTURE AND BEHAVIOR IN EDUCATIONAL ORGANIZATIONS (3). An
291 examination of theories of organizational structure, organizational behavior, and group dynamics in educational organizations. *Fall*. George, Watson, Noblit.
- EDSP SCHOOL PERSONNEL ADMINISTRATION (3). Prerequisite, EDSP 291. An exami-
292 nation of the long-range strategy of personnel administration, which seeks to help schools attract, retain and develop the kinds of human resources needed to achieve the overall goals of the schools. *Spring*. Hartwig.
- EDSP MANAGEMENT IN EDUCATIONAL ORGANIZATIONS (3). Prerequisite, EDSP
293 291. Introduction to management functions of planning and control in educational organizations. Individual decision making emphasized through a case study method. *Spring*. Dill, Wiegerink.
- EDSP SUPERVISION AND INSTRUCTION (3). Identifies nature and purposes of supervi-
294 sion, recent trends in theory and practice, teacher participation in policy, organization, and planning; specific techniques and devices of supervision; and training and qualifications of supervisors. *As demand warrants*.
- EDSP LEADERSHIP BEHAVIOR AND ORGANIZATIONAL CHANGE IN EDUCA-
295 TIONAL SETTINGS (3). Prerequisite, EDSP 291. An examination of theoretical and empirical studies that provides bases for interpreting leadership roles in educational organizations, and various current perspectives on how organizational change can be effected. *Spring*. George, Watson.
- EDSP SCHOOL FINANCE: ECONOMIC AND POLITICAL ISSUES (3). Content covers
296 the area of financing of school corporations in the current economic and political setting, with emphasis on interrelationships of educational, economic, and political decisions. *Fall*. Staff.
- EDSP SCHOOL LAW (3). Prerequisites, courses required for the Class A North Carolina
298 Teachers Certificate and six semester hours of graduate work in school administration. Provides overview of legal structure of education, liability, constitutional rights, contractual relationships, federal regulations, and collective action. *Spring*. Hartwig.
- EDSP PSYCHOLOGY OF CAREER DEVELOPMENT (3). Open to doctoral students. Review
300 of theories and research in the psychology of career development and counseling. Emphasis is upon theory and implications for practice. *Fall*. Brown.

- EDSP INTRODUCTION TO STUDENT PERSONNEL SERVICES (3). Student personnel
301 administration structure, admissions, student discipline, institutional climate, housing,
health services, counseling and testing, placement, foreign students, and financial aid
are considered. *Fall*. Boulton.
- EDSP INTERNSHIP IN STUDENT PERSONNEL SERVICES (4). Provides experiences
302 in student personnel offices and in functions specific to the student's career orientation
in placements, in student personnel offices. Under the joint supervision of personnel
of offices and staff of School of Education. *Spring*. Staff.
- EDSP COUNSELING PSYCHOLOGY: THEORIES AND PRACTICE (3). Prerequisite,
304 EDSP 201 or equivalent and permission of instructor. An examination of selected
theories of counseling combining readings and analysis of counseling experiences.
Spring. Brooks, Brown.
- EDSP PROBLEMS IN COUNSELING PSYCHOLOGY (3-6). May be repeated for credit.
305 Prerequisites, two graduate courses in counseling psychology. Practicum experiences,
which may include working with individual family, and group counseling, and consulta-
tion, are arranged. *Fall and spring*. Brooks, Brown, Galassi.
- EDSP DOCTORAL PRACTICUM IN COUNSELING AND CONSULTATION (3-6). May
306 be taken four times for credit. Prerequisite, permission of instructor. Practicum experi-
ences which may include working with individual, family, and group counseling and
consultation. *Fall*. Brooks, Edgerly, Sakata, Van Wey, Majestic, Martin.
- EDSP DOCTORAL INTERNSHIP IN COUNSELING PSYCHOLOGY (1-6). Prerequisites,
307 EDSP 306 sequence and permission of the instructor. May be repeated for no more
than cumulative total of six credit hours. Supervised professional predoctoral, internship
training experience in counseling psychology. *Fall, spring, and summer*. Brooks.
- EDSP SUPERVISION AND TEACHING IN COUNSELING PSYCHOLOGY (3). Enables
308 students to gain supervision and teaching skills that will enhance their functions as
professors and as leaders in counseling agencies. Strategies of practicum supervision
summarized and research literature reviewed. *Spring*. Galassi.
- EDSP DOCTORAL SEMINAR IN COUNSELING PSYCHOLOGY (3). Prerequisite, enroll-
309 ment in doctoral program. In depth appraisal of topics of theoretical and/or clinical
nature that are of particular relevance to the field. *Fall and spring*. Brooks, Brown,
Edgerly, Galassi, Sakata.
- EDSP DOCTORAL INTERNSHIP IN SCHOOL PSYCHOLOGY (1-6). Prerequisite, permis-
320 sion of the instructor. Supervised field placement experiences for doctoral level students
in school psychology integrating training with field responsibilities at a systems level
in schools and school-related settings. *Fall and spring*. Staff.
- EDSP SEMINAR IN LEARNING DISABILITIES (3). Prerequisite, permission of instructor.
322 Designed to explore the etiology, classroom manifestations, and treatment programs
of children with learning disabilities. *Fall and spring*. Pryzwansky, Schulte.
- EDSP PROBLEMS IN SCHOOL PSYCHOLOGY (1-3). May be repeated for credit. Prerequi-
325 site, permission of the instructor. Provides opportunity for advanced students to do
independent study under supervision. *Fall and spring*. Staff.
- EDSP MASTER'S INTERNSHIP IN SPECIAL EDUCATION (3 or 6). Provides supervised
340 experience in a phase of special education appropriate to the student's qualifications
and future educational goals. Requires a minimum of 300 clock hours at the internship
site per semester. *Fall, spring and summer*. Staff.
- EDSP SUPERVISED POST-MASTER'S INTERNSHIP IN SPECIAL EDUCATION (3, 6
341 or 9). Prerequisite, permission of the instructor. A full-time field placement under
the joint direction of a University staff member and a selected professional at the
internship site. *Fall and spring*. Staff.
- EDSP SEMINAR IN SPECIAL EDUCATION (1-3). May be repeated for credit. Advanced
342 seminar on special education issues and topics involving the interpretation and applica-
tion of theory and research. *Fall*. Lillie.

- EDSP PROBLEMS IN SPECIAL EDUCATION (3). May be repeated for credit. Prerequisite, 345 permission of the instructor. Available for post-master's students who wish to engage in supervised field and pilot research. *Fall, spring and summer.* Staff.
- EDSP SEMINAR AND SUPERVISED INTERNSHIP IN EDUCATIONAL ADMINIS-
390 TRATION (3). Prerequisite, graduate status in School of Education and permission of instructor. A supervised internship or field problem explicitly relevant to the program in administration and to the student's progress toward certification in the principalship. *Fall, spring and summer.* Staff.
- EDSP ADVANCED SEMINAR AND SUPERVISED INTERNSHIP IN EDUCATIONAL
391 ADMINISTRATION (6). Prerequisites, EDSP 291, 295, 296, permission of instructor. Provides opportunity for groups of students to share experience and research opportunities, while working under supervision in administrative settings. *Fall, spring and summer.* Staff.
- EDSP PROBLEMS IN EDUCATIONAL ADMINISTRATION (3 or 4). May be repeated
395 for credit. Prerequisites, permission of the instructor. Provides opportunity for advanced students to do independent study under supervision. *Fall, spring and summer.* Staff.
- EDSP PROBLEMS IN SUPERVISION (3 or 4). Prerequisite, permission of the instructor.
396 A study of major problems in the supervision of instruction, investigations of new trends, and recent research. *As demand warrants.*

DEPARTMENT OF ENGLISH

JOSEPH M. FLORA, *Chairman*

Professors

LAURENCE G. AVERY	(2)	American Literature, the Drama
ROBERT A. BAIN	(3)	Colonial and Nineteenth-Century American Literature
DORIS W. BETTS	(59)	Creative Writing
THADIOUS M. DAVIS	(61)	American Literature, American Studies
ALAN C. DESSEN	(6)	Renaissance
CHARLES E. EDGE	(11)	Prose Fiction, Nineteenth-Century English Novel
EVERETT EMERSON	(73)	American Literature, American Studies
JOSEPH M. FLORA	(13)	American Literature, Twentieth-Century British and American
ROBERT L. HAIG	(16)	Eighteenth-Century British
WILLIAM R. HARMON	(17)	Twentieth-Century British and American, Poetry, Creative Writing
HOWARD M. HARPER, JR.	(18)	Twentieth-Century British and American
TRUDIER HARRIS	(60)	American Literature, Folklore
S. K. HENINGER, JR.	(69)	Renaissance
ROBERT HOWREN	(67)	Linguistics
EDWARD D. KENNEDY	(22)	Medieval Literature
J. KIMBALL KING	(23)	Twentieth-Century Drama, American Literature
GEORGE S. LENSING, JR.	(26)	Modern Poetry, American Literature
ERIKA C. D. LINDEMANN	(63)	Composition
CHARLES T. LUDINGTON, JR.	(27)	Twentieth-Century British and American, American Studies
WILLIAM A. MCQUEEN	(32)	Seventeenth-Century British
JERRY L. MILLS	(33)	Renaissance
DANIEL W. PATTERSON	(36)	American Literature, Folklore
MARK L. REED	(40)	English Romanticism
LOUIS D. RUBIN, JR.	(41)	Modern American, Literary Criticism, Creative Writing, American Studies
RICHARD D. RUST	(42)	American Literature, American Studies
HAROLD I. SHAPIRO	(53)	Victorian Literature
ALBRECHT B. STRAUSS	(44)	Eighteenth-Century British
FRED C. THOMSON	(47)	Victorian Literature
WELDON E. THORNTON	(48)	Twentieth-Century British and American, the Novel
CHARLES G. ZUG III	(52)	Folklore, Nineteenth-Century American

Associate Professors

CHRISTOPHER M. ARMITAGE	(1)	Twentieth-Century, British, Canadian
CONNIE C. EBLE	(9)	English Language, Linguistics
DARRYL J. GLESS	(62)	Renaissance
JOHNNY LEE GREENE	(57)	American Literature
ANNE D. HALL	(54)	Renaissance
RANDALL HENDRICK	(68)	Linguistics, Criticism

RITCHIE D. KENDALL	(64)	Renaissance
ROBERT G. KIRKPATRICK	(24)	English Romanticism
THEODORE H. LEINBAUGH	(65)	Medieval Literature
ALLAN R. LIFE	(55)	Victorian Literature
MARGARET A. O'CONNOR	(35)	American Literature, Women's Studies, American Studies
PATRICK P. O'NEILL	(66)	Medieval Literature
JULIUS R. RAPER III	(38)	American Literature
THOMAS A. STUMPF	(45)	Eighteenth-Century British
BEVERLY W. TAYLOR	(70)	Victorian Literature
JAMES P. THOMPSON	(72)	Eighteenth-Century British
JOSEPH S. WITTIG	(51)	Medieval Literature

Assistant Professors

MARY K. DAVIS	(79)	American Literature
LINDA S. KAUFFMAN	(74)	Literary Criticism, Twentieth Century
ALEC P. MARANTZ	(75)	Linguistics
JEANNE MOSKAL	(77)	Nineteenth-Century British, Literary Criticism
JOSEPH S. VISCOMI	(76)	Nineteenth-Century British
JAMES D. WILLIAMS	(80)	Composition

Professors Emeriti

CHRISTOPHER BROOKHOUSE
LYMAN A. COTTEN
NORMAN E. ELIASON
RICHARD H. FOGLE
JAMES R. GASKIN
C. CARROLL HOLLIS
BLYDEN JACKSON
GEORGE J. KANE
LEWIS LEARY
CLIFFORD P. LYONS
FRED H. MACINTOSH
PETER G. PHIALAS
HARRY K. RUSSELL
H. MAXWELL STEELE
ROBERT B. VOITTE
WILLIAM S. WELLS

The Department offers work leading to the Master of Arts and Doctor of Philosophy degrees. The M.A. degree aims at mastery of scholarly techniques, comprehension of the English language, and broad knowledge of British and American literature. Building on the M.A., the Ph.D. is a more specialized degree, with a major in one of six literary periods and a minor either in a second literary period or in the English language. Students may take an appropriate minor outside the department, with the approval of the Director of Graduate Studies; a formal Minor in Medieval Studies is

also available (see the end of the Classics entry). The Department recognizes the following areas of specialization:

- (1) the English Language.
- (2) English Literature from the Beginning to 1485.
- (3) English Literature from 1485 to 1660 (including Milton).
- (4) English Literature from 1660 to 1789.
- (5) English Literature from 1789 to 1900.
- (6) American Literature to 1900.
- (7) British and American Literature from 1900 to the Present.

Admissions Requirements

Application for admission must be made on forms provided by the Graduate School. These forms serve also as applications for fellowships and assistantships if the applicant marks the appropriate statement on the form.

Applicants for advanced degrees must have completed at the time of enrollment an undergraduate degree, customarily with a major in English. To be reviewed for admission by the Department's Graduate Advisory Committee, applications must be supported by scores on the Graduate Record Examination Aptitude Test (Advanced test not required, but recommended for fellowship applicants), at least three letters of recommendation, and official transcripts showing courses, grades, and degrees awarded.

Only applicants with an M.A. in English are eligible for admission directly into the Ph.D. program. Every applicant without an M.A. in English is considered an applicant for the M.A. degree. Students who complete an M.A. in the English Department must be reviewed and re-admitted for doctoral work.

Fellowships and Assistantships

Financial support for graduate students is described in the General Information section under the heading "Fellowships and Financial Aid." Applicants to the English Department are eligible to compete for University Fellowships and Assistantships. In addition, the Department awards two types of assistantships—Research Assistantships and Teaching Assistantships. Neither type is usually available in the summer. Research Assistants are assigned to faculty members to help with research projects. They work ten hours a week and receive a stipend of \$700 a semester. Teaching Assistants have full instructional responsibility for sections of beginning composition courses. Normally, only persons with a Master of Arts degree are eligible for Teaching Assistantships. Non-native speakers are not considered for Teaching Assistantships until they have been enrolled in the Ph.D. program for at least a year. The stipend for a Teaching Assistant is \$2,850 per section, the initial assignment usually one section a semester. Teaching Assistants are trained and supervised by the Director of Composition and are subject to student and faculty evaluation.

The M.A. Program

Candidates for the M.A. must complete nine courses, demonstrate a reading knowledge of a foreign language, write a thesis, and pass a written comprehensive examination. The courses elected by an M.A. student must include Bibliography and Methodology (English 298); either Old English (English 237) or Modern Grammar (English 136); and six courses from the literary fields enumerated above, no more than two from a single group. If a minor outside the Department (normally nine semester hours) is chosen, the program must be adjusted and the adjustment approved by the student's adviser and the Director of Graduate Studies. Most students take one and a half years to complete the degree.

With permission of the Director of Graduate Studies, a regularly admitted graduate student whose native language is not English may follow a special program of studies leading to a terminal Master's degree with a concentration in American literature.

The Ph.D. Program

Graduate School requirements for the degree Doctor of Philosophy are set forth under the heading "Graduate Degrees and Degree Requirements." A Ph.D. student in the English Department must fulfill the following course requirements: Bibliography (English 298 or its equivalent); Old English (English 237) and either a second semester of Old English (English 250) or History of the English Language (English 238); two seminars in the major; one seminar in the minor; and two courses in each of three areas outside of the major and minor. For the six courses in the last category, courses taken as part of the UNC-CH M.A. program count. Students with an M.A. from another institution can propose courses from that program for certification toward this requirement. In addition to course work, a candidate for the Ph.D. must pass three examinations administered by the Department: The Graduate Comprehensive Examination, a written examination in the major and minor, and an oral examination in the major and minor. The Graduate Comprehensive Examination serves as a qualifying examination for continuation in the doctoral program. Students who take the M.A. in English at UNC-CH will take the examination as part of that degree program. Students who enter the doctoral program from another department or from another institution must take the Graduate Comprehensive Examination during the fall or spring semester of their first year in the Ph.D. program. Doctoral candidates must also demonstrate a reading knowledge of two foreign languages. The culmination of the candidate's program is the writing and successful defense in an oral examination of a dissertation. The Department strongly recommends that candidates for the Ph.D. have supervised classroom teaching experience before receiving the degree. Such experience, when it can be offered, will be considered as

fulfilling a requirement for the degree. Students generally take four to six years beyond the M.A. to complete the degree.

Foreign Language Proficiency

The English Department considers a reading knowledge of foreign languages essential to the educational and professional aims of its degree programs. M.A. candidates must show proficiency in one foreign language and Ph.D. candidates in two. The Department recommends Latin, French, and German. The use of other languages to fulfill the requirement must be approved by the Director of Graduate Studies. An undergraduate major in an approved language automatically satisfies the requirement. Ordinarily, however, students fulfill the requirements by passing an examination administered by the University Testing Service; by completing reading courses for graduate students offered by the Classics, German, and Romance Language departments; or, while enrolled as a graduate student, by completing with a grade of at least B an undergraduate literature course in a foreign language. The foreign language requirement must be satisfied before the student can be admitted to candidacy.

Library and Research Facilities

The library system at the University of North Carolina at Chapel Hill has recently been ranked among the top twenty research libraries in the United States. It has excellent holdings for the study of English philology and British and American literature, including the Southern Historical Collection (containing manuscripts, letters, diaries, etc.) and the Hanes Collection of incunabula, early printed books, and manuscripts. Through cooperative arrangements, Duke University libraries are open to graduate students from the University of North Carolina at Chapel Hill.

Publications

Early American Literature, *Studies in Philology*, *The Southern Literary Journal*, and *The Spenser Newsletter* are edited by English Department faculty members and have their editorial offices in the English Department building.

Courses for Graduates and Advanced Undergraduates

- 130 ADVANCED EXPOSITORY WRITING (3). This course is planned to strengthen the writing of graduate students and to ground them in the body of knowledge available to help them confront the writing problems most frequently faced in the worlds of thought, work, and teaching. Open to graduate students in all disciplines.
- 131 RHETORICAL THEORY AND PRACTICE (3). A study of rhetorical theories and practices from classical to modern times. Emphasis is on translation of theories into practice in contemporary college rhetorics. Lindemann.

- 134 ADVANCED CREATIVE WRITING (3). Advanced workshop in fiction. Written exercises in the use of scene, point of view, narration, dialogue. Student projects in short story or beginning novel. (Permission of instructor required.)
- 134S CREATIVE WRITING FOR TEACHERS (3). For students who undertake creative writing or a study of literary forms. Recommended for teachers of creative writing.
- 136 MODERN ENGLISH GRAMMAR (3). A study of current English structure and usage, using a traditional approach modified by appropriate contributions from structural and generative grammar, with some attention to the application of linguistics to literary analysis. Eble.
- 140 INTERPRETATION OF LITERATURE (3). A study of various critical approaches to literature, including traditional, new critical, psychological, archetypal, etc. O'Connor.
- 142 LITERATURE AND FILM (3). An examination of several books made into films, with stress on the relationship of literature to the filmed image. Harper.
- 144 STUDIES IN ENGLISH LITERATURE AND THE CLASSICS (3). A study of the influences of classical literature upon selected English authors; for example, Horace and Pope. Stumpf.
- 146 INTRODUCTION TO FOLKLORE (Folklore 146) (Comparative Literature 146) (Anthropology 146) (3). A survey of the primary genres (song, narrative, proverb, riddle, custom, belief, drama, game) with attention to their forms, transmission, and functions in traditional and urban societies. Zug.
- 147 BRITISH AND AMERICAN FOLKSONG (Folklore 147) (3). Patterson.
- 151 ENGLISH LITERATURE OF THE MIDDLE AGES (3). A survey of Old and Middle English literature exclusive of Chaucer. Old English texts and Middle English texts with difficult language are read in translation. For non-specialists. O'Neill.
- 153 MEDIEVAL ROMANCE (Folklore 153) (Comparative Literature 153) (3). British and continental Arthurian literature in translation from the early Middle Ages to Sir Thomas Malory.
- 154 NON-DRAMATIC LITERATURE OF THE ENGLISH RENAISSANCE (3). A survey of major non-dramatic genres and of about twenty authors from the period 1485-1605. Mills.
- 160 SEVENTEENTH-CENTURY LITERATURE (3). A survey of representative English poetry and prose from Donne to Marvell. McQueen.
- 166 ENGLISH LITERATURE, 1660-1780 (3). A survey of English literature from Dryden to Burke. Though the emphasis falls on Swift, Pope, and Johnson, a considerable amount of reading in minor authors provides essential background for the period. Stumpf.
- 172 ROMANTIC LITERATURE (3). A survey of the major English Romantic writers, including Blake, Wordsworth, Coleridge, Shelley, Byron, Keats, with an introduction to the chief scholarly and critical problems in this period. Viscomi.
- 174 VICTORIAN LITERATURE (3). A survey of the major Victorian writers, such as Tennyson, Browning, Arnold, Carlyle, Mill, Ruskin, Dickens, and Eliot. Taylor.
- 181 AMERICAN LITERATURE TO 1900 (3). A survey of American authors and literary trends from the seventeenth through the nineteenth centuries, with emphasis on the works of Franklin, Irving, Cooper, Poe, Emerson, Thoreau, Hawthorne, Melville, Whitman, Dickinson, Mark Twain, James, and Crane. King, Emerson.
- 184 AFRO-AMERICAN FICTION AND POETRY (3). An intensive study of either fiction or poetry aimed at some comprehension of black literature as a whole. Greene.
- 186 FOLK NARRATIVE (Folklore 186) (3). An intensive study of myths, legends, and folktales (Märchen, tall tale, animals tale, fable) with attention to their aesthetic and cultural applications.
- 187 FOLKLORE IN THE SOUTH (Folklore 187) (3). Exploration of folklore in the South, with emphasis on genres such as tales, black and white spirituals, chanted sermons, work songs, blues, and dance music. Attention to social and historical backgrounds. Patterson.

- 188 SOUTHERN AMERICAN LITERATURE (3). The literature of the South, with special attention to the Southern Literature Renaissance of 1930-1950. Raper.
- 189 AFRO-AMERICAN FOLKLORE (Folklore 189) (3). A study of folklore within the black community, concentrating on African and slave backgrounds, and covering rural and urban folktales, spirituals, worksongs, blues, toasts and folk beliefs. Harris.
- 190 ENGLISH AND AMERICAN LITERATURE OF THE TWENTIETH CENTURY (3). A survey of 20th-century British and American drama, poetry, fiction, and criticism.
- 195 BRITISH AND AMERICAN DRAMA OF THE TWENTIETH CENTURY (3). A survey of British and American drama, poetry, fiction, and criticism.
- 196 IMAGES OF WAR IN TWENTIETH-CENTURY LITERATURE (Peace, War, Defense 196) (3). A study of literary works in English concerning World War I, the Spanish Civil War, World War II, and the Vietnam War. Armitage, Harper.

Courses for Graduates

- 237 OLD ENGLISH GRAMMAR AND READINGS (3). A study of grammar and phonology of Old English. Readings from Old English prose. An introduction to Old English versification. Wittig, Leinbaugh.
- 238 HISTORY OF THE ENGLISH LANGUAGE (3). Prerequisite, English 237. A study of the linguistic development of the sounds and vocabulary of English from 1000 to the present, with emphasis on the English language in America. Eble.
- 240 STUDY IN BRITISH AND AMERICAN LITERARY CRITICISM (3). An examination of the major movements and figures in British and American literary criticism, together with attention to classical and continental influences. Heninger, Moskal.
- 243 STUDIES IN THE ENGLISH NOVEL OF THE EIGHTEENTH CENTURY (3). An examination of representative novels by Defoe, Fielding, Richardson, Smollett, Sterne, Goldsmith, and others.
- 244 STUDIES IN THE ENGLISH NOVEL OF THE NINETEENTH CENTURY (3). Examination of the major 19th-century novelists, such as Austen, Scott, Dickens, Thackeray, Eliot, the Brontës, Trollope, Hardy, Meredith, with particular attention to problems of technique. Edge.
- 250 OLD ENGLISH LITERATURE: BEOWULF (3). Prerequisite, English 237. Translation, interpretation and background of selected Old English poetry, including *Beowulf*. Leinbaugh.
- 251a EARLY MIDDLE ENGLISH LITERATURE (3). Prerequisite, Old English. Close reading of Middle English texts before c.1300. For intending specialists in the medieval field. Wittig.
- 251b MIDDLE ENGLISH LITERATURE TO 1400 (3). Prerequisite, a working knowledge of Middle English. Historical and critical study of Middle English literature with particular attention to the fourteenth century.
- 251c LATER MIDDLE ENGLISH LITERATURE (3). A historical and critical study which includes consideration of medieval drama and the Scottish "Chaucerians." Kennedy.
- 252 CHAUCER (3). Critical and historical study of Chaucer's poetry. Kennedy.
- 254 STUDIES IN THE NON-DRAMATIC LITERATURE OF THE ENGLISH RENAISSANCE (3). Selected themes and authors from the period 1485-1605. Hall.
- 255 STUDIES IN THE ENGLISH DRAMA TO 1600 (3). Major figures and forms of medieval, Tudor, and Elizabethan drama exclusive of Shakespeare. Dessen.
- 258 STUDIES IN SHAKESPEARE: THE EARLY PLAYS (3). The romantic comedies, the history plays, and the early tragedies. Dessen.
- 259 STUDIES IN SHAKESPEARE: THE LATE PLAYS (3). The major tragedies, the problem plays, and the romances. Weimann.
- 260 STUDIES IN ENGLISH LITERATURE, 1600-1660 (3). Studies in English poetry from 1600 to 1660.

- 261 STUDIES IN ENGLISH DRAMA, 1600-1642 (3). Jacobean and Caroline drama exclusive of Shakespeare, with emphasis upon Jonson, Webster, and Middleton.
- 264 STUDIES IN MILTON (3). A study of all of Milton's major poetry, of selected minor poems, and of selections from the prose. McQueen.
- 265 RESTORATION AND EIGHTEENTH CENTURY DRAMA (3). Thompson.
- 266 STUDIES IN ENGLISH LITERATURE, 1660-1740 (3). A study of the works of Dryden, Swift, and Pope.
- 267 STUDIES IN ENGLISH LITERATURE, 1740-1800 (3). A study of the major authors (exclusive of novelists and dramatists) of the later 18th-century. Authors considered are Gray, Collins, Boswell, Johnson, Goldsmith, Burke, Reynolds, and Gibbon. Strauss.
- 272 STUDIES IN ENGLISH LITERATURE, 1780-1832 (3). Sections: (1) Blake, Wordsworth, Coleridge; (2) Byron, Shelley, Keats. Examination of the major Romantic poets, supplemented by readings in other Romantic authors. Kirkpatrick.
- 273 STUDIES IN VICTORIAN LITERATURE: PROSE (3). Examination of three major Victorian critics with regard to the issues they confront and the literary structure of their works. Shapiro.
- 274 STUDIES IN VICTORIAN LITERATURE: POETRY (3). Examination of the poetry of Tennyson, Browning, and Arnold. Life.
- 280 STUDIES IN AMERICAN LITERATURE (3). An introduction to the emerging genres of American literature during the colonial and early national period, with an emphasis on prose narrative. Bain.
- 281 STUDIES IN AMERICAN LITERATURE, 1830-1855 (3). Interpretation of selections from Emerson, Thoreau, Poe, Hawthorne, and Melville, with attention to these writers as American Romantics. Gura.
- 282 STUDIES IN AMERICAN LITERATURE, 1855-1900 (3). A survey of American writing from 1855-1900, with emphasis on Whitman, Dickinson, Mark Twain, Henry James, and the local colorists.
- 283 STUDIES IN THE AMERICAN NOVEL (3). Historical survey of the American novel from its beginnings to the first World War, with some attention to the cultural and social conditions out of which it comes. Representative novels will be read to examine the history of genres, techniques, critical schools, and modes. Bain.
- 288 THE DEVELOPMENT OF LITERATURE IN THE SOUTH (3). A study of important themes, motifs, social and historical relationships, and formal problems in the literature and life of the South from colonial times onward. Rubin.
- 290 STUDIES IN TWENTIETH-CENTURY ENGLISH AND AMERICAN LITERATURE (3). Studies in special modern literary topics: e.g., the Irish literary renaissance, politics and the modern American novel, realism and fantasy in recent American fiction, cultural influences in modern American literature. Raper.
- 291 STUDIES IN RECENT ENGLISH AND AMERICAN CRITICISM (3). Usually taught as a survey of major types of modern literary criticism.
- 292 STUDIES IN ENGLISH AND AMERICAN POETRY OF THE TWENTIETH CENTURY (3). Usually taught as a survey of major poets: Yeats, Frost, Stevens, Williams, Pound, Eliot, Auden, with some more recent poets. Harmon, Lensing.
- 293 STUDIES IN ENGLISH AND AMERICAN FICTION OF THE TWENTIETH CENTURY (3). Usually taught as a survey of major writers: Joyce, Lawrence, Woolf, Hemingway, Faulkner, with some other writers. Thornton.
- 295 STUDIES IN ENGLISH AND AMERICAN DRAMA OF THE TWENTIETH CENTURY (3). Usually taught as a survey of major playwrights of the modern era, from the continental influences (Ibsen and Strindberg) to such contemporary figures as Pinter and Stoppard.
- 298 BIBLIOGRAPHY AND METHODOLOGY (3). An introduction to the materials and methods of research in literary study, and to that branch of literary study known as textual criticism. Required of all candidates for the M.A. and Ph.D. degrees. Avery.

- 300 SEMINAR IN SELECTED TOPICS (1-4). Harmon, Rust.
- 343 SEMINAR IN THE ENGLISH NOVEL (3). Topics concerning major novelists and critical issues in the field of the novel. Thomson.
- 350 SEMINAR IN OLD ENGLISH LANGUAGE AND LITERATURE (3). Wittig.
- 351 STUDIES IN MIDDLE ENGLISH LITERATURE (3). Seminars on particular authors and genres.
- 354 SEMINAR IN ELIZABETHAN LITERATURE (3). Selected topics in the non-dramatic literature of the English Renaissance.
- 358 SEMINAR IN SHAKESPEARE (3). Selected topics. Weimann.
- 360 SEMINAR IN SEVENTEENTH-CENTURY LITERATURE (3). Selected topics in the literature of the period 1600-1660.
- 366 SEMINAR IN EIGHTEENTH-CENTURY LITERATURE (3). Stumpf.
- 372 SEMINAR IN NINETEENTH-CENTURY ROMANTICISM IN ENGLAND (3). Topics concerning major authors and issues of the Romantic period. Reed.
- 373 SEMINAR IN VICTORIAN LITERATURE (3). Topics concerning major authors and issues of the Victorian period. Shapiro.
- 381 SEMINAR IN AMERICAN LITERATURE TO 1855 (3). Topics vary: e.g., New England response to American literary nationalism; Emerson; Hawthorne; Irving, Hawthorne and Poe and the development of the American short story. Gura, Rust.
- 382 SEMINAR IN AMERICAN LITERATURE, 1855-1900 (3). Topics vary: e.g., Native American humor, Whitman and Mark Twain.
- 383 SEMINAR IN THE AMERICAN NOVEL (3). Topics vary: e.g., Time, space, and history in the American novel; the literary artist as American. Davis.
- 384 SEMINAR IN AFRO-AMERICAN LITERATURE (3). Harris.
- 388 SEMINAR IN SOUTHERN AMERICAN LITERATURE (3). Topics vary: e.g., Mark Twain, Southern literary identity, Southern literature of memory. Rubin.
- 390 SEMINAR IN TWENTIETH-CENTURY LITERATURE, ENGLISH AND AMERICAN (3). Greene, Ludington, Rubin.
- 393 MASTER'S THESIS (3).
- 394 DOCTORAL DISSERTATION (3).
- 395 SEMINAR IN MODERN DRAMA (Dramatic Art 395) (3). Avery.
- 397 DIRECTED READINGS (3). Topics vary according to the needs and interests of the individual student and the professor directing the reading and writing project.
- 398 THE USE OF MIDDLE ENGLISH MANUSCRIPT MATERIALS (3). Prerequisite, a working knowledge of Middle English. Training in reading English vernacular hands of the Middle Ages, with an introduction to the theory and practice of textual criticism.

Celtic Courses

- 105A OLD IRISH (3). Old Irish language and literature (600-900), with the main emphasis on grammar; readings from selected Old Irish glosses (Strachan) and from *Aislinge Óenguso* (Shaw). O'Neill.
- 105B OLD AND MIDDLE WELSH (3). An introduction to Medieval Welsh language and literature, with selected readings from the *Mabinogi* and the early nature poetry. From time to time as alternative to Celtic 105A. O'Neill.
- 106A READINGS IN OLD IRISH (3). Prerequisite, Celtic 105A. Readings in genres of Old Irish literature: *Stories from the Táin* (Strachan), *Críth Gablach* (Binchy), *Cambrai Homily*, *Early Irish Lyrics* (Murphy), *Scéla Mucce Meic Dathó* (Thurneysen).
- 106B READINGS IN OLD AND MIDDLE WELSH (3). Prerequisite, Celtic 105B. Selected readings from Medieval Welsh poetry (*Cynfeirdd*, *Gogynfeirdd*, and *cywydd* poets), sagas (*Branwen*), and laws (*The Laws of Hywel Dda*.) From time to time as alternative to Celtic 106A. O'Neill.
- 107 INTRODUCTION TO MODERN IRISH (3). A basic course in modern Irish grammar and pronunciation; background readings in Irish history and culture. O'Neill.

- 108 READINGS IN MODERN IRISH (3). Prerequisite, Celtic 107. Selected readings from various genres: the autobiography (*Mo Scéal Féin*, *Peig*, *Fiche Blián ag Fás*) and poetry (the *aisling* and *caoineadh*). O'Neill.
- 109 INTRODUCTION TO CELTIC CULTURE (3). O'Neill.

CURRICULUM IN FOLKLORE

DANIEL W. PATTERSON, *Chairman*

Professors

*JULIA GORHAM CRANE	(1)	Field Methods, Social Organization, Caribbean
KAJA FINKLER	(21)	Medical Anthropology, Latin America
*TRUDIER HARRIS	(19)	Afro-American Folklore and Literature
AUGUSTIN MAISSEN	(7)	Spanish Folklore, Swiss Folklore
*DANIEL W. PATTERSON	(9)	Folksong, Southern Folklore, Folk Religion
*JAMES LOWE PEACOCK	(10)	Culture Change, Symbolic Systems, Southeast Asia
*JACK M. SASSON	(17)	Ancient Near East
PETRUS W. TAX	(13)	German Volkslied, Literary Relations

Associate Professors

CAROLE L. CRUMLEY	(22)	Archaeology, Complex Societies, Europe
ROBERT EDWARD DANIELS	(2)	Social Anthropology, Culture and Personality, Africa
*JOHN W. FLORIN	(16)	Population Geography, Medical Geography, and Historical Anglo-America
*JACQUELYN HALL	(18)	American History, Southern Oral History
*NORRIS B. JOHNSON	(21)	Cultural Anthropology, Art and Literature
EDWARD DONALD KENNEDY	(6)	Medieval Romances, Arthurian Literature
H. CRAIG MELCHERT	(23)	Indo-European Linguistics
PATRICK P. O'NEILL	(20)	Medieval Literature, Celtic Languages and Culture
*RUEL W. TYSON, JR.	(15)	Philosophy and Anthropology of Religion
*CHARLES GORDON ZUG	(14)	Folklore Theory, Folk Narrative, Material Folk Culture

*Core Faculty

The Curriculum offers both a major and a minor for the Master of Arts degree and a doctoral minor for those with a major in a related department. It originates some folklore courses, and crosslists other pertinent graduate courses offered in such departments as Anthropology, English, Geography, Germanic Languages, History, Religion, and Romance Languages. Students from any undergraduate major are eligible to take work in the Curriculum in Folklore.

The aim of the curriculum is to give the students a solid introduction to the discipline of Folklore and to prepare them for either advanced academic study of Folklore or for employment in such fields as public-sector folklore. It offers both classroom instruction and practical training in the tools and techniques of field and library research and other professional activities.

University resources that support the program include tape recorders and cameras for field work and extensive library holdings of books, manu-

scripts, periodicals, photographs, slides, and sound recordings relating to folklore. They are especially strong in materials about the folklore of the United States—particularly the Southern region—and of the British Isles and West Africa. Among the distinguished collections are the Don Yoder Collection of American religious tunebooks and the John Edwards Memorial Collection of early Southern commercially-recorded folk and popular music.

Recent projects of the Curriculum have included the preparation of documentary films, sound recordings, radio programs, and museum exhibitions. Research interests of the faculty members indicate other lines along which students may pursue their research training most advantageously: the ballad, folk music, and folktale, folklore of the South, Afro-American folklore, folklore of Middle Eastern and medieval Germanic literatures, folk religion, the spiritual, oral history, and material folk culture.

For more complete course descriptions, see the departmental listings of courses.

Courses for Graduates and Advanced Undergraduates

- 103 THE THEORY AND PRACTICE OF ORAL HISTORY: A FIELD WORK APPROACH (History 103) (3). *Fall*. Hall.
- 104 FOLK MUSIC OF EUROPE AND THE NEW WORLD (Music 104) (3).
- 105 CELTIC: OLD IRISH (Linguistics 105) (3). O'Neill.
- 106 CELTIC: READINGS IN OLD IRISH (Linguistics 106) (3). O'Neill.
- 109 INTRODUCTION TO CELTIC CULTURE (Celtic 109) (3). O'Neill.
- 121 CULTURE AND PERSONALITY (Anthropology 121) (3). *Spring*. Daniels.
- 122 CULTURAL ANTHROPOLOGY (Anthropology 122) (3). *Fall*. Staff.
- 123 MAGIC, RITUAL, AND BELIEF (Anthropology 123) (3). *Spring*. Evens.
- 126 AFRICA: PEOPLES AND CULTURES (Anthropology 126) (3).
- 129 SOUTHEAST ASIA: PEOPLES AND CULTURES (Anthropology 129) (3). *Spring*. Peacock.
- 132 LATIN AMERICAN CULTURES (Anthropology 132) (3). *Fall*. Finkler.
- 133 THE PEOPLE OF THE CARIBBEAN (Anthropology 133) (3). *Fall*. Crane.
- 134 ANTHROPOLOGY OF ART AND ARCHITECTURE (Anthropology 134) (3). *Spring*. Johnson.
- 135 CONSCIOUSNESS AND SYMBOLS (Anthropology 135) (3). *Fall*. Peacock.
- 141 MYTHS AND EPICS OF THE ANCIENT NEAR EAST (Religion 121) (3). *Spring*. Sasson.
- 142 RELIGION AND ANTHROPOLOGY (Anthropology 142) (Religion 142). *Spring*. Peacock and Tyson.
- 143 INDO-EUROPEAN CULTURE AND SOCIETY (Linguistics 142) (3). *Fall*. Melchert.
- 146 INTRODUCTION TO FOLKLORE (English 146) (Comparative Literature 146) (Anthropology 146) (3). *Fall*. Zug.
- 147 BRITISH AND AMERICAN FOLKSONG (English 147) (3). *Fall*. Patterson.
- 148 TRADITIONAL CRAFTSMANSHIP (3). An introduction to material folk culture, the study of the origins and transmission, forms and construction, functions and meanings, of traditional architecture, arts, crafts, food, clothing, tools and technology. *Spring*. Zug.
- 153 MEDIEVAL ROMANCE (English 153) (3). *Fall*. Kennedy.
- 154 HISTORICAL GEOGRAPHY OF THE UNITED STATES (Geography 154) (3). Florin.

- 155 METHOD AND THEORY IN ETHNOHISTORY RESEARCH (Anthropology 155) (3). *Fall*. Crumley.
- 170 GENERAL INTRODUCTION TO GERMAN VOLKSKUNDE (German 170) (3). Tax.
- 171 MEDICINE AND ANTHROPOLOGY (Anthropology 170) (3). *Fall*. Finkler.
- 175 ETHNOGRAPHIC METHOD (Anthropology 175) (3). *Spring*. Crane.
- 184 LANGUAGE AND CULTURE (Anthropology 184) (3). *Spring*. Holland.
- 185 WOMEN IN FOLKLORE AND LITERATURE (English 185) (3). *Spring*. Harris.
- 186 FOLK NARRATIVE (English 186) (3). *Spring*. Zug.
- 187 FOLKLORE IN THE SOUTH (English 187) (3). *Spring*. Patterson.
- 189 AFRO-AMERICAN FOLKLORE (English 189) (3). *Fall*. Harris.
- 195 TOPICS IN FOLKLORE (3). *Fall and Spring*. Staff.
- 198 FIELD RESEARCH (3). *Fall and spring*. Staff.
- 199 DIRECTED READINGS IN FOLKLORE (3). *Fall and spring*. Staff.

Courses for Graduates

- 288 OBSERVATION AND INTERPRETATION OF RELIGIOUS ACTION (Religion 188) (Anthropology 188) (3). *Spring*. Tyson.
- 297 THEORY AND METHODS OF FOLKLORE RESEARCH (3). An introduction to the history, theory, tools, and techniques of folklore research. *Spring*. Staff.
- 393 MASTER'S THESIS (3-6). Research in a special field under the director of members of the staff. *Fall and spring*.
- 395 RESEARCH. *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

CURRICULUM IN GENETICS

KENNETH F. BOTT, *Chairman*

Professors

EDWARD G. BARRY	(17)	Microbial Genetics, Cytogenetics
*KENNETH F. BOTT	(3)	Molecular Genetics of Bacillus
*MARSHALL H. EDGELL	(4)	Genetic Engineering, Molecular Genetics, Behavior Genetics
*JEFFREY A. FRELINGER	(49)	Immunogenetics; Cellular Immunology
HARRY GOODER	(7)	Bacterial Genetics, Bacterial Cell Wall
JOHN B. GRAHAM	(1)	Hereditary Diseases, Blood Coagulation, Population Dynamics
*JACK GRIFFITH	(35)	Chromosome Structure; Viruses and their Host Cells.
*GEOFFREY HAUGHTON	(9)	Transplantation Genetics
*ENG SHANG HUANG	(52)	Molecular Biology; Tumor Virology
*CLYDE A. HUTCHISON, III	(10)	Genetic Engineering, Molecular Genetics, Virus Structure
HENRY NEIL KIRKMAN	(11)	Human Biochemical Genetics
*JOHN C. LUCCHESI	(13)	Functional Aspects of Chromosome Organization, Biochemistry of Development
*P. FREDERICK SPARLING	(21)	Bacterial Genetics
*DARREL W. STAFFORD	(37)	Biochemistry of Development; Gene Control; Ribosomal Genes
MICHAEL R. SWIFT	(15)	Clinical, Mathematical and Cell Culture Genetics

Associate Professors

*STEVEN L. BACHENHEIMER	(30)	Molecular Biology of Viruses
*PHILIP J. BASSFORD, JR.	(38)	Bacterial Genetics; Molecular Biology of Prokaryotic Membrane Biogenesis and Function
*KERRY S. BLOOM	(45)	Yeast Molecular Genetics
*PATRICIA F. MANESS	(41)	Biochemical Basis of Malignant Transformation
*GUSTAVO P. MARONI	(23)	Biochemical Genetics, Genic Regulation, <i>Drosophila</i>
*ANN G. MATTHYSSE	(24)	Molecular Biology of Plants
JOHN E. NEWBOLD	(20)	Molecular Virology, Molecular Biology of Mitochondria
*PATRICIA J. PUKKILA	(34)	Mechanism in Genetic Recombination; Eukaryotic Genome Organization
*HOWARD M. REISNER	(25)	Immuno-genetics of Human Plasma Proteins
*AZIZ SANCAR	(58)	Structure and Function of DNA Repair Enzymes; Chemical Carcinogenesis
*MICHAEL D. TOPAL	(42)	Mutagenesis, Carcinogenesis

Assistant Professors

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| *JANE AZIZKHAN | (62) | Regulation of eukaryotic gene expression, cell cycle regulation |
| *JANNE G. CANNON | (46) | Genetics of Pathogens; Pathogenesis of Infectious Disease |
| STEPHAN H. CLARKE | (63) | Molecular Immunology; Structure and Function of Immunoglobulins |
| *CORA-JEAN S. EDGELL | (47) | Somatic Cell Genetics |
| *BEVERLY J. ERREDE | (44) | Biological Chemistry |
| *DANA M. FOWLKES | (48) | Molecular Genetics; Eukaryotic Gene Regulation; Gene Therapy |
| *HOWARD M. FRIED | (50) | Yeast Genetics; Molecular Biology |
| *LAURA J. KALFAYAN | (56) | Transformation, Molecular Genetics and Development of <i>Drosophila</i> . |
| *BRIAN K. KAY | (57) | Molecular Biology of Embryo Development; Eukaryotic Gene Regulation |
| RYSZARD KOLE | (64) | RNA Processing, Pre-mRNA splicing; RNA-Protein Interactions |
| *SUSAN T. LORD | (53) | Genetic Engineering; Molecular Biology of Fibrinogen |
| *STEVEN W. MATSON | (54) | Molecular Biology of DNA |
| *KATHLEEN W. RAO | (60) | Human Cytogenetics; Somatic Cell |
| ROBERT G. ROHWER | (65) | Molecular Biology and Pathogenesis of Slow Virus Diseases, Scrapie, Creutzfeldt-Jacob Disease and Kuru |
| LILLIE L. SEARLES | (66) | Molecular Biology; Eukaryotic Genetic Regulatory Mechanisms |
| *RONALD I. SWANSTROM | (51) | Interaction of Retroviruses with the Host Genome |
| *THEA D. TLSTY | (61) | Molecular Pathology; Resolution of Genomic Instability; Cellular Responses to Environmental Stress |

Adjunct Professors

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| FREDERICK J. DE SERRES | (16) | Microbial Genetics, Chemical and Environmental Mutagenesis, Mutagenicity of Carcinogens |
| JOHN W. DRAKE | (28) | Mutagenic Mechanisms |
| BURKE JUDD | (33) | Chromosome Organization; Gene Function and Regulation |
| HEINRICH V. MALLING | (26) | Mutagenesis in the Mammal |

Adjunct Associate Professors

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| J. CARL BARRETT | (31) | Chemical Carcinogenesis, Mutagenesis of Mammalian Cells in Culture |
| MICHAEL A. RESNICK | (40) | Roles of various DNA Repair in Meiosis |
| AKIO SUGINO | (59) | Enzymology of DNA Replication Proteins; Mechanism of DNA Replication |

Professors Emeriti

WILLIAM S. POLLITZER
MAURICE WHITTINGHILL

Genetics is one of the more rapidly developing fields of modern biology and basic to the understanding of many aspects not only of biology but also of medicine and the future of man. The Curriculum in Genetics was established to provide an integrated and interacting interdepartmental program of study leading to the Ph.D. degree in genetics. The courses open to the students are primarily those of the departments of Anatomy, Anthropology, Biochemistry, Biology, Chemistry, Microbiology, Pathology, and Pharmacology. The facilities as well as the talent of those departments are available to students in the Curriculum in Genetics. Types of research being conducted by faculty members of the Curriculum include bacterial and viral genetics, microbial genetics, mutagenesis, immunogenetics, human and medical genetics, biochemical genetics, tissue culture, chromatin structure, behavioral genetics, anthropological genetics, developmental genetics, statistical and population genetics, *Drosophila* genetics, *Neurospora* cytogenetics, cell biology, and molecular biology. (Although research is being conducted in medical genetics, there is not a professional program in genetic counseling or medical genetics.)

Requirements for Admission for Graduate Work

Applications will be favorably considered from students with good academic records and interest in careers in genetic research. They should preferably have majored or minored in one of the following disciplines: genetics, biology (zoology or botany), microbiology, chemistry, mathematics, physics, or biophysics. They should have taken calculus and organic and physical chemistry although these are not absolutely essential. Applicants are accepted to begin their initial studies in the fall. They must apply to both the Graduate School and the Curriculum in Genetics. Graduate Record Examination scores, transcripts of records, and *three* letters of recommendation (submitted on the Graduate School official form) should be received soon after the application. Those persons whose application portfolio places them highest on the admission list will be asked to visit Chapel Hill for interviews at their expense. Students are encouraged to apply as early as possible, preferably before January. (Those applicants seeking a master's degree will not be considered for admission.)

Requirements for the Ph.D. Degree

Students may receive the Ph.D. degree either in Genetics or in one of the departments participating in the Curriculum. No minor is required for those majoring in Genetics; the requirements concerning a minor for those majoring in a department vary among the participating departments. Graduate students are expected to master one subdiscipline of genetics, but to be sufficiently versed in related aspects of that science. Students work under a research advisor of their choosing, assisted by other faculty members in closely allied branches of genetics.

The most important requirement is independent laboratory research leading to the dissertation. Written and oral examinations in the field of the major research interest are required.

Financial Aid

A limited number of NIH predoctoral fellowships are available; they carry stipends plus tuition and fees.

Genetics Colloquia

This seminar series provides a forum for persons interested in all phases of genetics. The seminars are presented every Friday during the academic year. Seminars are presented by faculty, students, and invited speakers from other institutions.

Courses for Graduates and Advanced Undergraduates

- 105 MOLECULAR BIOLOGY (Biochemistry 105) (3). Prerequisites, Biochemistry 100 or equivalent. Mechanisms of replication, transcription, and translation of genetic material in prokaryotic and eukaryotic systems, gene sequence and organization, biochemical genetics, and regulatory mechanisms. *Three lecture hours a week, fall.* Chae, Fried, Sancar.
- 106 ENZYME KINETICS (Biochemistry 106) (1). Prerequisite, Biochemistry 100 or equivalent. An analysis of enzyme-catalyzed multiple substrate reactions, the kinetic characteristics of allosteric enzymes, and methods for studying control of reaction in intact cells. *Spring.* Jones, White.
- 108 MOLECULAR AND CELLULAR BASIS OF MICROBIOLOGY (Microbiology 105) (5). Prerequisites, organic chemistry, permission of department except for department majors. Basic concepts of the structure, metabolism, growth and reproduction, genetics and control and regulation of prokaryotes and single cell eukaryote systems. *Five lecture hours, fall.* Bott.
- 115 HUMAN GENETICS AND EVOLUTION (Anatomy 115, Anthropology 115) (3). Fundamental principles of genetics; population genetics; factors of evolution; race and species formation; evolution of primates and man. The interaction of genetics and culture in human behavior, society, and evolution. *Three lecture hours a week, spring.* Pollitzer.
- 122 HUMAN GENETICS (Biology 122) (3). Prerequisite, Biology 53 or equivalent. Applications of traditional and contemporary methods of genetic analysis to matters of human concern; pedigree analysis, population genetics, tissue transplants, immuno-

- genetics, somatic cell genetics, and recombinant DNA in medical applications. *Three lecture hours a week, spring.* Maroni.
- 150 ELEMENTS OF PROBABILITY AND STATISTICAL INFERENCE (Biostatistics 150) (3). Prerequisite, integral calculus. Fundamentals of probability theory; descriptive statistics; fundamentals of statistical inference, including estimation and hypothesis testing. *Three lecture hours a week, fall.* Biostatistics Staff.
- 160 ADVANCED GENETICS DEVELOPMENTAL (Biology 160A) (3). Prerequisite, Biology 53. The genetic control and molecular basis for gene expression during development. *Three lecture hours a week, Spring* (Alternate years). Lucchesi, Pukkila.
- 160L ADVANCED GENETICS LABORATORY (Biology 160L) (3). Corequisite, Biology 53. Methods and techniques of developmental and biochemical genetics and cytogenetics. Each student will develop an individual project in the laboratory of one of the instructors. *Six laboratory hours a week, fall.* Lucchesi, Maroni, Pukkila.
- 164 MOLECULAR BIOLOGY (Biology 164) (3). Prerequisite, Biology 120 or 121; Chemistry 61, prerequisite or corequisite. The nature, production, and replication of biological compounds and their relation to structure and function in development. *Three lecture hours a week, spring.* Matson, Stafford.
- 169 INTRODUCTION TO HUMAN IMMUNOGENETICS (Pathology 169) (3). Prerequisite, permission of the instructor. A seminar course to familiarize participants with genetic systems defined in humans using immunological techniques. Includes discussion of methodology and its application to problems of interest to participants. *Three lecture hours a week.* Reisner.
- 170 MUTAGENESIS AND GENETIC TOXICOLOGY (Toxicology 170) (2). Prerequisite, course in general genetics and general biochemistry. A survey of basic mechanisms of mutagenesis, its impact on populations, mutagenicity screening systems and their deployment. *Two lecture hours a week, spring.*
- 172 CYTOGENETICS (Biology 172) (3). Prerequisite, Biology 53. Critical study of research papers concerned with the behavior and organization of chromosomes. *Spring.* (1985 and alternate years.) Barry.
- 173 PLANT GENETICS AND SPECIATION (Biology 173) (3). Prerequisite, Biology 53 or permission of the instructor. Mendelian and molecular genetics of vascular plants, with emphasis on genetic phenomena characteristic of plants and the role of heredity in plant systems. *Three lecture hours a week, spring.* (Alternate years.) Parks and Matthyse.
- 180 STRUCTURE-FUNCTIONS OF DNA AS IT RELATES TO CELL PATHOLOGY (Pathology 180) (Biochemistry 180) (3). Prerequisite, Biochemistry course and permission of the instructor. The basic chemistry of DNA and its associated structural and replicative proteins as it relates to mechanisms of mutagenesis and carcinogenesis. *Three lecture hours a week, spring.* (Alternate years.) Topal.
- 189 NUCLEIC ACID TECHNIQUES (Microbiology 189, Biology 189) (4). Prerequisite, some molecular biology, permission of instructor. An intensive course covering many aspects of recombinant DNA technology such as: cDNA preparation, gel analysis, southern, nick translations, Berk-Sharp analysis, library analysis and DNA sequencing. *Fee required. Eight laboratory hours, spring.* Newbold, Staff.
- 190 EUKARYOTIC GENE ORGANIZATION (Microbiology 190) (3). Prerequisite, Organic Chemistry, permission of instructor. Basic concepts of classical chromosomal structure, function and mechanics. Eukaryotic molecular genetics and cellular regulation will be emphasized. Readings, short answer examinations, term project. *Three lecture hours, spring.* Griffith.
- 201/ GENETIC LECTURE SERIES (1). Diverse but current topics in all aspects of genetics.
- 202 Relates new techniques and current research of notables in the field of genetics. *Spring and fall.* Staff and invited guest lecturers.

- 210 SEMINAR/TUTORIAL IN MICROBIAL CHEMISTRY AND GENETICS (Microbiology 210) (3). One or two faculty and a small number of students will consider in depth current research of importance. Emphasis will be on current literature, invited speakers, etc., rather than textbooks. *Fall*. Cannon.
- 222a HUMAN GENETICS AND CONSTITUTIONAL PATHOLOGY (Pathology 222) (3½). Prerequisite, permission of the instructor. Includes elementary statistics, basic genetic theory and relevant field work with persons, archives and census records. *Two conference and six laboratory hours a week*. (On occasion). Graham.
- 235 LEGAL ISSUES IN GENETICS AND MEDICINE (2-3). (Course is also open to law and medical students.) Prerequisite, permission of the instructor. The course examines the interfaces of law with medicine and genetics. Considers implication of medical records and data banks, informed consent, abortion, privacy, genetic engineering, etc. *Ten lecture hours a week, first summer session*. (On occasion). Shaw.
- 240 SPECIAL TOPICS IN GENETICS (2-4). Prerequisite, permission of the instructor. *Fall*. Staff.
- 241 SPECIAL TOPICS IN GENETICS (2-4). Prerequisite, permission of the instructor. *Spring*. Staff.
- 249 GENETICS OF COMMON DISEASES (Epidemiology 249) (3). Prerequisite, Biostatistics 150, Genetics 122 or Epidemiology 160, or permission of the instructor. Critical analysis of genetic issues in human disease. The genetics of cancer, heart disease, diabetes, mental illness, mental retardation, hypertension and arthritis will be covered. The application of genetic and epidemiological techniques will be examined. *Three lecture hours a week, spring*. Swift.
- 270 SEMINAR IN GENETICS (Biology 270) (2). Prerequisite, permission of instructor. *Two seminar hours a week, fall and spring*. Lucchesi, Maroni, Pukkila.
- 275 GENETICS SYSTEMS (Microbiology 275, Biochemistry 275, Biology 275, Pathology 275) (3). An advanced course in genetics emphasizing the genetics and molecular biology of viruses, bacteria, fungi, insects and mammals and based upon the personal research of the staff. Required of all candidates for the degree in Genetics. *Fall*. (Alternate years.) Staff.
- 281 STATISTICAL METHODS IN HUMAN GENETICS (Biostatistics 281) (3). Prerequisite, permission of the instructor. An introduction to statistical procedures for genetic counseling, testing genetic hypothesis and estimating genetic parameters from human data. Topics covered include models for monogenic autosomal and X-linkage, mutation and selection, polygenic inheritance. Special emphasis will be given to segregation and linkage analysis. *Three lecture hours a week, spring*. (Alternate years.) Biostatistics staff.
- 305 RESEARCH IN GENETICS (3 or more). May be continued for credit two or more semesters. Hours and credits to be arranged. *Throughout the year*. Staff.
- 350 TRAINING IN GENETIC TEACHING (3). Prerequisites, two courses in genetics and permission of the instructor. Principles of genetic pedagogy. Students will be responsible for assistance in teaching genetics and will work under the supervision of the faculty with whom they will have regular discussion of methods, content and evaluation of performance. *Throughout the year*. Staff.
- 393 MASTER'S THESIS (3 or more). (Special permission required). *Throughout the year*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Throughout the year*. Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF GEOGRAPHY

JOHN W. FLORIN, *Chairman*

Professors

STEPHEN S. BIRDSALL	(5)	Transportation Geography, Social Geography, and North America
CLYDE E. BROWNING	(3)	Urban Geography and The South
JOHN D. EYRE	(2)	Political Geography and Asia
RICHARD J. KOPEC	(4)	Climatology and Cartography
BARRY M. MORIARTY	(7)	Urban Geography, Economic Development, Industrial and Residential Location Theory

Associate Professors

JOHN W. FLORIN	(8)	Population Geography, Medical Geography, and Historical Anglo-American
WILBERT M. GESLER	(11)	Medical Geography Quantitive Methods and Africa
MELINDA S. MEADE	(10)	Medical Geography, Population, and Southeast Asia
PETER J. ROBINSON	(9)	Meteorology, Climatology
STEPHEN J. WALSH	(12)	Remote Sensing, Geographic Information Systems, Physical, Resource Management

Assistant Professor

ARTHUR J. HAWLEY	(6)	Water Resources, Remote Sensing, and Europe
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Professor Emeritus

DAVID G. BASILE

The Department of Geography offers graduate work leading to the degrees of Master of Arts and Doctor of Philosophy. Faculty offices and some classroom facilities are located in Saunders Hall. Sheet maps are housed in the Map Room of Wilson Library. Library holdings in domestic and foreign geographical periodicals are strong.

Geographers are concerned with an analysis of the spatial aspects of cultural and physical phenomena, their interrelationships and their composite expression in the form of regions. They find employment in teaching and a number of professional and applied fields. Government agencies offer a variety of opportunities in such fields as cartography and map analysis, remote sensing and geographic information systems, census work, interpretation, resource and land-use surveys, and foreign area intelligence. Industrial concerns, medical facilities, property development and management firms, research organizations, and federal, state, and municipal agencies

employ sizeable numbers of geographers as field investigators, location analysts, and planners. The expanding national recreation and travel fields also have job opportunities.

A student beginning graduate study in geography is normally required to hold a bachelor's degree in geography. However, a student who has achieved a good record as an undergraduate in another major field may, at the discretion of the department, be accepted for graduate study in geography. In such cases, some prerequisite course work is usually added to minimum M.A. requirements.

Graduate study is offered in a variety of systematic specialties. Under the guidance of an advising committee, students can select programs tailored to their interests from offerings within the department or from interdisciplinary curricula. Although the department stresses training in climatology, geographic information systems and remote sensing for physical and resource management, cartography, urban, economic, population and medical geography, students can elect topical and regional study programs from those listed under faculty specializations. Curriculum groupings are available which combine courses systematically related under such titles as Urban and Economic Locational Behavior, Population Problems, Health Ecology and Care, Physical Environment Research, Regional Development Studies, and Spatial Analysis Techniques. These groupings capitalize on courses of sister departments as well as those of nearby Duke University and North Carolina State University.

For the degree of Master of Arts a student must complete at least 30 hours of course work. Of this total a minimum of eighteen hours in geography (including geography 190, 202, 393 and 1 seminar course) is required. The remaining courses (a minimum of six hours) may be taken outside the department. The number and kind of such supporting courses will be established through consultation between the student and his or her graduate advisors.

For the degree of Doctor of Philosophy a student must complete at least 30 hours of course work (including Geography 202 and 3 seminars) in addition to Geography 394. The courses to be taken, in Geography or any other appropriate discipline, will be established through consultation between the student and his or her advisors. It is possible to do joint coursework leading to a Master of Public Health degree.

The student must demonstrate competence in a research skill, to be selected in consultation with the advisor. For the M.A., this requirement may be met by passing a reading examination in one foreign language (usually French, German, or Spanish); or by passing 2 sequential courses, from a selected list, usually in Statistics, Mathematics, Computer Science, Spatial Techniques, or Demography. Ph.D. students must demonstrate competence in two such skills.

Assistantships up to \$6,300 a year are available to qualified students. Out of state students may be entitled to tuition remission. Duties consist

primarily of preparation for and supervision of sections of introductory physical (Geography 10 or 11) and cultural (Geography 20) courses. Some additional funds (e.g., NSF and University Fellowships) are also available.

Courses for Graduates and Advanced Undergraduates

- 110 METEOROLOGY (3). Prerequisite, Geography 10 or 11. An analysis of the atmospheric processes acting to create day-to-day weather changes. Techniques of producing weather forecasts are discussed. *Fall*. Kopec, Robinson.
- 112 MICROMETEOROLOGY (3). Permission of instructor desirable. An introduction to the theory and practice of micrometeorology. Factors influencing rural environments are initially considered and agricultural problems emphasized. Man's role in changing both rural and urban microclimates is assessed. *Spring*. Robinson.
- 115 CLIMATOLOGY (3). Prerequisite, Geography 10 or 11 or permission of the instructor. The factors creating climates and their spatial variation are considered. Emphasis is given to the nature, causes, and impacts of climatic change. *Spring*. Kopec, Robinson.
- 116 APPLIED CLIMATOLOGY (3). An investigation of the ways climatic information and techniques can be applied to societal problems, such as energy production, food production and health. Case studies utilizing North Carolina data will be discussed. *Fall*. Robinson, Kopec.
- 117 SOILS (3). Natural science credit. A study of the nature and geographic distribution of the soils of the world. *Three hours of lecture a week, in addition to field work, spring*. Robinson.
- 132 THE WORLD'S FOOD SUPPLY (3). A study of the environmental parameters, cultural preferences, technological developments, and spatial economic infrastructure which result in world patterns of food consumption, production, and distribution. *Fall*. Meade, Hawley.
- 135 TRANSPORTATION GEOGRAPHY (3). Transportation as a spatial factor in the economic and political integration of regions; also, regional variations in mode development, and application of transportation as a movement system. *Fall and spring*. Birdsall.
- 138 INDUSTRIAL LOCATION (3). Factors in the regional location of manufacturing location theory, measures of manufacturing, locational decision-making, and a survey of selected industries. *Fall*. Moriarty.
- 143 ECOLOGICAL PLANT GEOGRAPHY (Botany 143) (3). Description of the major vegetation types of the world including their distribution, structure, and dynamics. The principle causes for the distribution of plant species and communities, such as climate, soils and history will be discussed. (*Alternate years*). Peet.
- 145 MEDICAL GEOGRAPHY (3). The human ecology of health is studied by analyzing the culture/environmental interactions that lie behind world patterns of disease distribution, diffusion and treatment, and the ways these are being altered by development of worldwide health-care delivery systems, manpower and facility distributions, accessibility, and utilization. *Fall*. Gesler, Meade.
- 148 FUNDAMENTAL CONCEPTS OF HUMAN GEOGRAPHY (3). A systematic study of the approaches, key concepts, and methods of human geography. Emphasis is given to the cultural landscape and location analysis within a thematic rather than a regional framework. *Fall*. Florin.
- 149 LOCATION, PERCEPTION, AND SOCIETY (3). A study of the spatial components of current social problems, such as poverty, race relations, environmental deterioration and pollution, and crime. *Fall or spring*. Birdsall, staff.
- 150 POPULATION GEOGRAPHY (3). A study of the spatial dimensions of population growth, density and movement and of the shifts in these patterns as they relate to changes in selected socio-economic environmental and cultural phenomena. *Spring*. Florin, Birdsall, Meade.

- 151 URBAN GEOGRAPHY (3). A geographical study of the spatial structure and function of urban settlements. Emphasis is on the regional relations, economic aspects and growth of cities. *Spring*. Browning.
- 152 ECONOMIC GEOGRAPHY (3). An inquiry into the factors involved in the location of agriculture, manufacturing and central place activities within the context of population growth and economic development in different regions of the world. *Spring*. Moriarty.
- 153 POLITICAL GEOGRAPHY (3). Geographic elements (nation formation; boundary, territorial and ethnic issues; and regional blocs) in contemporary international affairs. Case studies are in Eurasia. *Fall*. Eyre.
- 154 HISTORICAL GEOGRAPHY OF THE UNITED STATES (Folklore 154) (3). A study of selected past geographies of the United States with emphasis on the significant geographic changes in population, cultural, and economic conditions through time. *Fall or Spring*. Eyre, Florin.
- 156 NATURAL RESOURCES (3). An analysis of selected mineral and biological resources of the world with particular emphasis on the distribution, utilization, management policies and on their social and economic implications. *Spring*. Hawley.
- 158 EUROPE TODAY (3). A survey by topic and country of Western Europe of the Soviet Union. Those features that make Europe a distinct and important region today are emphasized. *Spring*. Hawley.
- 159 GEOGRAPHY OF LATIN AMERICA (3). A study of countries in the western hemisphere south of the United States. Emphasis will be placed on their resources and economic activities as well as those aspects of the physical and cultural environments that provide an understanding of their political character. *Spring*. Browning, staff.
- 161 THE SOUTH (3). Present day southern United States, approached historically through a study of its physical, economic, and cultural environment. *Fall*. Browning.
- 165 SOVIET UNION (3). An Analysis of the physical setting, resources, economic activities and cultural environment of the natural regions of the world's largest country. *Fall*. Moriarty.
- 166 EASTERN ASIA (3). Geographical structure of population, urbanization, agriculture, industrialization and regional links in China, Japan and Korea. *Fall*. Eyre.
- 167 TROPICAL ASIA (3). Geographical structure of population, urbanization, agriculture, industrialization and regional links in the nations of Southeast Asia and Southern India. *Spring*. Eyre, Meade.
- 168 AFRICA (3). Primary emphasis on the dynamic spatial organization of Africa south of the Sahara. Individual countries will be studied in view of their geographic characteristics and problems. *Spring*. Birdsall, Gesler.
- 171 CARTOGRAPHY (3). Introduction to maps and map-making, stressing drafting and computer techniques, map design, and methods of representing data on maps. *One lecture and four laboratory hours a week*. *Fall and spring*. Kopec.
- 172 ADVANCED CARTOGRAPHY (3). Prerequisite, Geography 171. Advanced study in map graphics. Application of graphic methods and material for illustrating spatial arrangements and relations of earth phenomena. *Fall*. Kopec.
- 173 COMPUTER CARTOGRAPHY (3). Prerequisite, Geography 171. Introduction to computer graphics emphasizing the utility of the computer in cartography; the employment of current cartographic display hardware and software systems and the application of computer mapping to geographic problems. *Spring or fall*. Walsh; staff.
- 175 MEDICAL CARTOGRAPHY (3). Prerequisite, Geography 171. Map graphics applied to problems in Medical Geography. Spatial analyses and planning in epidemiology and health delivery services through map applications are emphasized. *Spring or fall*. Kopec; staff.
- 176 ADVANCED COMPUTER CARTOGRAPHY (3). Will explore the applications of computer cartography to geographic problems, focusing on the nature of questions

asked by spatial scientists and the distinctive role maps play in answering these questions. *Spring*. Staff.

- 177 REMOTE SENSING (3). An introduction to remote sensing of human and physical patterns on the earth's surface from aircraft and spacecraft. Emphasis is on the interpretation of imagery from imaging scanners and camera systems. *Spring or fall*. Hawley, Walsh.
- 178 INTERPRETATION OF AERIAL PHOTOGRAPHS (3). A fundamental review of the uses of aerial photographs in the social sciences. Emphasis is on detecting and identifying man-made objects on the earth's surface from the perspective of space. *Spring*. Hawley.
- 179 FIELD METHODS AND TECHNIQUES (3). The philosophy behind field study in geography and various techniques used to solve local sample problems are examined. Emphasis is on developing innovative approaches to problem solutions. *Fall*. Hawley.
- 190 QUANTITATIVE METHODS IN GEOGRAPHY (3). Introduction to the application of statistical methods to geographic problems with some computer use in their solution. Attention given to analysis of areal data and areal sampling. *Fall*. Birdsall, Gesler.
- 191 GEOGRAPHIC INFORMATION SYSTEMS (3). Thematic data sets will be used to model test interactions between spatially-oriented information for resource evaluation. Modeling techniques, cartographic output, data overlay methods, and "hands-on" computer application will be featured. *Fall, spring*. Walsh.

Courses for Graduates

- 202 THE DESIGN OF GEOGRAPHIC RESEARCH (3). History and philosophy of geographic discipline; Basic elements of scientific inquiry, methods of spatial analysis, and selection and formulation of research topics. *Spring*. Birdsall.
- 205 ADVANCED QUANTITATIVE METHODS IN GEOGRAPHY (3). Application of selected multivariate statistical techniques to the analysis of geographic phenomena and problems. *Spring*. Gesler, Moriarty.
- 209 THE GEOGRAPHY OF HEALTH CARE DELIVERY (3). An examination of the spatial aspects of United States and other health care delivery systems. Looks at theoretical and empirical developments in health care resources distribution, location and allocation, accessibility, and utilization. *Spring*. Gesler.
- 210 ADVANCED PHYSICAL GEOGRAPHY (3). Further treatment of the physical environment. Special problems relating to the interrelationships among the natural and human environments are emphasized. *Fall*. Kopec and Staff.
- 211 SPECIAL WORK IN GEOGRAPHY (2 or more). Prerequisites, two courses in the one hundred bracket, or permission of the instructor. *On demand*. Staff.
- 240 ADVANCED REGIONAL GEOGRAPHY (3). Selected features, developments and problems of human geography in major world regions. *On demand*. Staff.
- 245 GEOGRAPHY AND A CROWDING WORLD (3). Prerequisite, Geography 132 or 145 or 150 or permission of instructor. Cultural and environmental changes in human population ecology related to development and technological change. Study of the context of environment and resources for food systems, human health and settlement. *Spring*. Meade.
- 251 URBAN MICROSPATIAL GEOGRAPHY (3). The course will analyze selected theories accounting for the spatial pattern of urban residential and non-residential land use. Analog growth and distribution models will be examined. *Fall*. Moriarty.
- 274 PROBLEMS IN CARTOGRAPHY (3). Mapping methods and techniques are applied to spatial problems. The utility of maps as problem-solving devices is emphasized. *Spring*. Kopec.
- 277 ADVANCED REMOTE SENSING (Geography 277 and Planning 235) (3). Computer and field work enhancements of LANDSAT data are emphasized providing "hands on" experience for graduate students interested in Remote Sensing specializations. Ap-

- lications of LANDSAT data in a variety of landuse categories will promote knowledge and skill in interpretation and problem solving by remote sensing techniques. Staff.
- 290 SPATIAL ANALYSIS AND COMPUTER MODELING (3). The course is an introduction to spatial analysis techniques involving points, lines, areas, surfaces, and non-metric spaces and programming basic geographic models on micro-computers. Gesler, staff.
- 301 SEMINAR IN CARTOGRAPHY (3). Kopec.
- 302 SEMINAR IN ECONOMIC GEOGRAPHY (3). Moriarty.
- 303 SEMINAR IN GEOGRAPHIC INFORMATION SYSTEMS (3). Walsh.
- 304 SEMINAR IN POLITICAL GEOGRAPHY (3). Eyre.
- 305 SEMINAR IN HISTORICAL GEOGRAPHY (3). Florin.
- 306 SEMINAR IN REGIONAL GEOGRAPHY (3). Staff.
- 307 SEMINAR IN URBAN GEOGRAPHY (3). Browning, Birdsall, Moriarty.
- 308 SEMINAR IN PHYSICAL GEOGRAPHY (3). Kopec, Robinson, Walsh.
- 309 SEMINAR IN MEDICAL GEOGRAPHY (3). Florin, Meade, Gesler.
- 310 SEMINAR IN POPULATION GEOGRAPHY (3). Birdsall, Florin, Meade.
- 311 RESEARCH IN GEOGRAPHY (2 or more). *On demand*. Staff.
- abcdefghi:
- a. Economic (Rural Land Use)
 - b. Economic (Primary Materials)
 - c. Economic (Industrial)
 - d. Political
 - e. Historical
 - f. Regional
 - g. Urban
 - h. Physical
 - i. Cartography
- 393 MASTER'S THESIS (3 or more). *Fall or spring*. Members of the graduate faculty.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Members of the graduate faculty.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF GEOLOGY

PAUL D. FULLAGAR, *Chairman*

Professors

JOHN M. BANE, JR.	(24)	Physical Oceanography
J. ROBERT BUTLER	(1)	Igneous-Metamorphic Petrology
JOHN M. DENNISON	(2)	Paleozoic Stratigraphy
PAUL D. FULLAGAR	(4)	Isotope Geochemistry, Geochronology
ROY L. INGRAM	(5)	Sedimentology, Clay Mineralogy
CHRISTOPHER S. MARTENS	(7)	Chemical Oceanography
A. CONRAD NEUMANN	(16)	Geologic Oceanography
JOHN J. W. ROGERS	(13)	Igneous Petrology, Crustal Evolution
JOSEPH ST. JEAN, JR.	(9)	Micropaleontology, Invertebrate Paleontology
DANIEL A. TEXTORIS	(11)	Sedimentary Petrology, Carbonates

Associate Professors

LARRY K. BENNINGER	(17)	Geochemistry
JOSEPH G. CARTER	(15)	Paleoecology, Invertebrate Paleontology
P. GEOFFREY FEISS	(14)	Economic Geology
CHRISTINE A. POWELL	(18)	Geophysics, Seismology

Assistant Professors

MICHAEL F. FOLLO	(29)	Sedimentology, Tectonics
ALLEN F. GLAZNER	(20)	Igneous Petrology
CHARLES K. PAULL	(28)	Continental Margins, Stratigraphy
JOSE A. RIAL	(26)	Geophysics, Seismology
KEVIN G. STEWART	(27)	Structural Geology

Lecturer

STEPHEN A. GOLDBERG	(23)	Geochemistry
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Adjunct Associate Professors

ROBERT R. REEBER	(22)	Crystallography
RICHARD K. SPRULL	(30)	Geohydrology, Geochemistry
JOHN T. WELLS	(25)	Coastal Geomorphology, Sedimentation

Professors Emeriti

WALTER H. WHEELER
WILLIAM A. WHITE

The Department of Geology offers graduate work leading to the degrees of Master of Science and Doctor of Philosophy. The Department of Geology also participates in the interdepartmental curricular program in Marine Sciences. Graduate students working for graduate degrees in Marine Sciences

must meet the specific requirements of the Curriculum rather than those of the Department of Geology.

Admission and General Degree Requirements

Students applying for admission to graduate studies normally should have completed an undergraduate degree with a major in geology. Students with majors in other sciences, engineering, or mathematics are given equal consideration for admission; however, such students should expect to spend one or more semesters taking basic geology courses for which graduate credit cannot be given.

All applicants must take the Graduate Record Examination. All foreign students whose native language is not English must also take the TOEFL examination.

Course requirements for all graduate degrees are determined for each student by the student's faculty committee. Specific requirements are varied to meet the needs and career objectives of the individual. All geology students must have had, or must take, physical geology, geology with a historical perspective, elementary mineralogy, elementary petrology, structural geology, one year of chemistry (with laboratory), one year of college physics (with laboratory), mathematics through integral calculus, and a geology field course or equivalent professional field experience. Approval of the equivalent professional field experience must be given by the geology faculty. Geophysics and geochemistry concentrators must complete the same basic course requirements as geology majors with the exception of the geology field course. Geophysics and geochemistry concentrators may substitute physics and chemistry courses, respectively, for the summer field course requirement.

Master of Science

Requirements for the Master of Science degree are: 30 semester hours, 6 of which may be credit for thesis; a written comprehensive examination taken after most of the course work has been completed; a thesis; and a final oral examination in defense of the thesis.

Doctor of Philosophy

Normally a person must have completed a master's degree before being admitted to the doctoral program. A person may be permitted to by-pass the master's degree after one year of residence upon demonstration of superior scholastic performance and research potential, recommendation of the person's graduate committee, and approval by the geology faculty.

Admission to the Ph.D. program after completing the M.S. degree in our department requires the approval of the geology faculty.

Requirements for the Ph.D. are: a minimum of 45 semester hours of graduate credit (which includes 30 hours for M.S. degree), plus 3 to 12 hours credit for the dissertation; reading knowledge of one foreign language specified by the student's committee; a written comprehensive examination and an oral comprehensive examination taken after most of the formal course work has been completed; a dissertation; and a final oral examination in defense of the dissertation.

Facilities and Research Interests

The Department of Geology occupies the 50,000 square feet of floor space in Elisha Mitchell Hall. The departmental library contains over 43,000 volumes and over 37,000 maps, and regularly receives 750 serial publications. Computerized literature searches on databases such as Georef are performed by the librarian.

Laboratory equipment and special apparatus available include: seismological station; magnetometer; gravimeter; electrical resistivity apparatus; portable seismographs; VAX 11/750 computer facility, including a MASS-COMP color graphics minicomputer, and MicroVAX workstations, plus access to the IBM mainframe campus computer; minicomputer data- and work-processing facilities; solid-source mass spectrometer and clean-lab; electron microprobe; X-ray diffraction; X-ray fluorescence spectrometer; counting laboratory (alpha-, beta-, and gamma-emitting radionuclides); flame- and graphite-furnace atomic absorption spectrometers; fluid-inclusion heating/freezing stage; gas-, liquid-, and ion-chromatography equipment; carbon/nitrogen/sulfur analyzer; petrographic, ore, and binocular microscopes; size and shape analyzer; thin section and polishing equipment; small outboard motor boats; cameras and darkrooms; drafting facilities; field vehicles.

The staff is prepared to direct the study and research of graduate students in: igneous and metamorphic petrology; geochemistry and geochronology, structural geology and tectonics, carbonate petrology, sedimentology and stratigraphy, paleontology and paleoecology, marine geology and geochemistry, geology of ore deposits, and seismology. A booklet of the staff's research and teaching interests is available upon request, and may be obtained from the Graduate Secretary, Department of Geology, CB# 3315, Mitchell Hall, University of North Carolina, Chapel Hill, NC 27599-3315.

Financial Aid

About 23 graduate and teaching assistantships paying \$6200-\$7200 per school year (1987-1988 stipends) are available to graduate students. Some research assistantships supported by faculty research grants are available. Remission of out-of-state tuition is available for recipients of assistantships.

Graduate students in geology are considered by the Graduate School for several kinds of nonservice and limited-service fellowships. It is not

necessary to apply separately for these as superior students recommended by the department are given full consideration by the Graduate School.

Courses for Graduates and Advanced Undergraduates

- 101 OCEANOGRAPHY (MASC 101, Biology 126, Environmental Sciences 127) (3). Prerequisites, Biology 11, Chemistry 21, and Physics 25, or permission. An interdisciplinary study of the sea and the interrelationship of marine processes. *Three lecture hours a week. Fall. Neumann; Spring. Frankenberg.*
- 115 ECONOMIC GEOLOGY (4). Prerequisites, Geology 53, 55, and 58. An introduction to metallic ore deposits. Emphasis is placed on their description, origin and distribution. *Three lecture and two laboratory hours a week, fall. Feiss.*
- 128 SUMMER FIELD COURSES IN GEOLOGY (6 or 8). Prerequisites, Geology 53, 55, 58, and one of Geology 16, 42, 46, 132, or 135. Six-week field camp conducted in New Mexico, Colorado, and Utah. Field interpretation of rocks and their deformation; construction of geologic maps. Includes field trips to classic localities such as Carlsbad Caverns and Arches National Park. *First Summer Session only. Staff.*
- 129
- 132 INVERTEBRATE PALEONTOLOGY (4). Prerequisite, Geology 42 or the permission of the instructor. A survey of the major invertebrate phyla represented in the geologic record, with emphasis on basic skeletal morphology, classification, paleoecology, and biostratigraphic index genera. *Three lecture and three laboratory hours a week, fall. St. Jean.*
- 135 STRATIGRAPHY (4). Prerequisite, Geology 11. Principles of measuring time and making correlations in stratified rocks. Examples will illustrate both the resolution and pitfalls with lithologic, paleontologic, isotopic, magnetic, and seismic reflection techniques. *Two laboratory hours a week, spring. Paull.*
- 138 GEOMORPHOLOGY (3). Prerequisite, Geology 11 or 41 or permission of the instructor. The origin of landforms. Includes those formed by weathering, mass wasting, streams, dissolution of limestone, coastal processes, glaciation, and wind. *Fall. Dennison.*
- 138L GEOMORPHOLOGY LABORATORY (1). Prerequisite or corequisite, Geology 138. *Two laboratory hours a week, fall. Dennison.*
- 142 GEOPHYSICS (3). Prerequisites, Physics 24, 25. Elementary seismic, gravity, magnetic and electric theory; earthquakes, gravity of the earth, geomagnetism, and telluric currents; seismic gravity, magnetic, electrical, and radioactivity prospecting and instrumentation. *Fall. Powell.*
- 142L GEOPHYSICS LABORATORY (1). Prerequisite or corequisite, Geology 142. *Three laboratory hours a week, fall. Powell.*
- 145 GEOCHEMISTRY (3). Prerequisites, Geology 11 or 41, Chemistry 21, or permission of the instructor. Introduction to the application of chemical principles to geological problems, with emphasis on isotope methods. *Three lecture hours a week, spring. Benninger.*
- 146 PHYSICAL GEOCHEMISTRY (4). Prerequisites, Chemistry 21, Mathematics 32, or permission of the instructor. An introduction to physical geochemistry and chemical thermodynamics with special emphasis upon geological applications. *Three lecture and three laboratory hours a week, fall. Benninger.*
- 148 OPTICAL MINERALOGY (4). Prerequisites, Geology 52, 53, 55. Introduction to basic optical techniques of the petrographic microscope for identification of rock-forming minerals. *Two lecture and six laboratory hours a week, fall. Butler.*
- 151 GEODYNAMICS (3). Prerequisites, Geology 11 or 41, Mathematics 32, Physics 24, 25, Chemistry 21. Interior of the earth deduced from seismology, gravity, heat flow, magnetism; geophysics of continents and ocean basins; age of earth. *Spring. Rogers.*
- 152 PLATE TECTONICS (3). Prerequisites, Geology 11 or 41, Physics 24, 25, and Mathematics 32. Kinematic and dynamic analysis of plate tectonics. Geology of plate boundaries;

- plate reconstructions; relative and absolute plate motions; stability of triple junctions; driving mechanisms. *Spring*. (1989–1990 and alternate years), Powell, Stewart.
- 162 ENERGY RESOURCES (3). Prerequisites, Geology 11 or 41, 42 or 135. Geology of oil, natural gas, uranium, hydropower, and geothermal energy. *Spring*. (1989–1990 and alternate years). Dennison.
- 162L ENERGY RESOURCES LABORATORY (1). Prerequisite or corequisite, Geology 162. Laboratory problems and field trips related to Geology 162. *Three laboratory hours a week, spring*. (1989–1990 and alternate years.) Dennison.
- 165 GROUNDWATER GEOLOGY (3). Prerequisites, Geology 11 or 41, and Physics 24, 25. (Not offered 1988–1989)
- 173 IGNEOUS AND METAMORPHIC PETROLOGY (4). Prerequisites, Geology 53, 148. Origin of magmas and evolution of igneous and metamorphic rocks, combined with petrographic study of selected suites and individual examples. *Two lecture and six laboratory hours a week, spring*. Butler.
- 176 VERTEBRATE PALEONTOLOGY (3). Prerequisite, Geology 42 or Zoology 41. Vertebrate fossil finds and their bearings on our understanding of vertebrate evolution. Some emphasis given to dinosaurs and primates. (Not offered 1988–1989.)
- 185 SOLID EARTH GEOPHYSICS (3). Prerequisites, Mathematics 34, Physics 52. Treatment of the earth and its elastic, mechanical and thermal properties. Topics include the relationships between ray theory, wave theory and normal modes, earthquake sources and seismicity, anelasticity both in a microscopic and macroscopic level, and the role of convection in the Earth. Emphasis will be on the development of the techniques and their relationships through time. *Fall*. Rial.
- 188 GEOLOGICAL OCEANOGRAPHY (Marine Science 103) (4). Prerequisites, Geology 11 or 41, 42. The origin and bathymetry of ocean basins, the nature and history of deep-sea sedimentation, the structure and sediments of continental margins, and the dynamic geomorphology of the coastal zone. Field trip to Outer Banks. *Three lecture and two laboratory hours a week, fall*. Neumann.
- 197 PALEOBOTANY (Botany 181) (5). Prerequisite, Biology 11–11L and permission of the instructor. An introduction to the morphology, stratigraphic occurrence, and evolutionary relationships of fossil plants. Both macrofossils and microfossils will be considered. *Three lecture and three laboratory hours a week, fall*. (Alternate years.) Gensel.
- 199 SPECIAL PROBLEMS IN GEOLOGY (1-4). Registration requires the approval of the department chairman. *Fall and spring*. Staff.

Courses for Graduates

- 201 PALEOZOIC STRATIGRAPHY (4). Prerequisites, Geology 132, 135. Paleozoic stratigraphy of United States, emphasizing facies, eustatic sea level changes, paleoclimatology, and sedimentary tectonics. A regional stratigraphic mapping project reconstructs sedimentary tectonics for a small interval of Paleozoic time. *Spring*. Dennison. (1988–1989 and alternate years.)
- 202 MESOZOIC-CENOZOIC STRATIGRAPHY (3). Prerequisites, Geology 132, 135. The Mesozoic-Cenozoic strata of the United States and their geologic settings. Triassic of eastern United States especially considered. Coastal plain of eastern U.S. omitted (see Geology 215). *Fall*. (1988–1989 and alternate years.) Staff.
- 202L MESOZOIC-CENOZOIC STRATIGRAPHY LABORATORY (1). Prerequisite or corequisite, Geology 202. *Fall*. Carter (1988–1989 and alternate years.)
- 206 MARINE PALEOECOLOGY (4). Prerequisite, Geology 42 or 132, or equivalent. Principles and applications of paleoenvironmental analysis based on faunal content of sediments, including animal-sediment relationships, trace fossils, life habits of marine invertebrates, and analysis of marine benthic communities. *Spring*. (1988–1989 and alternate years.) Carter.

- 208 PALEOZOIC PALEONTOLOGY (4). Prerequisites, Geology 132, 135, or permission of the instructor. Evaluation of biostratigraphic techniques for chronoresolution in Paleozoic strata. Survey of important megainvertebrate index fossils. Term project with field collections investigates a selected correlation problem. *Spring*. (1989-1990 and alternate years.) Dennison.
- 212 MICROPALAEONTOLOGY (4). Prerequisite, Geology 132 or permission of the instructor. An in-depth study of the biostratigraphy, paleoecology, and taxonomy of various microfossil groups (i.e., Foraminifera, ostracodes, conodonts, coccoliths, Radiolaria, diatoms, acritarchs, dinoflagellates, etc.) dependent upon individual student objectives. *Three lecture and three laboratory hours a week, spring*. St. Jean.
- 215 COASTAL PLAIN GEOLOGY (3). Prerequisite, Geology 53. Stratigraphy, geomorphology, and structure of Coastal Plain from New Jersey to the Mississippi River. Course includes lectures, readings, and field trips. *Fall*. (Not offered 1988-1989.) Staff.
- 216 PALEOCEANOGRAPHY (3). Prerequisite, Geology 55 or 135 or 188, or permission of the instructor. Origin and distribution of pelagic sediments. Review of the major Mesozoic and Cenozoic events in the world oceans. Glacial/interglacial changes in the ocean/atmosphere system. *Fall*. Paull.
- 221 SEDIMENTARY PETROLOGY (4). Prerequisites, Geology 55 and 148, or permission of the instructor. Detailed microscopic studies of the description, classification, diagenesis, and origin of sedimentary rocks. *Three lecture and three laboratory hours a week, fall*. (1989-1990 and alternate years.) Textoris.
- 223 MARINE CARBONATE ENVIRONMENTS (Marine Science 223) (4). Prerequisite, permission of the instructor. Chemical and biological origins of calcium carbonate, skeletal structure, and chemo-mineralogy, preservation, sedimentation, and early diagenesis are studied in a variety of deep and shallow environmental settings, in order to understand skeletal genesis, limestone origin and carbonate facies variability. Field trip to Florida, Bahamas, or Bermuda. Lab exercises; research report. *Three lecture and three laboratory hours a week, spring*. (1988-1989 and alternate years.) Neumann.
- 224 CARBONATE FACIES (3). Prerequisite, Geology 221 or permission of the instructor. Various aspects of the formation of limestone and dolostone, as determined by regional basin analysis coupled with the study of microfacies. *Fall*. (1988-1989 alternate years.) Textoris.
- 225 CLASTIC SEDIMENTOLOGY (4). Prerequisite, Geology 55 or permission of the instructor. An introduction to the study of sedimentary processes and depositional systems. Systematic coverage of modern clastic sedimentary environments and facies, with extensive reference to sedimentary sequences in the rock record. *Three lecture and two laboratory hours a week, spring*. (1989-1990 and alternate years). Follo.
- 227 CLAY MINERALOGY (4). Prerequisites, Geology 53 and 55. Includes X-ray diffraction studies of clay minerals. *Two lecture and four laboratory hours a week, spring*. (1988-1989 and alternate years.) Ingram.
- 228 SEDIMENTARY TECTONICS (4). Prerequisites, Geology 55, 151, 221, or permission of the instructor. Tectonic controls on sedimentation and the evolution of sedimentary basins. Theory and techniques of provenance analysis, as well as models of basin development and thermal history, will be considered from tectonic and sedimentological perspectives. *Three lecture and two laboratory hours a week, spring*. (1988-1989 and alternate years). Follo.
- 236- GEOLOGICAL RESEARCH TECHNIQUES (1-4). Prerequisite, permission of the
237 instructor. An introduction to methods of obtaining, analyzing, and presenting geologic and paleontologic data. *Fall and spring*. Staff.
- 246 ADVANCED MINERALOGY (3). Prerequisites, Geology 52 and 148. Principles of crystal chemistry; X-ray diffraction methods; linear algebraic and computer methods in crystallography. *Offered as requested, fall*. Glazner.

- 250 MARINE AND SURFICIAL GEOCHEMISTRY (3). Prerequisites, Marine Science 105 or Geology 145 or Environmental Science 122 or Chemistry 180 and 181. Low temperature geochemical processes occurring in marine environments; sediment-water interactions, kinetics of chemical processes, results of organic material degradation, and mineral-water equilibria are emphasized. *Spring*. (1988-1989 and alternate years.) Martens, Benninger.
- 257 ISOTOPE GEOCHEMISTRY (3). Prerequisites, Geology 52, 53, 55 and Chemistry 21. Survey of isotopic studies in geology; geochronology, crustal evolution, heat flow, paleotemperatures, origin of ore deposits. *Spring*. (1989-1990 and alternate years.) Fullagar.
- 264 ADVANCED IGNEOUS PETROLOGY (4). Prerequisites, Geology 146, 148, 173. Applications of phase equilibria and thermodynamics to studies of the origin and evolution of magmas. *Three lecture and three laboratory hours a week, fall*. (1989-1990 and alternate years.) Glazner.
- 265 METAMORPHIC PETROLOGY (4). Prerequisites, Geology 148, 173. Studies in the occurrence of metamorphic rocks in orogenic belts and their mineralogical, textural, and structural evolution. *Two lecture and six laboratory hours a week, spring*. (1989-1990 and alternate years.) Butler.
- 272 METALLIC ORE DEPOSITS (4). Prerequisites, Geology 115 or equivalent and Geology 146. An introduction to modern theories of ore genesis. Topics to be discussed include thermodynamic of aqueous sulfide systems, geothermometry, and geobarometry, stable and radiogenic isotopes, lithogeochemistry and the distribution of metals in the earth's crust. Laboratory will emphasize ore microscopy. *Three lecture and three laboratory hours a week, spring*. (1988-1989 and alternate years.) Feiss.
- 280 TECTONOPHYSICS (3). Prerequisites, Mathematics 34, Physics 52, 58, or permission of the instructor. Fundamental physical processes necessary for an understanding of plate tectonics; stress and strain in solids; elasticity and flexure; heat transfer; gravity; mantle rheology and convection. *Fall*. (1988-1989 and alternate years.) Powell, Rial.
- 281 ADVANCED SEISMOLOGY (3). Prerequisites, Mathematics 124, Physics 58, or permission of the instructor. Radiation, propagation of seismic waves. Theoretical and quantitative methods in seismology. Synthetic seismograms for body, surface waves in realistic models. Uses of elastic waves to study the earth's internal structure. *Spring*. (1988-1989 and alternate years.) Powell, Rial.
- 282 ADVANCED STRUCTURAL GEOLOGY (3). Prerequisites, Geology 58, Physics 24, 25, Mathematics 32 and 116, or equivalent. Theoretical and experimental methods in structural geology; strain analysis; mechanical behavior of rocks. *Fall*. (1989-1990 and alternate years.) Stewart.
- 301 SEMINAR (1 or more). Will be offered as required. Staff.
- 301 SEMINAR IN STRATIGRAPHY (1 or more). Will be offered as required. Staff.
- 306 SEMINAR IN PALEOECOLOGY (1 or more). Will be offered as required. Staff.
- 310 SEMINAR IN PALEONTOLOGY (1 or more). Will be offered as required. Carter.
- 318 SEMINAR IN CONTINENTAL MARGINS (1 or more). Will be offered as required. Paull.
- 320 SEMINAR IN SEDIMENTOLOGY (1 or more). Will be offered as required. Staff.
- 345 SEMINAR IN GEOCHEMISTRY (1 or more). Will be offered *Fall 1988 and Spring 1989*. Staff.
- 357 SEMINAR IN ISOTOPE GEOLOGY (1 or more). Will be offered as required. Staff.
- 360 SEMINAR IN PETROLOGY (1 or more). Will be offered as required. Staff.
- 372 SEMINAR IN ECONOMIC GEOLOGY (1 or more). Will be offered as required. Feiss.
- 380 SEMINAR IN GEOPHYSICS (1 or more). Will be offered as required. Powell.
- 381 SEMINAR IN SEISMOLOGY (1 or more). Will be offered as required. Powell.
- 382 SEMINAR IN STRUCTURAL GEOLOGY (1 or more). Will be offered as required. Staff.
- 383 SEMINAR IN TECTONICS (1 or more). *Spring*. Will be offered as required. Rogers.

Research Courses

- 392 RESEARCH IN GEOLOGY (2 or more).
- 393 MASTER'S THESIS (3 or more).
- 394 DOCTORAL DISSERTATION (3 or more).
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF GERMANIC LANGUAGES

SIDNEY R. SMITH, *Chairman*

Professors

SIEGFRIED MEWS	(5)	Nineteenth and Twentieth Century Literature, Comparative Literature
CHRISTOPH E. SCHWEITZER	(2)	Baroque, Eighteenth Century Literature, Goethe
SIDNEY R. SMITH	(6)	Germanic Linguistics, Scandinavian Languages
PETRUS TAX	(4)	Old High and Middle High German Literatures, Netherlandic Language and Literature

Associate Professors

WALTER K. FRANCKE	(9)	Medieval German Literature, Modern German Literature, Pedagogy
CRAIG MELCHERT	(16)	Indo-European Linguistics, Sanskrit
DAVID PIKE	(15)	Twentieth Century Literature, Literature and Politics
PAUL T. ROBERGE	(18)	Germanic Linguistics
MARILYN SCOTT	(13)	Nineteenth and Twentieth Century Literature, German Lyric, Pedagogy

Assistant Professor

ALICE A. KUZNIAR	(17)	Romanticism, Age of Goethe
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Lecturer

HELGA BISTER	(19)	Pedagogy, Linguistics, Stylistics
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Professors Emeriti

WERNER PAUL FRIEDERICH
RICHARD H. LAWSON
JOHN G. KUNSTMANN

The Department of Germanic Languages offers a diversified graduate program leading to the Master of Arts and the Ph.D. degrees. Teaching and research interests of the faculty cover a wide spectrum within the discipline, providing students with opportunities to pursue interests in literature, historical linguistics, *Volkskunde*, Dutch, and Scandinavian studies. Students are exposed to a variety of approaches during their studies in the Department.

Prospective students should write to the Chairman with a request for the publication "Guide to Graduate Studies in German," which contains important information supplementary to what is found in this catalog.

Students accepted into the program may write for a reading list any time prior to arrival on campus.

Candidates for the degree of Master of Arts take German 100, 161, 235, 191, and five other courses (plus thesis credit) chosen after consultation with the graduate adviser. One or more of these elective courses may be taken in another department, or a minor in another area may be arranged (with three courses in another department). One year of supervised teaching of elementary German is part of the training of the student and is required for the M.A. degree. Candidates for the M.A. must demonstrate proficiency in French or in another language chosen with consultation.

Candidates for the degree of Doctor of Philosophy take a total of twenty-one courses, with work taken toward the M.A. counted among these. Courses are chosen with guidance of a graduate adviser with the goal of providing intensive experience with and knowledge of a special area along with more general familiarity with the field as a whole. The emphasis may be either on German literature or on Germanic linguistics. Students are encouraged to take courses outside the department, subject to the adviser's approval. (For an interdisciplinary specialty in Medieval Studies consult the Classics section of this catalog. Interdisciplinary studies involving such areas as Comparative Literature and Linguistics may be arranged with the aid of the graduate adviser.) Candidates for the Ph.D. must demonstrate a reading knowledge of French and of Latin or another language chosen after consultation with faculty. One year of supervised teaching is part of the student's training and is required for the Ph.D. degree; as a rule Ph.D. candidates teach for several years at various levels.

The goals of the program include helping the student to achieve competence in the German language, familiarity with representative literary works of various periods, exposure to a variety of approaches to literature, well-developed critical judgment, mastery of research tools, and solid competence as a teacher of German. Graduate students participate in a rigorous teaching methods course during their first year of teaching and are supervised and observed throughout their teaching appointment in the Department. Students are expected to demonstrate professional commitment by participating fully in Department events, including lectures, activities of the German Club (Delta Phi Alpha), and other programs of the Department.

The University Library has excellent holdings in German literature and language, with further materials available from the nearby Duke University Library (especially valuable for the Jantz Collection of Baroque literature and German-Americana). The Language Laboratory has not only instructional tapes but also much other recorded material such as German plays, German songs, and recordings of German dialects. A good collection of basic reference works and standard editions is available to students in the Department Reading Room.

Since 1949 the Department has been publishing a monograph series entitled *The University of North Carolina Studies in the Germanic Languages*

and Literatures. In more than one hundred volumes the results of research in a wide range of specialties in Germanic studies are made available to an international community of scholars. In addition to an ample number of Teaching Assistantships the Department offers annually its distinguished Kent James Brown Fellowship to qualified first-year students. Advanced doctoral students may apply for University stipends for research abroad.

In the following course listings the designation *fall* and *spring* is given if the course is taught on a completely predictable schedule. If no such designation is indicated, the course in question will be taught on demand or according to a regular rotation system within the Department, so that most such courses will be available approximately in alternate years. Students should consult the Department chairman for projected course schedules.

Courses without Credit for Graduate Students

- 101X ELEMENTARY GERMAN FOR GRADUATE STUDENTS (3). These courses are designed as a preparation for the reading knowledge examination for higher degrees. Passing of the examination at the end of 102X will certify that this requirement has been satisfied, although the course will not count for graduate credit. *Three hours a week, fall and spring.* Smith; instructors. (NOTE: 101X is *not* a prerequisite for 102X.)

Courses for Graduates and Advanced Undergraduates

- 100 ADVANCED GERMAN GRAMMAR (3). Form and content, difficulties and peculiarities, from a structural and historical point of view. Required of candidates for advanced degrees in German. *Fall.*
- 103 EXERCISES IN STYLISTICS (3). A *rigorosum* in advanced oral and written composition. *Spring.*
- 109 GERMAN FICTION IN THE NINETEENTH CENTURY (3). Study of the major prose writers of the nineteenth century. Readings, lectures and reports. Mews.
- 110 THE STRUCTURE OF MODERN GERMAN (3). Introduction to the formal analysis of German grammar (phonology, morphophonemics, prosodics, morphology, syntax) within the framework of generative grammar. Roberge.
- 111 GERMAN DRAMA IN THE NINETEENTH CENTURY (3). Kleist, Grabbe, Büchner, Grillparzer, Hebbel, Raimund, Nestroy, among others. Readings, lectures, and reports. Mews.
- 115 THE GERMAN LYRIC FROM HÖLDERLIN TO THE PRESENT (3). An analysis of the chief lyric poets, movements, and types of the past one hundred and fifty years. Mews, Scott.
- 121 GOETHE'S POETRY AND FAUST (3). Close analysis of poems selected from all phases of Goethe's life and of the two parts of *Faust*. Schweitzer.
- 125 SPECIAL TOPICS IN GERMAN STUDIES (3). Study of literature or language on an announced theme, with subject matter, perspective, or combination of approaches not available in the regular offerings of the department. Staff.
- 131 GERMAN LITERATURE OF THE EIGHTEENTH CENTURY (3). From the Enlightenment to *Sturm und Drang*. Schweitzer.
- 139 GERMAN ROMANTICISM (3). Theoretical background and realization in poetry, prose, and drama. Schweitzer, Kuzniar.
- 141 SCHILLER (3). Discussion of the plays, representative poems, and selected essays against the intellectual background of his and our own times. Schweitzer.

- 152 GERMAN NOVEL FROM 1890 TO 1945 (3). A survey of German, Austrian, and Swiss novelists from 1890 to 1945, including writers such as Schnitzler, Thomas Mann, Heinrich Mann, Hesse, Kafka, Musil, and Broch. Mews.
- 153 GERMAN DRAMA FROM 1890 TO 1945 (3). A comprehensive study of German, Swiss, and Austrian drama from Naturalism to the end of World War II. Mews.
- 154 DRAMA AND PROSE FICTION IN AUSTRIA, WEST GERMANY, AND SWITZERLAND SINCE 1945 (3). Reading and discussion of works by such authors as Böll, Grass, S. Lenz, Handke, Frisch, Dürrenmatt, Hochhut, and Weiss. Mews.
- 155 GOETHE (3). The poet within the Western tradition. Study of his masterpieces, including the poetry, *Werther*, *Wilhelm Meister's Apprenticeship*, and *Faust*. Schweitzer.
- 156 LITERATURE AND SOCIETY IN EAST GERMANY (3). Study of the development of literature in East Germany from 1945 to the present in its political and social context. Selection of works by Seghers, Fühmann, Heym, Wolf, Becker, Loest, and others. Pike.
- 161 HISTORY OF THE GERMAN LANGUAGE (3). Development of sounds and forms from ancient times to present. Political, social, and literary forces influencing the language. Recommended for first semester of graduate study. Prerequisite, a good reading knowledge of German. *Fall*. Smith, Roberge.
- 170 GENERAL INTRODUCTION TO GERMAN VOLKSKUNDE (Folklore 170) (3). Prerequisite, a reading knowledge of German. Tax.
- 171 GERMAN CIVILIZATION (3). Major trends in intellectual, artistic, and political life from early times to the present. Tax.
- 191 TEACHING METHODS AND MATERIALS (3). For prospective teachers of German. Required of all teaching assistants. *Fall and spring*. Scott.
- BRECHT'S WORLD OF THE THEATRE (3). (See Comparative Literature 192.) Mews.

DUTCH

- 105 ELEMENTARY DUTCH (3). Prerequisite, reading knowledge of German or permission of the instructor. Rapid introduction to modern Netherlandic with emphasis on both speaking and reading. *Fall*. (Alternate years.) Francke, Tax.
- 106 INTERMEDIATE DUTCH (3). Prerequisite, Dutch 105 or equivalent. Reading of modern Dutch literature with discussions in Dutch. (Alternate years.) *Spring*. Francke, Tax.
- 158 THE GOLDEN AGE OF DUTCH LITERATURE (RENAISSANCE AND BAROQUE) (3). Prerequisite, permission of the instructor. Masterpieces of Dutch literature of Renaissance and mainly Baroque; literary relations with German and other literatures will be stressed. *Spring*. Tax, Francke.

SCANDINAVIAN

- 181 ELEMENTARY NORWEGIAN (3). Rapid introduction to modern Norwegian (*bokmaal*) with attention to both speaking and reading. *Fall*. *On demand*. Smith.
- 182 INTERMEDIATE NORWEGIAN (3). Prerequisite, Norwegian 181 or equivalent. Reading of twentieth-century short stories. Introduction to Danish and Swedish, with readings. *Spring*. *On demand*. Smith.
- 187 INTRODUCTION TO MODERN SCANDINAVIAN LITERATURE (3). An introduction to nineteenth-century and twentieth-century Scandinavian literature (in translation) with particular reference to the work of Ibsen and Strindberg, and modern fiction. *Spring*. Staff.
- 233 OLD NORSE I (OLD ICELANDIC) (3). Introduction to the language, with reading of mythology texts (prose *Edda*) and sagas about the discovery of America. Phonological development from Indo-European and Germanic; comparison with other Germanic dialects. *On demand*. Smith.

- 234 OLD NORSE II (OLD ICELANDIC) (3). Advanced readings, including a complete saga. Morphology of Old Norse, and comparison with other Germanic dialects. Survey of the language into modern times. *On demand.* Smith.

SANSKRIT

- 111 ELEMENTARY SANSKRIT (3). Grammar and readings from the epic and didactic
112 literature. *Fall and spring.* Melchert.
201 ADVANCED SANSKRIT (3). Extensive reading from the Dharmacastra, the Sutras,
Brahmanas, and the Vedas. *On demand.* Staff.
202 ADVANCED SANSKRIT (3). Continuation of 201. *On demand.* Staff.

Courses for Graduates

- 201 MATERIALS AND METHODS OF RESEARCH (3). *Fall.* Tax.
202 GERMAN PALEOGRAPHY (3). A general introduction to codicological problems
and a discussion of the different types of script used in German literature to about
1500; with practical exercises. *Spring.* (Alternate years.) Tax.
210 OLDER GERMAN LITERATURE TO 1050 (3). Tax.
221 GOTHIC (3). Reading and linguistic analysis of Gothic biblical texts. Introduction
to Germanic linguistics, with emphasis on phonology and morphology; comparison
with other older dialects of Germanic. *On demand.* Smith, Roberge.
222 OLD HIGH GERMAN (3).
223 COMPARATIVE GERMANIC GRAMMAR (3). Analysis of phonological and mor-
phological development from Indo-European to the older stages of Germanic dialects.
Special attention to laryngeal hypothesis, Benveniste root theory, and structure of nouns,
pronouns, and verbs. Student presentations. Smith.
232 OLD SAXON (3). Reading and linguistic analysis of biblical texts (*Heliand*) in Old
Saxon, with study of phonology and morphology. Comparison with Old English, Old
High German, and other Germanic dialects. *On demand.* Smith, Roberge.
233 OLD NORSE I (OLD ICELANDIC) (3). *On demand.* Smith.
234 OLD NORSE II (OLD ICELANDIC) (3). *On demand.* Smith.
235 MIDDLE HIGH GERMAN GRAMMAR (3). Prerequisite, German 161 (waived in
special cases). Introduction to medieval German language, literature, and life. Francke.
236 MIDDLE HIGH GERMAN LITERATURE (3). Tax, Francke.
237 MIDDLE HIGH GERMAN POETRY (3). Tax, Francke.
240 READING COURSE (3). *Fall or spring.* Staff.
241 READING COURSE (3). *Fall or spring.* Staff.
250 LATE MEDIEVAL LITERATURE (3). Previous study of German 235 is desirable.
Staff.
251 THE LITERATURE OF THE REFORMATION ERA (3). Staff.
252 INTRODUCTION TO EARLY NEW HIGH GERMAN (3). Analysis and discussion
of form and content of the new literary language in the age of Humanists and
Reformers, documenting the change in ideas and ideals. Staff.
253 GERMAN BAROQUE LITERATURE (3). Discussion of representative works from
Baroque poetry, drama (especially Gryphius), and the novel (especially Grimmelshau-
sen). Schweitzer.
340 SEMINAR IN OLDER GERMAN LITERATURE (3). *On demand.* Tax.
342 SEMINAR IN GERMAN VOLKSKUNDE (3). *On demand.* Tax.
344 SEMINAR IN LATE MEDIEVAL AND REFORMATION LITERATURE (3). *On
demand.* Staff.
345 SEMINAR IN GERMAN LITERATURE (3). *On demand.* Schweitzer.
350 SEMINAR IN GERMAN LITERATURE (3). *On demand.* Mews.
355 SEMINAR IN GERMAN LITERATURE (3). *On demand.* Staff.

- 361 SEMINAR IN LINGUISTICS (3). *On demand.* Smith, Roberge.
393 MASTER'S THESIS (3 or more). *Fall and spring.* Staff.
394 DOCTORAL DISSERTATION (3 or more). *Fall and spring.* Staff.
400 GENERAL REGISTRATION (0).

DEPARTMENT OF HISTORY

COLIN A. PALMER, *Chairman*

Professors

JOSEF ANDERLE	(60)	Eastern Europe, Chiefly since 1815
WILLIAM L. BARNEY	(92)	The Political History of Nineteenth Century America
STEPHEN B. BAXTER	(21)	English History 1485-1815: Political, Diplomatic, Constitutional and Economic History
FREDERICK O. BEHRENS	(14)	Medieval Europe
HERBERT L. BODMAN, JR.	(50)	Islamic Civilization, Ottoman Empire
GILLIAN T. CELL	(22)	British Empire, Tudor and Stuart England
JANE DEHART-MATHEWS	(70)	Twentieth Century U.S.: Social, Cultural and Women's History
PETER G. FILENE	(83)	Twentieth Century: American Social and Cultural History
ROBERT E. GALLMAN	(99)	Economic History
OTIS L. GRAHAM, JR.	(98)	Twentieth Century U.S. History
JACQUELYN D. HALL	(90)	American History, Southern Oral History
JOHN M. HEADLEY	(31)	Renaissance, Reformation, Seventeenth Century Continental Europe
R. DON HIGGINBOTHAM	(84)	Colonial and Revolutionary America
MICHAEL H. HUNT	(97)	U.S. Diplomatic History, U.S.—East Asian Relations, Chinese Foreign Relations
KONRAD H. JARAUSCH	(32)	Nineteenth and Twentieth Century Europe
JOHN F. KASSON	(88)	American Intellectual and Cultural History, Technology and Society, Art and Literature
WILLIAM E. LEUCHTENBURG	(99)	Recent American History
ROGER W. LOTCHIN	(81)	Urban Political History, 1800 to the Present
MICHAEL R. McVAUGH	(15)	History of Science
DONALD G. MATHEWS	(87)	Antebellum U.S., American Religious History
ROBERT M. MILLER	(73)	American Social and Religious History, Intellectual History since 1860
JOHN K. NELSON	(78)	Social, Intellectual, Religious Development of America before the Revolution
NELL I. PAINTER	(96)	Recent U.S. and Afro-American History, 1865 to the Present
COLIN A. PALMER	(95)	Afro-American, Colonial Latin America and the Caribbean
RICHARD W. PFAFF	(16)	English Medieval History: Ecclesiastical, Cultural and Political History
JOHN E. SEMONCHE	(77)	American Legal and Constitutional History

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| RICHARD A. SOLOWAY | (23) | Nineteenth Century Britain: Social, Intellectual, and Church History |
| JOSEPH S. TULCHIN | (42) | Argentina and Chile, Caribbean Area, Inter-American Relations |
| PETER F. WALKER | (76) | Civil War and Reconstruction |
| GERHARD L. WEINBERG | (35) | Modern Germany, Diplomatic History |
| JOEL R. WILLIAMSON | (79) | History of the South, Race Relations |
| SAMUEL R. WILLIAMSON, JR. | (34) | Diplomatic and Strategic History since 1870 |

Associate Professors

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| JUDITH M. BENNETT | (37) | History of Women in Europe |
| E. WILLIS BROOKS | (61) | Russia in the Nineteenth Century: Social, Administrative, Intellectual |
| MELISSA M. BULLARD | (38) | Renaissance, Mediterranean and Early Modern Europe |
| LEON R. FINK | (94) | American Labor History, 19th-20th Century Social History |
| W. MILES FLETCHER | (52) | Japanese History |
| DAVID M. GRIFFITHS | (62) | Russia in the Eighteenth Century: Social and Intellectual, Marxism |
| GILBERT M. JOSEPH | (44) | Modern Mexico, Brazil and the Caribbean, Colonial Spanish America |
| LAWRENCE D. KESSLER | (51) | Chinese History: Seventeenth Century Political and Social, Revolutionary Experience since 1919, Modern U.S.-Chinese Relations |
| W. JAMES MCCOY | (17) | Ancient, particularly Greek History |
| DONALD M. REID | (36) | Modern French History |
| HARRY L. WATSON | (93) | North Carolina History |

Assistant Professors

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|-------------------|------|---|
| CHARLES H. CAPPER | (89) | American Intellectual and Cultural History, Antebellum U.S. |
| PETER A. COCLANIS | (85) | U.S. Economic and Business History; Colonial History |
| LLOYD S. KRAMER | (39) | European Intellectual History |
| DAVID S. NEWBURY | (53) | Sub-Saharan Africa |

Semi-retired Professors

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|-------------------|------|--|
| SAMUEL H. BARON | (63) | Russian History: Early Modern Period, Late Nineteenth Century |
| HENRY C. BOREN | (13) | The Ancient World, particularly Roman History |
| GEORGE V. TAYLOR | (30) | Europe in the Eighteenth Century and the French Revolutionary and Napoleonic Period, 1715-1815 |
| GEORGE B. TINDALL | (75) | The South since Reconstruction |

Professors Emeriti

HAROLD A. BIERCK
J. ISAAC COPELAND
ELISHA P. DOUGLASS
JAMES L. GODFREY
FRANK W. KLINGBERG
CARL H. PEGG
WILLIAM S. POWELL
FRANK W. RYAN, JR.
J. CARLYLE SITTESON

The courses required for the MA degree include an introduction to research (History 200) and introductory seminar (History 300), to be taken in the first year of study; a two-semester reading colloquium in the student's major field (numbered between 203 and 209), usually also taken in the first year; one additional seminar (300-level course); three hours of thesis credit (History 393); and four other courses, of which as many as three may be taken in fields other than that in which the student is concentrating or even in other disciplines. The student must also pass a reading-knowledge examination in an appropriate foreign language, prepare an acceptable thesis, and pass an oral examination on the thesis and all courses taken for the degree. A student who, after four semesters in residence, has not completed the requirements for the MA shall not be permitted to enroll for further course work until the requirements for the degree have been completed.

Every graduate student in the Department without an MA in History is considered a candidate for the master's degree. However, as the student nears the completion of eighteen hours of course-credit, he or she may ask the staff of his or her field to review his or her work and consider if the student might be allowed to petition to bypass the MA and proceed directly to the PhD. In practice the great majority of candidates are expected to take the MA, and the exceptional student who wishes to bypass it must secure the approval of his or her advisor, the Graduate Studies Committee, and the Graduate School. A student admitted to the department with a MA from another university will be reviewed by the staff of his or her field before he or she completes the second semester of study here, and at that time it will be determined whether the student must complete a MA degree here or whether he or she may proceed directly to the PhD.

The MA is a terminal degree and satisfactory completion of it does not automatically entitle a student to continue on to the PhD. At the time of the oral examination or at least within two weeks after it and before the student registers for the following semester, the student's committee, augmented where desirable by other faculty members with whom the student has worked, should decide whether or not he or she will be allowed to continue towards the PhD.

All students who apply for the PhD program will be expected to have completed an MA as described above or to have obtained permission from the Department and the Graduate School to bypass that degree. All courses taken here for the MA may be credited towards the doctoral program as well as graduate courses taken elsewhere which the Graduate School approves for transfer credit, but the latter must be validated at the time of the preliminary oral examination. The doctoral candidate must complete four semesters of fully-enrolled residence credit of which at least two must be in continuous residence here; and all work credited towards the PhD, including transfer course work, must be completed within a period of eight years. All required course work must be completed by the end of the sixth semester of residence during the regular academic year, and the comprehensive written and oral examinations must be taken by the end of the seventh; only in the most exceptional circumstances may the examinations be delayed until the eighth semester. Candidates for the PhD will complete the following minimum course program (in addition to the requirements for the MA) during their third year; seminar (fall); second-field reading colloquium (fall and spring; see below); research design (spring); dissertation credit (History 394; spring or fall of the fourth year). A reading knowledge of two foreign languages is also required of the doctoral student.

The doctoral student must present a second field within the Department. Most students will fulfill this during the second or third year by enrolling in a reading colloquium other than the one in their major field. Students who have enrolled in such a colloquium in order to meet their second-field requirement must pass a three-hour comprehensive written examination, covering the year's work, at the conclusion of the second semester.

The student must pass a written comprehensive examination on the major field, and an oral examination that will focus on the feasibility of the dissertation topic together with the student's knowledge of the topic's chronological and thematic contexts.

The final requirements for the PhD are a dissertation and a final oral examination, which is usually limited to a defense of the dissertation and its historical setting.

Fellowships and Assistantships

Three University teaching fellowships, one or two Waddell Memorial Fellowships, and several appointments as preceptors and graduate assistants are available annually on a competitive basis to graduate students in history.

Publications

The James Sprunt Studies in History and Political Science are published under the direction of the chairmen of the History and the Political Science Departments. Established by the late Dr. James Sprunt, of Wilmington, North Carolina, the series has at present reached fifty-nine volumes. The

contents have in the main concerned North Carolina state and colonial history and government, but by recent action the series has been enlarged to embrace other areas of history and political science. Publication in the Sprunt Studies is open to students as well as specialists.

Library and Research Facilities

The Library has a number of special collections of great value, and the University itself is conveniently situated close to a number of other research centers, particularly the Duke University Library and the North Carolina State Department of Archives and History.

Notable among the Library's special collections are the Southern Historical Collection (one of the most important in the country devoted to the subject), and the North Carolina Collection. Both are extremely rich in manuscripts, diaries, pamphlets, and newspapers. Other outstanding collections are: the Peabody Collection for international law and diplomacy; the William Henry Hoyt Collection (devoted to the Napoleonic period); and the Bowman Gray Collection (with materials on World Wars I and II). In addition the Library has extensive working collections in all the doctoral fields.

Courses for Graduates and Advanced Undergraduates

- 101 ISLAM: AN HISTORICAL INTRODUCTION (Religion 101) (3). A study of Islam in the historical context of its growth from the prophecy of Muhammad to a major force in a world civilization. *Fall*. (Alternate years.) Bodman.
- 102 INTRODUCTION TO BYZANTINE CIVILIZATION (Classics 118) (3). Intellectual and social history of the Byzantine Empire from Justinian to 1453, noting the interaction of classical and Christian culture and Byzantium's influence on neighboring peoples and on the Renaissance. (Alternate years.) Staff.
- 103 THE THEORY AND PRACTICE OF ORAL HISTORY: A FIELD WORK APPROACH (Folklore 103) (3). An introduction to the use of interviewing as a method of creating and interpreting historical evidence. Field work focuses on an aspect of North Carolina social history. *Fall*. Hall.
- 104 WOMEN AND PUBLIC POLICY IN 20TH CENTURY AMERICA (Women's Studies 194) (3). How gender-based cultural attitudes and social roles, collective action, social and economic change interacted to shape public policy with respect to work, family and legal rights. (Alternate years.) Dehart-Mathews.
- 105 RESISTANCE MOVEMENTS AND NATIONALISM IN AFRICA (3). An attempt to define the features of various movements in Africa during the nineteenth and twentieth centuries which sought to resist foreign domination in the cultural and political spheres. *Spring*. (Alternate years.) Newbury.
- 106 ANCIENT GREEK ATTITUDES TOWARDS PEACE, WAR, AND DEFENSE (Peace, War, and Defense 106) (3). An examination of ancient Greek attitudes towards peace, war and defense from the 16th to the 3rd century B.C. *Fall or spring*. (Alternate years.) McCoy.
- 107 HISTORY OF ROME, 133-27 B.C. (3). Emphasis on the decline of the Republican Oligarchy. Conducted in considerable part by student reports and classroom discussion. *Fall*. Boren.

- 108 ALEXANDER AND THE HELLENISTIC WORLD (3). History 52 recommended. The rise of Macedonia; the careers of Philip II and Alexander; the Hellenistic Age in the fourth, third, and second centuries B.C. *Fall*. (Alternate years.) McCoy.
- 109 GREEK AND ROMAN HISTORICAL LITERATURE (Classics 109) (3). The study in English translation of selections from Herodotus, Thucydides, Livy, Tacitus, and others with consideration of their literary qualities and their readability as historians. *Fall*. (Alternate years.) McCoy.
- 110 THE AMERICAN COLONIAL EXPERIENCE (3). Not open to graduate majors in American history. Major topics: European reconnaissance; founding of new societies; character and structure of institutions; thought and feeling from Cotton to Franklin; privilege and cost of empire. *Fall*. Nelson, Higginbotham.
- 111 REVOLUTION AND NATION-MAKING IN AMERICA, 1763-1815 (3). Not open to graduate majors in American history. Major topics: constitutional conflict in the British empire; independence and war; Confederation and Constitution; growth of political parties and nationality in a period of domestic change and international conflict. *Spring*. Higginbotham, Nelson.
- 112 JACKSONIAN AMERICA, 1815-1848 (3). Not open to graduate majors in American history. The society and politics of the United States during the period dominated by President Andrew Jackson. Topics include economic development, the expansion of slavery, religion and reform, the changing roles of women, and the political movements associated with "Jacksonian democracy." *Fall*. Watson.
- 113 UNITED STATES HISTORY, 1848-1900 (3). Not open to graduate majors in American history. An examination and interpretation of American history from the Mexican War to the beginning of the twentieth century. *Spring*. Walker, Barney.
- 114 UNITED STATES HISTORY, 1900-1932 (3). Not open to graduate majors in American history. This course deals with the political, diplomatic, social and intellectual experiences of the American people from the Spanish-American War to the Great Depression. *Both semesters*. Miller, Graham.
- 115 UNITED STATES HISTORY SINCE 1932 (3). Not open to graduate majors in American history. Diverse developments as interpreted within the framework of certain broad and open-ended themes: particularly, individual freedom, social welfare, mass culture, and community. *Both semesters*. Filene, Graham, Leuchtenburg.
- 117 THE PROMISE OF URBANIZATION: AMERICAN CITIES IN THE NINETEENTH AND TWENTIETH CENTURIES (3). A survey of the development of American cities since 1815 and their influence upon American history. *Spring*. Lotchin.
- 118 THE VIETNAM WAR AND AMERICAN SOCIETY, 1940-1975 (3). A study of the origins and course of American involvement in Vietnam including the strategy, technology and effect of the war on American society. *Fall*. Staff.
- 119 THE MEDIEVAL UNIVERSITY (3). The origins and development of the university during the period 1100-1400; types of organization, curricula and degrees, intellectual life, town-gown and student-master relationship. (Alternate years.) *Spring*. McVaugh.
- 120 THE MEDIEVAL CHURCH (Religion 133) (3). The nature and workings of the Western church between roughly 600 and 1300. Emphasis on the church 'from within'; organization, missionary strategies, liturgy, monasticism, popular religion. *Spring*. (Alternate years.) Pfaff.
- 121 MEDIEVAL THOUGHT AND LEARNING (3). A survey of the educational traditions and major (Latin) writers in Western Europe from late Roman times through the thirteenth century. *Fall*. (Alternate years.) Behrends.
- 122 EUROPE IN THE EARLY MIDDLE AGES (3). A survey of the Mediterranean World and northern Europe from the Later Roman Empire until the end of the ninth century. *Fall*. (Alternate years.) Behrends.
- 123 EUROPE IN THE HIGH MIDDLE AGES (3). A survey of the political and institutional development of primarily western Europe from late Carolingian times to the end of the thirteenth century. *Fall*. Behrends.

- 124 THE RENAISSANCE (3). Italy, birthplace of the Renaissance, 1300-1550. A study of the people, culture and intellectual achievements of the Italian Renaissance with emphasis on the interaction between culture and society. *Fall*. Bullard.
- 125 INTELLECTUAL HISTORY OF EUROPE, EARLY PERIOD (3). The course examines the gradual erosion of and criticism within the classical-Christian tradition that led to the emergence of a new mentality by the end of the seventeenth century. *Two lectures, one discussion per week, fall*. Headley.
- 126 MODERN EUROPEAN INTELLECTUAL HISTORY (3). The main developments in European thought from the Enlightenment to the twentieth century, with some attention to social context. Readings include Voltaire, Rousseau, Hegel, Marx, Toqueville, Mill, Flaubert, Nietzsche, Freud. *Spring*. Kramer.
- 127 MEDITERRANEAN SOCIETIES AND ECONOMIES IN THE RENAISSANCE WORLD (3). A picture of Mediterranean social and economic life 1300-1600, with special focus on rural and urban society, family structure, patronage, work and wages, public and private finance. *Spring*. Bullard.
- 128 EUROPE UNDER THE OLD REGIME, 1715-1787 (3). The aristocratic Old Regime societies in confrontation with the modernizing forces of royal absolutism, Enlightenment ideology, and economic change. *Fall*. Taylor.
- 129 FRANCE FROM 1787 TO 1870 (3). The French people from the Old Regime to the Commune: cultural and social sources of political instability, the revolutionary tradition, liberal and conservative movements, industrialization. *Fall*. Reid.
- 130 FRANCE SINCE 1870 (3). French society and culture from the Paris Commune of 1871 to the student revolt of May 1968. *Fall or spring*. (Alternate years.) Reid.
- 131 THE REFORMATION (Religion 134) (3). Examines a movement of religious reform that shattered Latin Christendom and contributed many of the conditions of Early Modern Europe. Emphases: religious, political, social. *Spring*. Headley.
- 132 EUROPE IN THE SEVENTEENTH CENTURY (3). The century marks the watershed in the European development. Emphases: state-craft, the emerging state-system, the new scientific world view, the impact upon European society. *Spring*. (Alternate years.) Headley.
- 133 THE FRENCH REVOLUTION, 1787-1815 (3). Collapse of the old regime, crisis of 1789, the first and second revolutions, the Terror in theory and practice, Thermidorean reaction, Directory, Napoleon and Napoleonic France, Revolutionary and Napoleonic imperialism. *Spring*. Taylor.
- 134 EUROPEAN SOCIAL HISTORY, 1815-1970 (3). The social transformation of Europe from agrarian through postindustrial society, discussing population growth, family history, spread of education, class structure, social conflict, group ideologies and mass politics as well as every day lives and popular lifestyles. *Fall*. (Alternate years.) Jarausch.
- 135 EUROPE, 1871-1918 (3). Emphasizes the disintegration of Europe, culminating in the First World War and the fall of the continental empires. *Fall or spring*. (Alternate years.) Staff.
- 136 EUROPE SINCE 1918 (3). The main currents in European history since the First World War. Special attention will be given to the interaction between national and international events and developments and to the emergence of the European communities. *Fall*. Weinberg.
- 137 MEDIEVAL ENGLAND (3). A consideration of England's origin, unification, and development as a national monarchy. Primary emphasis is on political, ecclesiastical, and cultural aspects. *Spring*. Pfaff.
- 138 TUDOR AND STUART ENGLAND, 1485-1660 (3). A lecture course, open to juniors, seniors, and graduate students. *Fall*. Baxter, Cell.
- 139 ENGLAND IN THE EIGHTEENTH CENTURY, 1660-1815 (3). A lecture course, open to juniors, seniors, and graduate students. *Spring*. Baxter.

- 140 GREAT BRITAIN IN THE NINETEENTH CENTURY, 1815-1901 (3). Emphasizes the social and economic foundations of the political, intellectual, religious, and cultural history of Victorian Britain. *Fall*. Soloway.
- 141 GREAT BRITAIN IN THE TWENTIETH CENTURY (3). Explores the economic and social foundations of British political, intellectual and cultural history from 1901 to the present. *Spring*. Soloway.
- 142 THE MAKING OF THE MODERN BRITISH CONSTITUTION (3). A study of the rise of political and economic institutions. Emphasis is placed on the common law, the courts, parliament, the crown, and the major developments of government. *Fall*. (Alternate years.) Cell.
- 143 U.S. FOREIGN RELATIONS TO 1914 (3). General coverage of the first century and a half of U.S. foreign relations—from the initial search for independence and security to the culminating adventure in empire. *Fall*. Hunt.
- 144 U.S. FOREIGN RELATIONS, 1914 TO THE PRESENT (3). A general survey of the emergence of the U.S. as a superpower with global rather than merely continental or hemispheric responsibilities. *Spring*. Hunt.
- 145 INTELLECTUAL AND CULTURAL HISTORY OF THE U.S., 1630-1860 (3). A survey of early American philosophical, religious, social, political and esthetic thought, with an emphasis on leading figures and movements from Puritanism to Romanticism. *Fall*. Capper.
- 146 INTELLECTUAL AND CULTURAL HISTORY OF THE U.S., 1860 TO PRESENT (3). This course deals with the changes and continuities in the American character, mind, and society over the past century. *Spring*. Miller.
- 147 AMERICAN CONSTITUTIONAL HISTORY TO 1876 (3). In a classroom environment characterized by discussion, simulation and interaction, the antecedents, formation and interpretation of the Constitution are confronted in a broad historical matrix. *Fall*. Semonche.
- 148 AMERICAN CONSTITUTIONAL HISTORY SINCE 1876 (3). Utilizing a classroom environment similar to 147, constitutional adjustment and change are related to psychological, political, social and economic factors and to Supreme Court members. *Spring*. Semonche.
- 150 THE SCIENTIFIC REVOLUTION (3). Traces the creation of scientific thought 1500-1700, from Leonardo to Newton, examining the various strands—Greek science, art, engineering, experimentation, occultism, etc.—woven into it. *Fall*. McVaugh.
- 151 HISTORY OF SCIENCE FROM NEWTON TO EINSTEIN (3). A survey of the development since 1700 of the various branches of physical and biological science, culminating in the twentieth-century revolution in physics. *Spring*. McVaugh.
- 152 TOPICS IN THE HISTORY OF SCIENCE (3). Takes up a different subject every year, ranging in the past from Isaac Newton to modern psychology. Presupposes some familiarity with the history of science. *Spring*. (Alternate years.) McVaugh.
- 153 SCIENCE AND THOUGHT IN THE TWENTIETH CENTURY (3). A survey of twentieth-century intellectual history broadly conceived, including revolutionary developments in modern science. *Spring*. McVaugh.
- 154 POPULAR CULTURE AND AMERICAN HISTORY (3). Study of the popular arts and entertainments of the 19th and 20th centuries and the ways in which they illuminate the values, assumptions, aspirations, and fears of American society. *Fall or spring*. (Alternate years.) Kasson.
- 155 SLAVERY IN THE NEW WORLD (3). A comparative approach to the institution of slavery in North America, Latin America and the Caribbean. *Spring*. Palmer.
- 156 HISTORY OF INTERNATIONAL RELATIONS, 1870-1919 (3). Examines the interaction of the European alliances, the impact of imperialism on international politics, the outbreak of World War I, and the diplomacy and peacemaking of that war. *Fall*. (Alternate years.) S. Williamson.

- 157 HISTORY OF INTERNATIONAL RELATIONS, 1919 TO THE PRESENT (3). A study of the "new diplomacy," totalitarian foreign policy in the 1930's, the diplomacy of World War II, the Cold War, and the re-emergence of the multipolar balance of power. *Spring*. (Alternate years.) S. Williamson.
- 158 THE BRITISH EMPIRE, 1485-1857 (3). An interdisciplinary approach to such problems as the reasons for expansion, culture contact in an imperial situation, founding of new societies, institutional transfer, and constitutional change. *Spring*. (Alternate years.) Cell.
- 159 THE BRITISH EMPIRE AND COMMONWEALTH, 1857 TO THE PRESENT (3). An interdisciplinary approach to such problems as the "new imperialism," the scramble for Africa, the impact of war on empire, the development of colonial nationalism, and the coming of independence. *Spring*. (Alternate years.) Cell.
- 160 WOMEN IN THE SOUTH (3). (Women's Studies 160) An exploration of the distinctive themes in southern women's lives, using the evidence of history and literature. *Fall or spring*. (Alternate years.) Hall.
- 162 NORTH CAROLINA HISTORY SINCE 1865 (3). The history of North Carolina from the end of the Civil War to the present. Important topics include Reconstruction, agrarian protest, disfranchisement and segregation, industrialization and workers' experience, the civil rights movement, and twentieth-century politics. *Spring*. Watson.
- 162 NORTH CAROLINA HISTORY SINCE 1865 (3). The history of North Carolina from the end of the Civil War to the present. Important topics include Reconstruction, agrarian protest, disfranchisement and segregation, industrialization and workers' experience, the civil rights movement, and twentieth-century politics. *Spring*. Watson.
- 163 THE OLD SOUTH (3). Economic, cultural, and social history of the antebellum South. The region's political history will serve as a supporting part of the study. *Spring*. J. Williamson, Walker.
- 164 THE SOUTH SINCE RECONSTRUCTION (3). A survey of the South during the past 100 years, covering developments in politics, economics, culture, and society. Course begins at the end of Reconstruction. *Fall*. Tindall.
- 165 HISTORY OF AFRO-AMERICANS, TO 1865 (3). Survey of Afro-American history from origins to abolition of slavery. Examination of role of Blacks in U.S. history to 1865. Focus on unique subculture of Afro-Americans. *Fall*. Edwards.
- 166 HISTORY OF AFRO-AMERICANS, 1865 TO PRESENT (3). Examination of role of Blacks in U.S. history after 1865. Focus on Black subculture. Analysis of theories about the Black experience in America. *Spring*. Edwards.
- 167 WHITE CULTURE AND RACE RELATIONS IN THE SOUTH (3). This course describes and analyzes the evolution of Southern white culture with emphasis on the years since 1831. It describes Southern white culture as the result of the black presence. *Fall and spring*. J. Williamson.
- 168 HISTORY OF AMERICAN BUSINESS (3). A survey of the rise and development of the major financial, commercial, manufacturing and transportation enterprises which transformed the United States from an agricultural into a leading industrial nation. *Spring*. Coclanis.
- 169 THE WORKER AND AMERICAN LIFE (3). From the experience of colonial artisans to contemporary factory and office workers, organized and unorganized, this course examines the effect of the industrial revolution on the American social and political landscape. *Spring*. Fink.
- 170 TECHNOLOGY AND AMERICAN CULTURE (3). Technology's impact on American thought and society and the responses it has engendered. Topics will include: the factory town; search for utopia; impact of Henry Ford; war and depersonalization. (Alternate years.) *Fall or spring*. Kasson.
- 171 ARGENTINA IN THE 20TH CENTURY (3). A survey of political events in the 20th century focusing on the experiments in democracy, the Radical Party, and the rise of militarism. *Spring*. Tulchin.

- 172 THE DEVELOPMENT OF LATIN AMERICAN SOCIETY (3). Prerequisite, some contact with Latin America through courses or personal experience. Selected aspects of Latin American social history, such as race relations, land tenure, labor systems, violence and social upheaval. *Spring*. (Alternate years.) Joseph.
- 173 PRE-COLUMBIAN AND COLONIAL MEXICO (3). Examines pre-Columbian Indian civilizations, the Spanish conquest, colonial society, the rise of nationalism and the achievement of political independence. *Fall*. Palmer.
- 174 HISTORY OF MEXICO SINCE INDEPENDENCE (3). Topical approach to the history of modern Mexico, from the wars of independence to the present. Stress is placed upon broad socioeconomic and political trends, particularly the success or failure of the Revolution of 1910. *Fall*. Joseph.
- 175 INTER-AMERICAN RELATIONS (3). Political, diplomatic and economic relations in the Western Hemisphere from the independence of Latin America to the present. Special consideration to the concept of informal empire, power relationships and policy formulation. *Spring*. (Alternate years.) Tulchin and Joseph.
- 177 LATIN AMERICAN URBAN HISTORY (3). Focuses on the structure and function of cities as well as their place in the historical evolution of Latin American society, from the Pre-Columbian era to the present. *On demand*. Tulchin.
- 178 HISTORY OF SPAIN (3). A survey of Spanish history from the Islamic invasion to Napoleon. Particular attention will be given to the period of the Habsburgs, 1516-1700. *Spring*. (Alternate years.) Headley.
- 179 HISTORY OF BRAZIL (3). This course is concerned primarily with the creation of a new society through race mixture and culture change, and with the political and economic development of Brazil. *Fall or spring*. (Alternate years.) Joseph.
- 180 RUSSIA AND THE WEST IN THE EIGHTEENTH CENTURY (3). A comparative approach, centering on Russia's contacts with the West, the resulting interaction, and the efforts of Russians to define the unique nature of their own society. *Spring*. (Alternate years.) Griffiths.
- 181 RUSSIA, 1796-1917 (3). The diplomatic, military, and ideological confrontations with the West; the decline and fall of the Russian autocracy; the evolution of reform thought and revolutionary opposition. *Spring*. Brooks.
- 182 HISTORY OF THE SOVIET UNION (3). A close study of the revolution of 1917 and the subsequent political, social, economic and cultural transformation of Russia. The Marxian dream and Soviet totalitarianism. *Fall*. Baron.
- 184 HISTORY OF SOCIALIST THOUGHT (3). An examination of the origins and development of Marxist ideas, and their application to specific historical conditions: in Germany, Russia, China, Algeria, Cuba, and modern industrial society. *Spring*. Griffiths.
- 185 RUSSIA FROM IVAN THE TERRIBLE TO PETER THE GREAT (3). The evolution of a distinctive Muscovite society and culture. Territorial expansion; the rise of autocracy, serfdom, and the compulsory service-state; popular rebellions and the church schism; relations with the West. *Spring*. Baron.
- 186 INTELLECTUAL HISTORY OF IMPERIAL RUSSIA (3). Interpretive lectures examine the most significant ideas and personalities and major social trends in modern Russia, emphasizing the decline of serfdom, growth of capitalism (and Marxism), and the impact of the West on Russia. *Fall*. Brooks.
- 187 HISTORY OF CZECHOSLOVAKIA (3). A case study of a small nation in the world of super-powers. *On demand*. Anderle.
- 188 THE RISE AND FALL OF THE HABSBURG EMPIRE, 1526-1918 (3). A study of the development of this multinational empire, its special role in the fortunes of Central Europe, and its demise under the impact of modern nationalism and great power conflicts. *On demand*. Anderle.

- 189 EAST EUROPEAN COMMUNISM (Political Science 139) (3). An examination of Communist regimes of Eastern Europe, their origins and development since World War II, their cohesion and conflict. *Spring*. Anderle.
- 190 RELIGION AND IDEOLOGY IN U.S. HISTORY (Religious Studies 149) (3). Prerequisite, Introductory History or Religious Studies course. A study of religion, collective action, and collective violence in U.S. history. *Fall*. (Alternate years.) Mathews.
- 191 WOMEN AND RELIGION IN U.S. HISTORY (Women's Studies 191) (3). Prerequisites are introductory courses in religious or women's studies or U.S. history. An interdisciplinary consideration of women's roles, behavior, and ideas in the religious life of Americans from 1636 to 1982. *Spring*. Mathews.
- 192 TRADITIONAL CHINA AND ITS COLLAPSE (3). Examines traditional social, political, and cultural patterns and its fortunes of the Ch'ing dynasty (1644-1911) to its demise under the twin burdens of internal decay and foreign aggression. *Spring*. Kessler.
- 196 HISTORY OF EUROPEAN SOCIAL THEORY (3). Prerequisite, previous work in European history or permission of instructor. To read and analyze a number of classic authors in European social thought, viz., Smith, Marx, Weber, Durkheim, Freud. *Fall*. Kramer.
- 198 GERMANY, 1815-1918 (3). The nature of Prussian society, the rivalry between Prussia and Austria for the command of German affairs, and the quality of Prussian leadership in the German Empire of 1871. *Fall*. (Alternate years.) Jarausch.
- 199 HISTORY OF GERMANY SINCE 1918 (3). Politics and culture in the Weimar Republic. Nazi totalitarianism, and the reshaping of East and West Germany since World War II. *Spring*. Weinberg.

Courses for Graduates

- 200 GRADUATE STUDIES IN HISTORY: FIRST COURSE (3). Introduction to research. Required for all first year students; sections for American and non-American concentrators. *Fall*.
- 203 COLLOQUIUM ON MODERN EUROPE (3). Directed readings on European History, from Britain through European Russia, from early modern times to the present. Required for students entering in European History who do not take History 205. *Both semesters*.
- 204 READINGS IN RUSSIAN AND EAST EUROPEAN HISTORY (3). A sequence of four courses on the several periods and the main themes of Russian and East European History. *Fall or spring*. Anderle, Baron, Brooks, Griffiths.
- 205 COLLOQUIUM ON PRE-MODERN EUROPE (3). Directed readings on European History from the classical world to early modern times. Required for second-year students in Ancient or Medieval History, and for students in European History who do not take History 203. *Both semesters*.
- 206 PROBLEMS IN GREEK HISTORY, 600-323 B.C. (3). Prerequisite, consent of instructor. (Alternate years.) *Spring*. McCoy.
- 207 COLLOQUIUM IN LATIN-AMERICAN HISTORY (3). Directed readings on Latin-American history from pre-conquest to the present; required for students entering in that field. *Fall or spring*.
- 208 HISTORY OF ROME, 27 B.C.-180 A.D. (Alternate years.) *Spring*. Boren.
- 209 INTRODUCTORY COLLOQUIUM IN UNITED STATES HISTORY (3). Directed readings on American History; required for students entering in that field. *Both semesters*.
- 215 READINGS IN THE HISTORY OF THE MIDDLE EAST (3). *On demand*. Bodman.
- 217 READINGS IN URBAN HISTORY (3). *Spring*. (Alternate years.) Lotchin.
- 219 EUROPE IN THE SIXTEENTH CENTURY (3). *Spring*. (Alternate years.) Headley.

- 220 READINGS IN EUROPEAN WOMEN'S HISTORY (Women's Studies 220) (3). A readings course in the history of Women in Europe. *Fall*. Bennett.
- 221 READINGS IN AMERICAN WOMEN'S HISTORY (Women's Studies 221) (3). A readings course in the history of women in the United States. *Fall*. Hall, DeHart-Mathews.
- 222 SELECTED TOPICS IN THE COMPARATIVE HISTORY OF WOMEN (Women's Studies 222) (3). Prerequisite, History 220 or 221 recommended. Directed readings on selected topics in the history of women in Western Europe and the United States. *Fall*. Bennett, Hall, DeHart-Mathews.
- 224 FRANCE, THE GERMAN EMPIRE AND THE PAPACY IN THE HIGH MIDDLE AGES (3). Prerequisite, reading knowledge of French or German. *Fall*. (Alternate years, on demand.) Behrends.
- 226 READINGS IN THE INTELLECTUAL HISTORY OF EUROPE (3). *Spring*. Kramer.
- 227 READINGS IN EARLY MODERN EUROPEAN HISTORY (3). *Fall*. Bullard.
- 233 PROBLEMS IN THE HISTORY OF THE FRENCH REVOLUTION (3). Readings, reports, and discussion on aspects of the French Revolutionary upheaval in Europe. *Spring*. Taylor.
- 234 READINGS IN 19TH CENTURY EUROPEAN HISTORY (3). *Fall*. Jarausch.
- 235 READINGS IN EUROPEAN SOCIAL HISTORY (3). *Spring*. (Alternate years.) Reid.
- 236 EUROPE BETWEEN THE TWO WORLD WARS (3). *Fall*. (Alternate years.) Weinberg.
- 238 POLITICAL AND INTELLECTUAL HISTORY OF ENGLAND UNDER THE TUDORS AND THE STUARTS (3). Prerequisite, History 138. *Fall or spring*. (Alternate years.) Baxter.
- 239 MEDIEVAL ENGLAND (3). Prerequisite, History 137 or equivalent. *Fall*. (Alternate years.) Pfaff.
- 240 STUDIES IN MODERN ENGLISH HISTORY (3). Directed readings in 19th and 20th century English history. Topics will vary from year to year. *Fall or spring*. (Alternate years.) Soloway.
- 241 STUDIES IN 20TH CENTURY ENGLAND (3). Directed readings in 20th century English history. Topics will vary from year to year. *Fall or spring*. (Alternate years.) Soloway.
- 242 ENGLAND IN THE EIGHTEENTH CENTURY (3). Directed readings in English 18th Century history; the topics selected, political, economic, diplomatic, social, or intellectual, will vary on demand. *Spring*. (Alternate years.) Baxter.
- 244 HISTORY OF U.S. FOREIGN RELATIONS (3). *Fall*. (Alternate years.) Hunt.
- 245 HISTORY AND THE SOCIAL SCIENCES (3). The relationship of the social sciences to history, logic of inquiry, use of quantitative methods, introduction to the computer. *Fall or spring*. Tulchin, Jarausch.
- 246 TOPICS IN AMERICAN INTELLECTUAL HISTORY (3). Readings and discussions on selected topics in the history of American thought and intellectual culture. *Fall or spring*. (Alternate years.) Capper.
- 249 CIVILIZATION IN THE AMERICAN COLONIES, 1607-1775 (3). *Fall*. (Alternate years.) Nelson.
- 250 THE AMERICAN REVOLUTIONARY ERA, 1763-1789 (3). *Spring*. (Alternate years.) Higginbotham.
- 251 THE FEDERAL PERIOD, 1789-1820 (3). Readings, discussion, and book lists designed to give familiarity with the historiographical problems, research opportunities, and bibliography of the period. *Spring*. (Alternate years.) Higginbotham.
- 252 THE MIDDLE PERIOD, 1815-1860 (3). An analysis of the material and ideological transformations within the antebellum republic which climaxed in the sectional crisis of the 1850's. *Fall*. (Alternate years.) Barney.
- 253 PROBLEMS IN U.S. SOCIAL HISTORY (3). Studies of basic problems in social history of the United States with special attention to the historiographical issues raised

- by a systematic study of society with regard to social structure, ideology, collective action, community, and change. *Fall*. Barney, Fink, Hall, D. Mathews, Watson.
- 254 CIVIL WAR AND RECONSTRUCTION, 1860-1876 (3). *Spring*. Walker.
- 255 FOUNDATIONS OF MODERN AMERICA (3). *Spring*. (Alternate years.) Miller.
- 256 RECENT AND CONTEMPORARY UNITED STATES (3). *Fall or spring*. Graham, Leuchtenburg.
- 257 TOPICS IN THE HISTORY OF INTERNATIONAL RELATIONS (3). An intensive examination of different aspects of international relations, with special emphasis on the period since 1848 and the diplomacy of the European state system. *Fall*. (Alternate years.) S. Williamson.
- 258 TOPICS IN BRITISH HISTORY AND IN BRITISH IMPERIAL HISTORY (3). *Spring*. Cell.
- 259 POLITICAL AND SOCIAL HISTORY OF MODERN AMERICA (3). A course of readings for advanced students that will relate social history to the history of the State in America in the period from the Great Depression and the New Deal to the present. *Spring*. Leuchtenburg.
- 260 PUBLIC HISTORY (3). An introduction to the various aspects of "public" (or "applied") history: cultural resources management, community and institutional history, and history in public and private policy-making. *Spring*. Graham.
- 264 READINGS IN THE SOUTH SINCE RECONSTRUCTION (3). Readings, reports, and discussions on selected topics with a view to gaining familiarity with the literature of the field. *Fall*. Tindall.
- 265 READINGS IN AFRO-AMERICAN HISTORY (3). Graduate students will compile bibliographies and read important contributions to various aspects of Afro-American history, stressing shifts in Afro-American historiography and including very recent works. *Fall*. Painter.
- 268 COMPARATIVE LABOR HISTORY (3). Course examines labor in the nineteenth and twentieth centuries from a comparative perspective. Depending on instructor's expertise, it will pair two of the following: American, European, and Latin American labor. *Spring*. (Alternate years.) Fink, Reid, Joseph.
- 269 TOPICS IN AMERICAN CULTURAL HISTORY (3). *Fall*. (Alternate years.) Kasson.
- 270 PROBLEMS IN LATIN AMERICAN HISTORY (3). *Spring, fall, on demand*. Tulchin, Joseph.
- 271 LATIN AMERICAN HISTORIOGRAPHY (3). *Spring, on demand*. Tulchin, Joseph.
- 290 TOPICS IN HISTORY FOR GRADUATES (3). *Fall or spring*. Staff.
- 298 READINGS IN THE HISTORY OF EUROPE SINCE 1789 (3). *On demand*. Staff.
- 299 INDEPENDENT STUDY FOR GRADUATE STUDENTS (3). Independent reading programs for graduate students whose needs are covered by no course immediately available. Consent of instructor required. For students physically resident in Chapel Hill. *Fall or spring*. Staff.
- 300 GRADUATE STUDIES IN HISTORY: SECOND COURSE (3). Application of research skills to historical investigation. Required for all first-year students; sections for American and non-American concentrators. *Spring*.
- 301 ANCIENT HISTORY (3). Conference and reports. *Spring*. Boren, McCoy.
- 311 MEDIEVAL HISTORY (3). (A reading knowledge of Latin is required.) Conference and reports. *Fall*. (Alternate years, on demand). Behrends.
- 312 MEDIEVAL ENGLAND: SEMINAR (3). Prerequisite, previous work in English Medieval History and some knowledge of Latin. *Spring*. (Alternate years.) Pfaff.
- 316 SEMINAR IN MODERN BRITISH AND BRITISH IMPERIAL HISTORY (3). Conferences and reports. *Spring*. (Alternate years.) Cell.
- 318 EUROPEAN INTELLECTUAL HISTORY (3). The study of beliefs and values in modern European societies. (Alternate years.) Kramer.
- 319 EARLY MODERN EUROPEAN HISTORY (3). Conference and reports. *Fall*. (Alternate years.) Headley.

- 321 RECENT EUROPEAN HISTORY (3). Conference and reports. *Spring*. (Alternate years.) Weinberg.
- 322 TUDOR-STUART ENGLAND (3). Conference and reports. *Fall or spring*. (Alternate years.) Baxter.
- 323 SEMINAR: MODERN ENGLAND (3). *On demand*. Soloway.
- 324 SEMINAR IN MODERN EUROPEAN HISTORY (3). Conference and reports. *Spring*. Jarausch.
- 325 SEMINAR IN MODERN RUSSIAN HISTORY (3). Conference and reports. *Fall*. Baron, Griffiths.
- 326 SEMINAR IN SLAVIC HISTORY (3). *Spring*. Staff.
- 327 SEMINAR IN INTERNATIONAL RELATIONS SINCE 1848 (3). An investigation of European and international politics/relations since 1848. A reading knowledge of French or German is desirable. *Fall*. (Alternate years.) S. Williamson.
- 330 THE AMERICAN REVOLUTION, 1763-1789 (3). *Fall*. Higginbotham.
- 331 AMERICAN COLONIAL HISTORY (3). Conference and reports. *Spring*. (Alternate years.) Nelson.
- 332 THE EARLY NATIONAL PERIOD, 1783-1815. *Fall*. Staff.
- 333 THE NATIONAL PERIOD, 1815-1860 (3). *Spring*. (Alternate years.) J. Williamson.
- 334 SEMINAR IN NINETEENTH AND TWENTIETH CENTURY AMERICAN URBAN HISTORY (3). *Spring*. (Alternate years.) Lotchin.
- 335 RECENT HISTORY OF THE UNITED STATES (3). *Fall*. Graham, Leuchtenburg.
- 336 CIVIL WAR AND RECONSTRUCTION (3). Conference and reports. *Spring*. Staff.
- 338 THE SOUTH SINCE RECONSTRUCTION (3). *Spring*. Tindall.
- 339 SEMINAR IN AMERICAN INTELLECTUAL AND CULTURAL HISTORY (3). Research seminar in the history of American thought and intellectual culture. *Fall or spring*. (Alternate years.) Capper, Miller.
- 340 SEMINAR IN AMERICAN CONSTITUTIONAL HISTORY (3). *On demand*. Semonche.
- 341 SEMINAR IN U.S. SOCIAL HISTORY (3). Seminar emphasizing topics, methods, theories and research in the history of American society. *Spring*. Barney, Fink, Hall, D. Mathews, Watson.
- 342 SEMINAR IN AFRO-AMERICAN HISTORY (3). Graduate students already well read in Afro-American history will write original research papers in the field. *Spring*. Painter.
- 343 SEMINAR IN MID-NINETEENTH CENTURY AMERICAN HISTORY (3). *Spring*. (Alternate years.) Walker.
- 344 SEMINAR IN THE HISTORY OF U.S. FOREIGN RELATIONS (3). *Fall or spring*. (Alternate years.) Hunt.
- 350 SEMINAR IN THE HISTORY OF SCIENCE (3). *On demand*. McVaugh.
- 360 SEMINAR IN COMPARATIVE HISTORY (3). (Alternate years, on demand.) Staff.
- 371 SEMINAR IN LATIN AMERICAN HISTORY (3). *Fall or spring*. Tulchin, Joseph.
- 387 RESEARCH SEMINAR ON WOMEN'S HISTORY (Women's Studies 387) (3). A research seminar on the history of women in Western Europe and the United States. *Spring*. Hall, Bennett, DeHart-Mathews.
- 390 SEMINAR IN HISTORY (3). Given on demand and as resources permit, in fields which lack another regularly scheduled seminar offering. *Fall and spring*. Staff.
- 393 MASTER'S THESIS (3 or more). *Fall or spring*. Members of the graduate faculty.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Members of the graduate faculty.
- 399 HISTORICAL EXPLANATION AND RESEARCH DESIGN (3). A dissertation practicum, discussing problems of historical explanation in conjunction with a student's choice and articulation of a dissertation topic. Required of all doctoral candidates in the last semester of course work. *Spring*. Staff.
- 400 GENERAL REGISTRATION (0).

SCHOOL OF INFORMATION AND LIBRARY SCIENCE

EVELYN H. DANIEL, *Dean*

BARBARA B. MORAN, *Assistant Dean*

Professors

- | | | |
|----------------------|------|--|
| ROBERT N. BROADUS | (16) | Collection Development, Library Buildings and Equipment, Bibliography |
| RAYMOND L. CARPENTER | (1) | Research Methods, Information Services for the Social Sciences, Comparative Librarianship |
| EVELYN H. DANIEL | (36) | Information Resources Management, Telecommunications and Networking, Organization Theory, Information Processing |
| JAMES F. GOVAN | (20) | University Librarian |
| EDWARD G. HOLLEY | (5) | Academic Libraries, Library Administration, Library History |
| MARY E. KINGSBURY | (7) | Children's Literature, Storytelling, Information Resources |

Associate Professors

- | | | |
|----------------------|------|--|
| BARBARA B. MORAN | (30) | Academic Libraries, Management, Research Methods, Popular Materials |
| WILLIAM M. SHAW, JR. | (32) | Bibliometrics, Information Retrieval, Library Effectiveness |
| SUSAN STEINFIRST | (15) | Services for Young Adults, Children's Literature, History of Children's Literature |

Assistant Professors

- | | | |
|--------------------|------|---|
| ELFREDA A. CHATMAN | (39) | Public Librarianship, Information Agencies, Management, Information Diffusion |
| ROBERT M. LOSEE | (40) | Information Retrieval, Information Science, Decision Making |
| JERRY D. SAYE | (37) | Organization of Information, Records Management, Abstracting and Indexing, Technical Services, Academic Librarianship |
| JUDITH B. WOOD | (33) | Information Science, Information Retrieval and Online Databases, Science and Medical Literature |

Adjunct Professors

- | | | |
|------------------|------|--|
| LAURA N. GASAWAY | (34) | Law Librarianship |
| JOE A. HEWITT | (21) | Theory of Classification, Technical Services |

Adjunct Instructors

RIDLEY R. KESSLER, JR.	(23)	Public Documents, Reference
CHARLES B. McNAMARA	(42)	Preservation, Rare Book Librarianship
IDA M. REED	(41)	Music Librarianship
DIANE C. STRAUSS	(35)	Business Information Sources

Professors Emeriti

LESTER ASHEIM
 MILDRED H. DOWNING
 BUDD L. GAMBEE
 LUCILLE KELLING HENDERSON
 GERTRUDE LONDON
 HAYNES McMULLEN
 MARY W. OLIVER
 JERROLD ORNE

The program of the School of Information and Library Science is designed to prepare candidates for positions as professional librarians and information specialists in all types and varieties of libraries—academic, public, school, special— and information systems, as well as to encourage their participation in the advancement of information work through study and research. The School offers graduate instruction leading to the degrees of Master of Science in Library Science and Doctor of Philosophy.

The master's program provides an integrated core curriculum in the fundamental aspects of information science and librarianship, scholarly communication and information organization and use, with additional courses to equip the candidate for significant contributions within the chosen area of emphasis. The selection of advanced courses is dependent upon the previous training and experience of the student and is determined through conferences between the student and his or her faculty advisor.

The basic requirement for admission to the master's program is a bachelor's degree from a recognized college or university. The student's undergraduate work should evidence a balanced distribution of courses in the sciences, the social sciences, and the humanities; quantitative training is increasingly important. Admission involves meeting the requirements for admission to the Graduate School, as described on pages 50–51, and submission of acceptable scores on the Aptitude Test of the Graduate Record Examination. After enrollment, each student will be required to complete a three semester hour foundations course, a course in research methods, a course in computing for information use, and a field experience. These courses will be supplemented by additional courses in information/librarianship and other subject fields as recommended by the School. The degree candidate will be expected to complete forty-eight semester hours of graduate study. For details regarding the entrance requirements and curriculum provisions for the master's program, see the separate Record of the School of Information and Library Science.

Students interested in the doctoral program should request further information from The School of Information and Library Science, CB# 3360, Manning Hall, The University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-3360.

The School of Information and Library Science occupies three floors of Manning Hall. The building, constructed in 1922, was completely renovated and air conditioned in 1970. The School's quarters afford ample space to house a computer laboratory, a special children's collection and audiovisual facilities, in addition to offices, classrooms, the Bibliographic Control Laboratory, and the Information and Library Science Library.

Courses for Undergraduate Students

- 92 SURVEY AND EVALUATION OF MATERIALS FOR CHILDREN: EARLY CHILDHOOD (3). A survey of materials for children, designed for prospective teachers enrolled in the program in Early Childhood Education. Steinfirst.
- 93 SURVEY AND EVALUATION OF MATERIALS FOR CHILDREN: INTERMEDIATE GRADES (3). A survey of materials for children, designed for prospective teachers enrolled in the program in Early Childhood Education. Kingsbury.

Courses for Graduates and Advanced Undergraduates

- 101 FOUNDATIONS: PHILOSOPHY AND THEORY OF INFORMATION (3). Introduction to libraries and the information profession. The study of how information is transmitted, acquired, organized, retrieved, managed, and used. Staff.
- 102 INTRODUCTION TO COMPUTING FOR INFORMATION USE (3). Study of the information processes that use computers in libraries and information systems. Development of skill in text processing and database management systems. Introduction to programming. Losee.
- 103 INFORMATION SYSTEMS IN LANGUAGE RESEARCH (Computer Science 119X) (3). Prerequisite, Computer Science 14, 114 or equivalent. Concepts of information and information processing as they relate to language research in the humanities and social sciences. Hardware and software systems for language research. Programming projects required. Staff.
- 107 MODERN PUBLISHING AND THE BOOK INDUSTRY (3). Functions of the modern book publishing organization; techniques of book production including the uses of automation; bookselling; the challenges of other media. Brief consideration of the history of American publishing. Staff.
- 108 HISTORY OF BOOKS AND LIBRARIES (3). The history of human communication focusing on the origin and development of libraries and librarianship. Holley.
- 110 SELECTED TOPICS (3). Members of the faculty. Course offered during the 1987-88 academic year:
110(40) TELECOMMUNICATIONS SYSTEMS (3). Losee.
- 111 INFORMATION RESOURCES (3). Introduction to the analysis, use and evaluation of information resources. Covers various forms of recorded knowledge with attention to complementary computer-based and micrographic sources. Kingsbury.
- 115 NATURAL LANGUAGE PROCESSING (Computer Science 171) (3). Prerequisite, Computer Science 14, or the equivalent. Statistical, syntactic, and semantic models of natural language. Tools and techniques needed to implement language analysis and generation processes on the computer. Staff.

- 120 HISTORY OF CHILDREN'S LITERATURE (3). A survey of children's literature in English from the Middle Ages through the nineteenth century. Steinfirst.
- 122 YOUNG ADULT LITERATURE AND RELATED MATERIALS (3). A survey of print and nonprint library materials particularly suited to the needs of adolescents. Steinfirst.
- 123 CHILDREN'S LITERATURE AND RELATED MATERIALS (3). Survey of literature and related materials for children with emphasis on 20th century authors and illustrators. Kingsbury.
- 125 NONBOOK MEDIA AS LIBRARY RESOURCES (3). Principles of selecting, acquiring, organizing, storing and using audiovisual materials in libraries of all types and in materials centers. Materials discussed include films, videorecordings, filmstrips, slides, microforms, audiorecordings, and graphics. Staff.
- 131 MANAGEMENT OF INFORMATION AGENCIES (3). An introduction to management in libraries and other information agencies. Topics to be studied include planning, budgeting, organizational theory, information sources for managers, staffing, leadership, organizational change, and decision making. Moran, Carpenter, Chatman.
- 143 MICROCOMPUTERS IN THE SCHOOL LIBRARY MEDIA CENTER (3). Identifies media center functions for automation; analyzes planning considerations; selects and evaluates existing software; determines equipment hardware; and evaluates implementation procedures and resulting applications. Staff.
- 145 ADMINISTRATION OF THE SCHOOL LIBRARY MEDIA CENTER (3). Administration of elementary and secondary school library media programs. Considers program planning and evaluation, policies and procedures for management, staffing, facilities, and budgeting. Staff.
- 151 ORGANIZATION OF MATERIALS I (3). An introduction to the problems of organizing information and collections of material. Formal systems for cataloging and classifying are studied. Saye.
- 158 ONLINE DATABASES: USE AND EVALUATION (3). Examination of the underlying structure of commercial online databases and their retrieval languages; experience in using these databases. Wood.
- 162 SYSTEMS ANALYSIS (3). Applications of structured systems analytic techniques to the study and description of library operations. Methods for determining the appropriateness of software packages for library automation are considered. Losee.
- 165 RECORDS MANAGEMENT (3). Prerequisites, LIBS 101 and 102 or equivalent. Introduces the principles of records center design, records analysis and appraisal, filing systems, reprographics and forms, reports and correspondence management. Legal issues and the security of records are also covered. Saye.
- 172 INFORMATION RETRIEVAL (Computer Science 172) (3). Prerequisite, LIBS 102, Computer Science 14, or the equivalent. Study of information retrieval and question answering techniques, including document classification, retrieval and evaluation techniques, handling of large data collections, and the use of feedback. Losee.
- 176 INFORMATION MODELS (3). An introduction to information science surveying its various representations and information flows and examining major analytical techniques used in the field. Losee.
- 201 RESEARCH METHODS (3). An introduction to research methods used in library and information science. Includes the use of packaged computer programs (SAS and SPSS) for statistical analysis, and the writing of a research proposal. Moran, Shaw.
- 204 INTERNATIONAL AND COMPARATIVE LIBRARIANSHIP (3). The concepts of the library's role in other countries; trends in international cooperation; American participation in international library-related organizations and programs. Carpenter.
- 207 INFORMATION STRUCTURES (3). Prerequisite, LIBS 102, LIBS 201 or equivalent. An introduction to the quantitative analysis of the elements of written communication. Relationships among these elements are applied to problems in automatic classification, document retrieval and indexing, and scholarly communication. Shaw.

- 216 REFERENCE AND INFORMATION SERVICES (3). Administrative and professional responsibilities in the provision of reference and information services; includes policy development and implementation styles of communication and linkage, ethics, integration of information technologies, assessment, and evaluation. Staff.
- 220 STORYTELLING: MATERIALS AND METHODS (3). Prerequisite, permission of instructor. The storyteller as an agent in the transmission of culture. Experience in selecting, adapting, and presenting materials from the oral tradition and modern literary sources. Opportunity for more intense study by each student of the customs and folklore of a single culture. Kingsbury.
- 221 READING INTERESTS AND GUIDANCE OF CHILDREN AND YOUNG ADULTS (3). Prerequisites, Library Science 122 and 123, or equivalent. Reading habits and interests in children and young adults; emphasis on readability factors, selection of readable materials, and the design of group guidance activities. Staff.
- 222 SCIENCE INFORMATION SOURCES (3). Prerequisite, LIBS 158. Survey of the literature in the physical and biological sciences, with emphasis on major bibliographic and fact sources and including online reference services. Wood.
- 223 SOCIAL SCIENCE INFORMATION SOURCES (3). Prerequisite, 158. Survey of the social sciences, their development, and selected major figures. Emphasis on bibliographic resources including online reference services and numerical databases. Site visits to special collections. Carpenter.
- 224 HUMANITIES INFORMATION SOURCES (3). A survey of informational materials in the arts and humanities. Attention to reference resources, including online bibliographic services. Broadus.
- 225 HEALTH SCIENCES INFORMATION SOURCES (3). Prerequisite, LIBS 158. A survey of information used in the health sciences disciplines and professions. The organization of sources, current techniques and tools for its control including online databases. Staff.
- 227 BUSINESS INFORMATION SOURCES (3). A survey of print and nonprint materials used in business. Attention to reference sources including online databases. Strauss.
- 228 PUBLIC DOCUMENTS (3). A survey of the major publications of the United States federal government, United Nations, United States governments, and British government, with attention to the selection, classification, and administration of a document collection. Kessler.
- 229 LAW LIBRARIES AND LEGAL RESOURCES (3). Prerequisite, permission of instructor. An introduction to the legal system and the development of law libraries, their unique objectives, characteristics, and functions. The literature of Anglo-American jurisprudence and computerized legal research are emphasized as well as research techniques. Gasaway.
- 231 PRINCIPLES OF LIBRARY ADMINISTRATION (3). Principles and practices of library organizations and operation; library governance, finance, and standards. Planning, directing, controlling, staffing, and financing library activities. Carpenter.
- 232 LIBRARY EFFECTIVENESS (3). Prerequisite LIBS 201 recommended. Application of systematic analytical methods to the problems of management and organization. Emphasis on the use of selected techniques in designing the solutions to problems in library and information service. Shaw.
- 234 HUMAN RESOURCES MANAGEMENT (3). An in-depth look at the management of human resources in libraries and other information agencies. Includes topics such as recruitment, hiring, job analysis, performance appraisal, training and compensation. Moran.
- 235 LIBRARY BUILDINGS AND EQUIPMENT (3). The planning of buildings for all types of libraries; selection and purchase of equipment; analyses of existing examples of good and bad results. Broadus.

- 241 ADMINISTRATION AND SUPERVISION OF PUBLIC SCHOOL LIBRARY SYSTEMS (3). The principles and problems in system-wide school library service, together with the functions and duties of coordinators and supervisors of school libraries. Staff.
- 242 ROLE OF THE SCHOOL LIBRARY MEDIA SPECIALIST IN CURRICULUM IMPLEMENTATION (3). Considers the curriculum implementation and teaching roles of the media specialist including the development of multimedia collections and the instruction media retrieval programs. Staff.
- 243 ADMINISTRATION OF PUBLIC LIBRARY WORK WITH CHILDREN AND YOUNG ADULTS (3). Objectives and organization of public library services for children and young adults; designed for those who may work directly with young people or who intend to work in public libraries. Staff.
- 251 ORGANIZATION OF MATERIALS II (3). Prerequisite, LIBS 151. Examination of underlying principles and consideration of future trends in the reorganization of information and materials. Training in original cataloging and classification, and online systems. Saye.
- 256 AUTOMATING INFORMATION SYSTEMS: SUBJECT ANALYSIS (3). Prerequisite, a knowledge of programming equivalent to that required for LIBS 102 or equivalent. An investigation of the basic goals and objectives of subject analysis, from thesaurus construction through evaluation of retrieval systems. Staff.
- 258 ADVANCED ONLINE RETRIEVAL (3). Prerequisite LIBS 158. In-depth investigation of topics in online information retrieval with emphasis on managing search services and assisting and evaluating others in acquiring knowledge and experience in this rapidly growing area. Wood.
- 262 ADULT MATERIALS IN LIBRARIES (3). Selection and use of books, periodicals, pamphlets, and audiovisual materials (other than reference) on all subject, for adults in public and academic libraries. Broadus.
- 265 ABSTRACTING AND INDEXING (3). Prerequisites, LIBS 102, LIBS 158. Presents the basic principles of subject analysis through the development and analysis of abstracts, indexes and classification systems. Both natural language and controlled vocabulary indexing is covered. Saye.
- 282 MUSIC LIBRARIANSHIP (3). Survey of the history and practice of music librarianship, with an emphasis on administration, collection development and public service in academic and large public libraries. Reed.
- 299 SUPERVISED FIELD EXPERIENCE (3). Prerequisites, completion of 24 semester hours and permission of advisor. Supervised observation and practice in an approved library or other information service agency. The student will work a required amount of time at the worksite and attend 5 hours of faculty-led group discussions for ongoing evaluation of the practical experience. Staff.
- 300 READINGS AND SPECIAL STUDIES IN LIBRARIANSHIP (3). Prerequisite, permission of the instructor. Advanced reading, study, and research by an individual student on a special topic under the direction of a specific faculty member. Members of the graduate faculty.
- 302 METHODOLOGIES FOR RESEARCH IN LIBRARIANSHIP (3). A survey of various methodologies useful in understanding libraries and solving their problems. Quantitative and nonquantitative techniques will be considered. Shaw.
- 306 SEMINAR IN ISSUES AND TRENDS IN LIBRARIANSHIP (3). Prerequisites, doctoral student status or permission of instructor. Examination and analysis of current issues and trends in librarianship, including public policy, legislation, leadership, intellectual freedom, and personnel. Holley.
- 307 THE AGENCIES AND MEDIA OF COMMUNICATION (3). A survey of the social role of the major media and agencies of communication with special attention to the role of the library as one such agency. Staff.

- 308 SEMINAR IN TEACHING AND ACADEMIC LIFE (3). Prerequisite, doctoral student status or permission of instructor. Examines teaching, research, publication, and service responsibilities; provides historical prospective, teaching experience, syllabi construction, test preparation, and discussion of the ethics, rewards and problems of academic life. Kingsbury.
- 309 PROBLEMS IN EDUCATION FOR LIBRARIANSHIP (3). Prerequisite, doctoral student status or permission of instructor. Programs for education for librarianship in the U.S., seen within the framework of professional education in general; exploration of how curricular elements meet changing goals and objectives of a library education program. Staff.
- 310 SEMINAR IN SELECTED TOPICS (1-6). Exploration of a special topic not otherwise covered in the curriculum. Members of the faculty. Courses offered during the 1987-88 academic year include:
- 310 (39) SEMINAR IN THEORY DEVELOPMENT. Chatman.
- 310 (36) EXPERT SYSTEMS APPLIED TO INFORMATION RETRIEVAL. Losee.
- 310 (44) MARKETING OF LIBRARY AND INFORMATION SERVICES. McGinn.
- 315 SEMINAR IN PUBLIC SERVICES (3). Prerequisite, permission of instructor. Examination of client-centered services in libraries and information centers. Includes: needs assessment methodologies; planning, organization, implementation, and evaluation of services; proactive and interactive styles of service. Chatman.
- 320 SEMINAR IN CHILDREN'S LITERATURE (3). Prerequisites, LIBS 123 or equivalent, and permission of instructor. Advanced study of a selected topic relating to literature for children. Kingsbury.
- 326 SEMINAR: POPULAR MATERIALS IN LIBRARIES (3). Selected topics relating to the roles of various types of libraries in the provision and preservation of popular materials (light romances, science fiction, comic books, etc.) existing in various forms (print, recorded sound, etc.). Moran.
- 341 SEMINAR IN PUBLIC LIBRARIES (3). Prerequisite, permission of instructor. Selected topics in public library services, systems, networks, and their management. Current issues are emphasized, along with the interests of the participants. Chatman.
- 342 SEMINAR IN ACADEMIC LIBRARIES (3). Prerequisite, permission of the instructor. Study of problems in the organization and administration of college and university libraries with emphasis upon current issues in personnel, finance, governance, and services. Moran.
- 343 SEMINAR IN SPECIAL LIBRARIES AND INFORMATION SERVICES (3). Study of the organization and administration of specialized information centers and services with emphasis on problems common to a variety of services. Staff.
- 344 ADMINISTRATION OF ARCHIVES AND MANUSCRIPT COLLECTIONS (3). The history, principles, and techniques of acquiring and administering public and private archives and manuscript collections. Instruction will be supplemented by special lectures and tours of nearby record repositories. Staff.
- 348 SEMINAR IN HEALTH SCIENCES LIBRARIANSHIP (3). An introduction to the organization of all types of health sciences libraries with emphasis upon problems of administration and technical processing; reference and information services; library networks and library cooperation. Staff.
- 349 SEMINAR IN RARE BOOK COLLECTIONS (3). Prerequisite, permission of the instructor. A study of the nature and importance of rare book collections; problems of acquisition, organization, and service. McNamara.
- 351 ADMINISTRATION OF TECHNICAL SERVICES (3). Advanced study of the role and organization of technical services. Emphasis on management of acquisitions, serials and cataloging departments, coordination of technical services, and the impact of automation and networking. Hewitt.

- 352 ADVANCED PROBLEMS IN THE ORGANIZATION OF MATERIALS IN LIBRARIES AND INFORMATION CENTERS (3). Prerequisite, permission of the instructor, LIBS 251. Analysis and solution of the more difficult problems in bibliographic description and classification; emphasis on the contributions of non-traditional systems such as UDC, PRECIS, and non-American cataloging codes. Saye.
- 353 COLLECTION DEVELOPMENT IN LARGE LIBRARIES (3). A study of collection development policies and procedures with emphasis on large libraries. Special attention to sources of evidence for evaluation of materials and collections. Broadus.
- 394 DOCTORAL DISSERTATION (3 or more). Staff.
- 400 GENERAL REGISTRATION (0).

SCHOOL OF JOURNALISM

RICHARD R. COLE, *Dean*

Professors

THOMAS A. BOWERS	(17)	Advertising, Mass Media and Society
RICHARD R. COLE	(18)	International Communication, Mass Communication and Society
ROBERT F. LAUTERBORN	(34)	Advertising
PHILIP MEYER	(29)	New Technology in Mass Communications, Issues in Media Management, Ethics
CAROL REUSS	(27)	Mass Media and Society, Public Relations, Magazine Journalism
DONALD L. SHAW	(23)	U.S. Newspaper History
ROBERT L. STEVENSON	(25)	Communication Theory and Research Methods, International Communication

Associate Professors

HARRY AMANA		News-Editorial Journalism
RICHARD J. BECKMAN		Photojournalism
MARGARET A. BLANCHARD	(30)	First Amendment Freedoms, Mass Media History
JANE DELANO BROWN	(28)	Communication Theory and Methodology, Social Effects of Mass Media, New Technologies
RALEIGH MANN		News-Editorial Journalism
MARY ALICE SENTMAN	(31)	Advertising, Newspaper Economics
JAMES H. SHUMAKER		News-Editorial Journalism
JOHN SWEENEY		Advertising

Assistant Professors

GEORGE W. CLOUD		News-Editorial Journalism
REGINA SHERARD	(32)	Advertising, Mass Media and Society
RUTH WALDEN	(33)	Advertising
		Law, First Amendment Theory

Adjunct Professor

ELI A. RUBINSTEIN		Mass Media and Society, Media and Health and Violence, Theory and Methodology
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Professors Emeriti

JOHN B. ADAMS
KENNETH R. BYERLY
NORVAL NEIL LUXON
JAMES J. MULLEN
VERMONT ROYSTER

The School of Journalism offers programs leading to the master of arts in journalism and the doctor of philosophy in mass communication research.

Admission

Application packets are available from Graduate School Admissions, CB# 4010, Bynum Hall, Chapel Hill, NC 27599-4010. Completed forms are submitted to the Graduate School, whose admissions decisions are based largely on recommendations from the School of Journalism. The minimum criteria for admission to a graduate program in journalism are:

1. A recognized undergraduate degree (or equivalent credential from a foreign university).
2. An undergraduate GPA of at least 3.0 (A=4.0) for the last two years of study.
3. Graduate Record Examination (GRE) scores of at least 1,000 on the verbal and quantitative sections combined, with at least 500 on the verbal test.
4. Three letters of recommendation (forms are provided in the application packet).
5. A statement of career intent, indicating how the applicant intends to use graduate education in journalism and mass communication.

Applicants should be aware that the number of applications far exceeds the number of spaces available and that many qualified applicants must be rejected because of limited space in the program.

Applicants for fall admission who apply for University financial aid must have all materials to the Graduate School by February 1. All applicants are encouraged to meet the same deadline because the admission quota is reached soon after this date. All applicants for spring admission must be submitted by October 1. Only a few persons are admitted to the graduate programs in the spring semester.

Financial Assistance

Superior applicants are eligible for nomination for all University merit awards. Financial aid through the School of Journalism is limited, with priority to doctoral students and continuing master's students. The School also helps graduate students find part-time professional work while they are enrolled in the program. Doctoral students are admitted with the understanding that they will receive financial support for three years.

The School's financial aid almost always comes in the form of graduate assistantships and is awarded on the basis of performance in the graduate program. The School usually names five Vermont Royster-Dow Jones scholars for each academic year; recipients receive stipends made possible by a generous grant from Dow Jones & Company Inc. in honor of Royster,

a professor emeritus in the School and former editor of *The Wall Street Journal*.

The M.A. Program

The M.A. program has two major purposes. One is to provide students with an opportunity to acquire skills and knowledge necessary to work in mass media and related fields. These include newspaper and magazine journalism, photojournalism, public relations, organizational communication and advertising. The other is to educate students in communication studies and techniques appropriate for teaching and research. All aspects of the program include a critical appreciation of the role of mass communication in society.

The M.A. program offers four distinct sequences. Three are related to specific areas of professional journalism—news-editorial, advertising and public relations. The fourth—mass communication—is designed for students interested in academic or professional research about mass communication and is particularly appropriate for students intending to pursue a doctoral degree.

All sequences consist of at least 30 credit hours in courses numbered 100 or above. A minimum of six courses (including thesis or optional project) must be numbered 200 or above. In addition, students are required to demonstrate competency in basic skills related to their specific sequence. This may involve additional coursework. Course requirements for the M.A. in journalism are:

Basic Competencies (3 courses). These courses represent skills students must have for graduate-level study in journalism. For the news-editorial and public relations sequence, competency must be demonstrated in JOUR 53 (Newswriting), 54 (Reporting), and 57 (News Editing); for the advertising sequence, the competency courses are JOUR 170 (Principles of Advertising), 171 (Advertising Copy and Communication), and 172 (Advertising Marketing); for the mass communication sequence, the competency courses must be appropriate to the student's research emphasis. Skills associated with JOUR 53, 54, and 57 may be acquired either by taking those courses with grades of at least B while enrolled in the M.A. program or by passing exemption exams offered each semester. Students who took these courses as undergraduates at UNC-CH but earned less than B must retake them or pass the exemption exams. Skills associated with JOUR 170, 171, and 172 may be acquired by taking the courses while enrolled in the M.A. program and earning grades of at least a P, by presenting evidence that equivalent courses were completed at other institutions with grades of at least B or by demonstrating that the skills were acquired through professional experience. Skills required for the communications sequence derive from substantive and research courses appropriate to the research program and

may be taken while in the graduate program or applied from an undergraduate or other graduate program.

Core Courses (2 courses). JOUR 251 (Mass Communication Research Methods) and JOUR 264 (Mass Communication Law and Ethics) represent the core of the graduate-level study of mass communication and are required of all students.

Path Courses (3–5 courses). These courses, together with courses outside the School of Journalism, define the specific focus of each student's program and will vary according to his or her interests and career objectives. In the three professional sequences, students have the option of writing a traditional research thesis or presenting a professional-quality series of articles, advertising campaign, or public relations project. The articles, campaign, and project require the same effort and professionalism as the thesis. In addition to the professional product itself, this option must include an extensive review of the literature and statement of methodology.

Students in the news-editorial sequence writing the articles must also take JOUR 262 (Specialized Reporting), at least one 100-level skills course—JOUR 154 (Advanced Reporting), 156 (Magazine Writing and Editing), 157 (Advanced Editing), 180 (Advanced Photojournalism), or 181 (Color Photojournalism)—and a 300-level seminar. Students in the news-editorial sequence writing a thesis must take a 300-level seminar appropriate to their thesis.

Students in the advertising sequence must take BUSI 160 (Principles of Marketing) and BUSI 263 (Advertising Management) as outside courses. Students choosing the campaign-option must take JOUR 173 (Advertising Campaigns). All students in the advertising sequence must take JOUR 370 (Seminar in Social and Economic Problems of Advertising) and JOUR 379 (Seminar in Advertising Research).

Students in the public relations sequence must take JOUR 130 (Business and Organizational Communication) and JOUR 131 (Case Studies in Public Relations). BUSI 150 (Organizational Behavior), BUSI 160 (Principles of Marketing), and SPCH 185 (Communication in Organizations) are recommended as outside courses.

Students in the mass communication sequence must define a coherent program comprising courses in the School of Journalism and outside the School appropriate to their thesis.

Outside Courses (2–4 courses). These courses may be taken in any other department or school of the University and must be at the 100-, 200-, or 300-level. They should be selected to complement journalism courses and should be pertinent to the thesis or professional option.

Thesis, Articles, Campaign, or Project (1 course). Students enroll in JOUR 393 (Master's Thesis) for three credits in the semester in which they write the thesis or the professional equivalent. If additional time is needed to complete the thesis or its equivalent, they should enroll in JOUR 400

(General Registration) for zero credits. A maximum of three thesis credits can be counted toward the 30 credits required for the M.A.

Finally, the following Graduate School rules apply to the M.A. program: At least six of the 10 courses must be at the 200-level or above; no more than six credits of graduate-level work earned outside of the program can be applied to the degree requirements.

In addition to the course requirements, M.A. students must also:

1. Pass the School's spelling and grammar examination in their first semester of residence. Students in the mass communication sequence are exempt from this requirement.
2. Select a committee to supervise the M.A. program. The committee consists of an adviser who is a member of the graduate journalism faculty, a second member of the graduate journalism faculty, and a representative from the outside field.
3. Pass two examinations. One is a written general examination taken at the completion of coursework; the second is an oral defense of the thesis or professional project before the supervisory committee.
4. Complete the M.A. within five years of admission to the program.

Ph.D. Program

The Ph.D. in mass communication research is designed to meet the needs of outstanding graduate students who wish to prepare for teaching and research positions in colleges and universities or to prepare for research careers in industry, business, or government. The program is small and highly selective; normally four or five students are admitted each year.

The doctoral program is tailored to the interests and needs of each student. It requires 48 credits beyond the master's degree (of which no more than six credits can be applied from a master's program or from other sources). The credits are arrayed into two substantive areas and a supporting methodology. The substantive areas are defined individually but are drawn from mass communication history, mass communication law, mass media and society, advertising, international communication, or communication theory. The research methodology must be appropriate to the core of each student's program and is considered a key part of the program. The goal of the program is to produce a small number of outstanding scholars who are highly knowledgeable about mass communication and highly skilled as researchers.

For admission, students must hold a master's degree from an accredited university. Admissions procedures and requirements are the same as for the M.A. program. Graduate School requirements for the doctorate are:

1. At least four semesters in residence with a minimum of two semesters in continuous study at UNC-CH. With rare exceptions, a doctorate cannot be earned by part-time enrollment.

2. A written comprehensive examination at the end of the coursework; the examination is administered by a supervisory committee of five graduate faculty members.

3. An oral defense of the dissertation before the supervisory committee.

Courses for Graduates and Advanced Undergraduates

- 101 THE MASS MEDIA AND U.S. HISTORY (3). An examination of the development of the mass media in the context of U.S. history. Emphasis will be on major developments and trends within a chronological framework. *Fall*. Shaw, Blanchard.
- 120 COMMUNITY JOURNALISM (3). Prerequisite, permission of instructor. Detailed study of the community press in North Carolina, including policies, procedures, and problems of the entire operation of community newspapers. *Spring*. Shumaker.
- 130 PRINCIPLES OF PUBLIC RELATIONS (3). Prerequisites, Journalism 53 and permission of instructor. Internal and external public relations concepts and practices for businesses and other organizations, with emphasis on identification and analysis of their publics and design, execution and assessment of appropriate communication strategies. *Fall and spring*. Reuss.
- 131 CASE STUDIES IN PUBLIC RELATIONS (3). Prerequisites, Journalism 130 and permission of instructor. Analysis of public relations practices, including planning, communication, evaluation exercises; management responsibilities. *Fall*. Reuss.
- 140 CURRENT ISSUES IN MASS COMMUNICATION (3). Prerequisite, permission of the School. Analysis of the interrelationships between United States mass media and the society that they serve. *Fall*. Sherard and staff.
- 141 PROFESSIONAL PROBLEMS AND ETHICS (3). Prerequisite, permission of the School. Intensive study of professional and ethical issues and problems facing the mass media and their employees in relation to modern society. *Spring*. Meyer.
- 146 INTERNATIONAL COMMUNICATION AND COMPARATIVE JOURNALISM (Political Science 146) (Radio, Television and Motion Pictures 146) (3). Development of international communication; the flow of news; the role of communication in international relations; communication in the developing nations; comparison of press systems. *Spring*. Stevenson.
- 154 ADVANCED REPORTING (3). Prerequisites, Journalism 53 and 54 or permission of instructor. Rigorous, in-depth instruction and critiques of students' news and feature assignments done with different reporting methodologies, including interviewing, official records, direct and participant observation and survey research (The Carolina Poll). *Fall and spring*. Meyer.
- 156 MAGAZINE WRITING AND EDITING (3). Prerequisites, Journalism 53 and 57; permission of instructor. Instruction and practice in planning, writing and editing copy for magazines. *Fall and spring*. Reuss.
- 157 ADVANCED EDITING (3). Prerequisites, Journalism 57 and permission of instructor. Concentration on the editing and display of complex news and feature stories and other print media content with a significant emphasis on newspaper design and graphics. *Spring*. Mann, Cloud, staff.
- 165 PROCESS AND EFFECTS OF MASS COMMUNICATION (3). Mass communication as a social process, incorporating literature from journalism, social psychology, sociology, political science, history. Acquaint students with factors in message construction, dissemination and reception by audiences. *Fall*. Brown, Stevenson.
- 170 PRINCIPLES OF ADVERTISING (3). Prerequisite, permission of School. A survey of the economic, psychology, philosophy, and history of advertising, with particular reference to research bases, copy, layout, media planning, production, and testing of advertisements. *Fall and spring*. Bowers, Sentman, Sweeney.

- 171 ADVERTISING COPY AND COMMUNICATION (3). Prerequisite, Journalism 170 or Business Administration 161, or equivalent and permission of instructor. Application of findings from social science research; social responsibility of the copywriter and advertiser; preparation of advertisements for the mass media; research in copy testing. *Fall and spring.* Lauterborn, Sweeney.
- 172 ADVERTISING MEDIA (3). Prerequisite, Journalism 170 or Business Administration 161, or equivalent and permission of instructor. The media planning function in advertising for both buyers and sellers of media; the relationships among media, messages, and audiences; research studies in media analysis. *Fall and spring.* Bowers, Sentman.
- 173 ADVERTISING CAMPAIGNS (3). Prerequisite, Journalism 171 or 172, and permission of instructor. Planning and executing advertising campaigns; types and methods of advertising research; the economic function of advertising in society. *Fall and spring.* Staff.
- 174 ADVANCED BROADCAST NEWS REPORTING (Radio, Television and Motion Pictures 174) (3). Prerequisite, RTVM 73 and permission of instructor. Examination and application of in-depth broadcast news reporting techniques, especially investigative reporting, special events coverage, and the documentary. Students film and produce radio and television programs of actual news events. *Two lecture and two laboratory hours per week, spring.* Staff.
- 176 ADVANCED ADVERTISING COPYWRITING (3). Prerequisites, Journalism 170 or equivalent and 171 and permission of instructor. Rigorous, in-depth instruction and critiques of student advertising writing. *Spring.* Sweeney.
- 177 INFORMATION PROCESSING IN ADVERTISING. Prerequisites, Journalism 170 and permission of instructor. Study of the use of information in advertising. Applications of computer software to advertising problems, including on-line searching, data management and analysis, and presentation graphics. *Spring.* Bowers.
- 178 RETAIL ADVERTISING (3). Prerequisite, Journalism 170 or equivalent and permission of instructor. Principles and practice of retail advertising in all media, with emphasis on selling, writing and layout of retail advertising for the print media. *Spring.* Bowers, Sentman.
- 179 ADVERTISING RESEARCH (3). Prerequisites, Journalism 170 and permission of instructor. Detailed study and application of advertising research methods, including focus groups, copy-testing, audience research and evaluation. *Fall.* Bowers, Sherard.
- 180 ADVANCED PHOTOJOURNALISM (3). Prerequisites, Journalism 80 and permission of instructor. Advanced course in black and white photojournalism, concentrating on the newspaper and magazine picture story, advanced camera and darkroom techniques and picture editing. *Fall.* Beckman.
- 181 COLOR PHOTOJOURNALISM (3). Prerequisites, Journalism 80 and permission of instructor. Color techniques are learned while students produce slide shows. Content includes slide processing, color printing and soundtrack production. *Spring.* Beckman.
- 191 PROSEMINAR IN CONTEMPORARY JOURNALISM (1-3). Prerequisite, permission of instructor. Small classes on various aspects of journalism with subjects and instructors varying each semester. One to three seminar hours a week. *Fall and spring.* Staff.

Courses for Graduates

- 251 MASS COMMUNICATION RESEARCH METHODS (RTVM 251) (3). Prerequisite, permission of instructor. Intensive study of mass communication research methods (experiment, survey, content, analysis and historiography), including computer applications, statistics, theory development, and trends in the published literature. *Fall.* Stevenson, Brown.
- 262 SPECIALIZED REPORTING (3). Prerequisite, permission of instructor. Reporting of complicated topics, using in-depth backgrounding, investigative reporting techniques, story conferences and documents and other research data. *Fall.* Blanchard, staff.

- 264 MASS COMMUNICATION LAW AND ETHICS (3). Prerequisite, permission of instructor. Press freedom and the First Amendment, including libel, privacy, access to information, free press-fair trial, advertising and broadcast regulation, journalistic privilege, prior restraint. *Fall*. Walden, staff.
- 281 EXECUTIVE MANAGEMENT OF NEW OPERATIONS (3). Prerequisite, permission of instructor. Planning and policy functions of management in the news-editorial department, including problems of budgeting, personnel management and labor relations. The course also covers management coordination among advertising, circulation and production functions. *Fall*. Meyer, staff.
- 301 SEMINAR IN MASS COMMUNICATION HISTORY (3). Prerequisite, permission of instructor. Readings, discussion and projects in mass communication history. *On demand*. Shaw, Blanchard.
- 311 SEMINAR IN MASS COMMUNICATION AND SOCIETY PERSPECTIVES (3). Prerequisite, permission of instructor. Readings, discussion and papers on the roles and responsibilities of mass communication in society. *Spring*. Reuss, staff.
- 340 SEMINAR IN MEDIA ANALYSIS (3). Prerequisite, permission of instructor. Students will participate in the design and execution of media research projects. *Spring*. Staff.
- 345 READING AND RESEARCH (3). Prerequisite, permission of instructor. Advanced reading or research in selected field. *Fall and spring*. Staff.
- 346 SEMINAR IN INTERNATIONAL COMMUNICATION (Political Science 346) (3). Prerequisite, Journalism 146 or permission of instructor. *Fall*. Stevenson.
- 351 SEMINAR IN MASS COMMUNICATION RESEARCH METHODS (Radio, Television and Motion Pictures 351) (3). Prerequisites, Journalism 251 or equivalent, and permission of instructor. Advanced work in quantitative data analysis and research preparation. *Spring*. Stevenson, Brown.
- 360 SEMINAR IN DEVELOPMENT OF FIRST AMENDMENT FREEDOMS (3). Prerequisite, permission of instructor. Readings and discussions about development of and interrelationships among the First Amendment freedoms of speech, press, assembly, petition, association and religion. *Spring*. Blanchard.
- 364 SEMINAR IN MASS COMMUNICATION LAW AND ETHICS (3). Prerequisite, Journalism 264 and permission of instructor. Readings, discussion and projects in major issues of mass communication law, including libel, privacy, access, court-press relations, the First Amendment and regulation of telecommunications. *Fall*. Walden.
- 365 SEMINAR IN THEORIES OF COMMUNICATION (3). Prerequisites, Journalism 165 or a course in social psychology and permission of instructor. Students will prepare analytical papers on theories of communication based upon extensive review of behavior science literature. *Fall*. Stevenson, Brown, staff.
- 370 SEMINAR IN SOCIAL AND ECONOMIC PROBLEMS IN ADVERTISING (3). Prerequisite, permission of instructor. Readings, discussion and a project examining advertising as a social and economic force in contemporary society. *Spring*. Sentman, staff.
- 379 SEMINAR IN ADVERTISING RESEARCH (3). Prerequisite, permission of instructor. Readings and discussion examining theories underlying advertising and the testing of those theories through research projects. *Fall*. Staff.
- 393 MASTER'S THESIS (3). *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

CURRICULUM IN LEISURE STUDIES AND RECREATION ADMINISTRATION

H. DOUGLAS SESSOMS, *Chairman*

Professor

- *H. DOUGLAS SESSOMS (1) Theory, Recreation Education, Group Dynamics

Associate Professors

- *CHARLES C. BULLOCK (4) Therapeutic Recreation Services, Sociology of Leisure
*LEE E. MEYER (3) Therapeutic Recreation Services, Program Development, Special Recreation

Assistant Professor

- *M. DEBORAH BIALESCHKI (6) Program Services, Women and Leisure, Outdoor Recreation

Lecturers

- *LEANDRA A. BEDINI (7) Therapeutic Recreation Services, Aging
RICHARD G. HATFIELD Therapeutic Recreation Services
JAMES H. HERSTINE Recreation Management

Visiting Associate Professor

KARLA HENDERSON

Adjunct Assistant Professor

RAYMOND WEST Therapeutic Recreation Services

*Core Faculty

The Curriculum in Leisure Studies and Recreation Administration provides an interdisciplinary approach to the study of leisure and the preparation of specialists to work in the field of parks and recreation services. It is a major area of study within the College of Arts and Sciences and offers the Master of Science in Recreation Administration degree at the graduate level. Optional areas of concentration include the study of therapeutic recreation services and general recreation and park management.

This professional degree program brings into play both academic and practical experience. It is highly individualistic, the specific requirements depending somewhat upon the student's undergraduate major, work experience and professional objectives. A minimum of eighteen hours of course work in Leisure Studies and Recreation Administration is required; the remaining hours of the thirty-three to thirty-six semester hour program may be taken in related areas of study.

All students admitted to this program must fulfill the requirements for admission to the Graduate School. To be admitted unconditionally, applicants will be required to have prerequisite training equivalent to an undergraduate major in one of the following: Dramatic Art, Physical Education, Education, Political Science, Recreation, or Sociology. The Master of Science in Recreation Administration normally requires twelve months for completion.

Three options are available for the fulfillment of the degree requirements. They are the ten courses and 1) a thesis (3 to 6 credits), or 2) a three month internship (6 credits), or 3) 6 hours of independent field study. The choice of option is based upon the student's interest and past experiences. Normally, those wishing to do further graduate work or those seeking an academic career in Recreation Administration elect the thesis option. For those experienced in recreation services or currently employed as recreation specialists while pursuing their graduate degree, the 6 hours of independent field study is recommended. For students with limited practical experience who seek a practitioner's role upon graduation, the internship option is suggested.

All candidates for the M.S. in Recreation Administration are expected to have a concurrent work experience with their course work. No academic credit is given for this experience, but it is a Curriculum expectation. A variety of opportunities exists through the cooperative efforts of the various recreation services and agencies within the university environs.

In addition to the research and teaching assistantships, a limited numbers of graduate traineeships are available, particularly for those interested in therapeutic recreation services, while work-study arrangements are negotiated with local recreation and park systems for those interested in general recreation administration. Two fellowships are provided for those interested in play therapy by the Tri Sigma National Society.

Minor Courses

Depending upon individual interests, a student may elect a minor. If so designated, at least three to four courses (nine to twelve semester hours) must be chosen with the advice of the department(s) in which the minor is being selected. It is possible for a student to split the minor (two courses or six semester hours in each area). The minor is not required; students may choose to elect a variety of experiences from various departments rather than concentrate on one subject area. If one does elect a minor, it must be declared and a minor representative designated as a member of his or her advisory committee.

Courses for Graduates and Advanced Undergraduates

- 101 WOMEN, WORK AND LEISURE (WS 101) (3). Implications of the relationship between women and leisure from a lifestyle perspective, and an analysis of the changing role of women and changing leisure concepts from a feminist perspective. *Fall*. Bialeschki.
- 120 PROGRAM PLANNING FOR RECREATION SERVICES (3). A study of the principles of planning recreation programs and the factors which affect their implementation and functioning. *Fall*. Meyer.
- 130 INTRODUCTION TO GROUP DYNAMICS AND COMMUNITY LEADERSHIP (3). An analysis of the techniques, methods, and motives of group and community leaders. Special attention is focused upon the roles of organizational structure, personnel policies, and in-service training programs. *Fall and Spring*. Bialeschki and Sessoms.
- 140 RECREATION SPACES: THEIR DESIGN AND USE (3). Principles of planning recreation areas and facilities and the relationship of human needs to environmental resources. *Spring*. Staff.
- 141 RECREATION AND THE PRIVATE SECTOR (3). Major suppliers of recreation opportunities in the private sector will be identified and analyzed. Major topics that will be covered include commercial recreation, industrial recreation, and travel and tourism. *Spring*. Staff.
- 142 THE SOCIOLOGY OF TOURISM (3). This course looks at tourist behavior, including motivations, problems encountered, decision making, and the relationship tourists have with tourist destinations. An interdisciplinary approach is used in the analysis of the various components of the travel industry and their impact on "tourism"; the economic costs and benefits of tourism on host communities and the sociological/psychological impact of tourism on the host/tourist relationship is considered. *Fall*. Staff.
- 150 EVALUATION OF RECREATION SERVICES (3). Techniques and application of various methods for evaluating organized recreation services and programs. *Spring*. Bullock.
- 160 ADMINISTRATION OF RECREATION SERVICES (3). Analysis of recreation from the standpoint of organization, administration, finances, training, legislation, public relations, and coordination of community resources. *Fall*. Staff.
- 161 MANAGEMENT CONCEPT APPLIED TO RECREATION SERVICES (3). The application of management theory to personnel, financial, and programming issues related to the provision of leisure services. *Spring*. Staff.
- 171 LEISURE AND THE AGING (3). Survey in gerontology and geriatrics as fields of study and professional services as they relate to the freetime behaviors of the aging. Visits to local service facilities and recreation agencies. *Fall*. Staff.
- 175 INTRODUCTION TO THERAPEUTIC RECREATION SERVICES (3). History and philosophy of therapeutic recreation. A survey of basic counseling/interactional styles, clinical and administrative skills, and inter/intra disciplinary approaches to a variety of clinical settings. A five hour practicum is required. *Fall*. Hatfield.
- 176 SPECIAL PROGRAM SERVICES IN THERAPEUTIC RECREATION (3). Development of helping skills for the practice of therapeutic recreation emphasizing rationale, techniques, and role responsibilities of therapeutic recreation in the area of leisure education. *Spring*. Bullock, Bedini.
- 180 SUPERVISED FIELD TRAINING IN RECREATION (3, 3). Prerequisite, three or
181 more courses in recreation. Students will have opportunity to receive varied practical on-the-job experience in one of many agency types. Staff.
- 199 SELECTED ISSUES SEMINAR (3). Current issues, techniques, and research of a topical short-term nature are the focus of these seminars. Generally offered during the summer. Staff.

Courses for Graduates

- 210 WORK, LEISURE AND ORGANIZED RECREATION IN THE UNITED STATES (3). A description and analysis of the scope of organized recreation systems, the evolution of work and leisure attitudes, and the trends of individual recreation behavior. *Fall*. Sessoms.
- 230 PROBLEMS OF ORGANIZED RECREATION (3). To promote insight into some problems confronting organized recreation in community life; to interpret and analyze the problems; to determine the specific needs; to plan for adjusting the problems. *Spring*. Sessoms.
- 250 RESEARCH DESIGN AND METHODS I (3). An appraisal of current recreation research. Introduction to statistical techniques and analysis; application of quantitative methods to research problems. *Fall*. Bialeschki, Bullock.
- 251 RESEARCH DESIGN AND METHODS II (3). Prerequisite, Recreation 250. Review and application of qualitative research methods to recreation issues. Design and preparation of a research proposal. Continued review of current recreation. *Spring*. Bialeschki, Bullock.
- 270 ADMINISTRATION OF THERAPEUTIC RECREATION SERVICES (3). Emphasis on information specific to the administration of therapeutic recreation such as fiscal management, quality assurance, evaluation, marketing of therapeutic recreation and other general administrative topics. *Fall*. West.
- 275 PRINCIPLES AND PROCEDURES IN THERAPEUTIC RECREATION (3). A study of the existing practices and principles utilized in therapeutic recreation. An in-depth treatment of assessment/evaluation, goal setting and individualized planning, documentation, leisure counseling and clinical skills. *Spring*. Bullock.
- 280 INTERNSHIP IN RECREATION ADMINISTRATION (3, 3). *Fall and spring*. Staff.
- 281
- 290 INDEPENDENT FIELD STUDY (3). Permission of faculty. May be repeated for credit. *Fall and spring*. Staff.
- 310 SEMINAR IN LEISURE STUDIES (3). A survey of contemporary views of society, its structures and functions, as they relate to concepts of leisure and recreation behaviors. *Fall and spring*. Staff.
- 376 ISSUES AND PROBLEMS IN THERAPEUTIC RECREATION (3). An in-depth treatment of various issues, problems and concerns such as professionalism, credentialing, accessibility, mainstreaming, recent legislation, and others as they relate to the provision of therapeutic recreation services. *Summer*. Meyer.
- 393 THESIS (3). Staff.
- 400 GENERAL REGISTRATION (0). Staff.

CURRICULUM IN LINGUISTICS

H. CRAIG MELCHERT, *Chairman*. Advisory Committee: Professors J. Flora, V. Friedman, R. Howren, W. Lycan, S. Smith, M. Tsiapera; Associate Professors C. Eble, R. Hendrick, Larry King; Assistant Professor, A. Marantz.

Professors

*ROBERT HOWREN	(9)	Phonology, Phonetics, American Indian Linguistics, Dialectology
*MARIA TSIAPERA	(7)	Historical Linguistics, History of Linguistics, Dialectology
SIDNEY R. SMITH	(14)	Germanic Linguistics and Philology
SAMUEL FILLENBAUM	(16)	Psychology of Language
PAUL ZIFF	(18)	Philosophy of Language
PAUL BRANDES	(19)	Communication Theory
STANLEY MUNSAT	(21)	Philosophy of Language and Linguistics
VICTOR FRIEDMAN	(23)	Slavic and Balkan Linguistics
CATHERINE MALEY	(28)	Romance Linguistics
WILLIAM LYCAN	(36)	Philosophy of Language
STEPHEN F. WEISS	(29)	Natural Language Processing
MARTIN DILLON	(30)	Natural Language Analysis

Associate Professors

*H. CRAIG MELCHERT	(10)	Indo-European Linguistics, Chinese Linguistics
*RANDALL HENDRICK	(11)	Syntax, Mathematical Linguistics
EDWARD D. MONTGOMERY, JR.	(22)	Romance Linguistics and Philology
LAWRENCE FEINBERG	(24)	Slavic Linguistics
CONNIE C. EBLE	(25)	English Linguistics
JOSEPH WITTIG	(26)	English Linguistics
LARRY D. KING	(32)	Spanish and Portuguese Linguistics
THOMAS L. LAYTON	(31)	Language Acquisition, Language Disorders
PATRICK P. O'NEILL	(37)	Celtic Language
PAUL T. ROBERGE	(40)	Historical Linguistics, Germanic Linguistics, Phonology

Assistant Professors

*ALEC MARANTZ	(39)	Morphology, Syntax, Language Acquisition
LAURENCE STEPHENS	(41)	Italic and Greek Linguistics

*Core Faculty

The Curriculum in Linguistics, comprised of specialists teaching core courses as well as faculty from nearly a dozen different departments, offers graduate work leading to the degrees of Master of Arts and Doctor of Philosophy in Linguistics.

Degree candidates must demonstrate both a basic knowledge of the field of linguistics as a whole and the ability to do independent study in a chosen

specialty. Basic knowledge of linguistics is acquired by taking certain required courses; knowledge of a specialty is gained through elective courses as well as by the writing of an M.A. thesis.

The elective courses are expected to form a coherent program in a subfield of linguistics (e.g. phonology, syntax, historical linguistics, sociolinguistics) or in the application of linguistics to a closely related discipline (e.g. anthropology, study of a particular language or language family). To this end, each student, after consultation with the Director of Graduate Studies, will by the beginning of the second semester of residence choose a permanent advisor, who will supervise the student's program of study.

Degree programs of students in the Curriculum must satisfy the general requirements of the Graduate School. In addition, the student must fulfill the following curriculum requirements.

Master of Arts in Linguistics

Course requirements: Linguistics 100, 101, 120, 123, 130, four courses within a chosen specialty (selected with guidance of the Graduate Director), and three hours of thesis credit. A student seeking transfer credit for graduate courses taken at another institution must make a formal request to the instructor of the corresponding curriculum course, who, after consultation with the Director of Graduate Studies, may recommend acceptance of the transfer credit. A maximum of six semester hours may be so transferred.

All graduate students are required to teach linguistics at least once during their course of study.

Foreign language requirement: Reading knowledge of one foreign language. For students in historical linguistics French or German is recommended.

Comprehensive Examination: The M.A. comprehensive examination, normally taken in the fall of the second year of graduate study, will consist of a three-part written examination covering the areas of phonology, syntax, and historical linguistics. The examination will be based on the required courses and a reading list published by the Curriculum. A follow-up oral examination may involve residual questions from the written examination but centers primarily upon the topic the student proposes for his or her M.A. thesis. Upon completion of the thesis the student defends his or her work in the final oral examination.

A student who wishes to bypass the M.A. Degree must submit a written request to the Chairman of the Curriculum after the M.A. comprehensive examination. The linguistics faculty will consider the request, and the student will be informed, in writing, of the decision.

Doctor of Philosophy in Linguistics

Course requirements: 60 credit hours. Required are the courses stipulated for the M.A. Either linguistic field work (Linguistics 293) or an approved philology course (see list of specific language groups) must be taken; also morphology (Linguistics 127), one advanced methods course at the 200 level, and a three-hour course on the history of linguistics. Students in theoretical linguistics should take one of the following: semantics (Linguistics 137), symbolic logic (Linguistics 104), or mathematical linguistics (Linguistics 140). Students in historical linguistics should take one year of a classical language such as Latin, Greek, or Sanskrit.

Foreign language requirements: (a) one year of a non-Indo-European language *or* one semester in the structure of a non-Indo-European language; (b) reading knowledge of two foreign languages. In the case of students in historical linguistics, these should be French and German. Other students may fulfill (b) with any two foreign languages or, if they wish, with one foreign language plus one course in the structure of a language [the latter must be other than the one used to satisfy (a)].

Preliminary Examination: For students who have taken the M.A. degree in the Curriculum the M.A. written comprehensive examination described above will also serve as a diagnostic preliminary examination to assist in determining the student's capability for Ph.D. work and in planning the program of study. For the same purpose, students who enter the program at the Ph.D. level will, upon completion of nine hours of course work, also take the same preliminary examination.

The Ph.D. written comprehensive examination will consist of three essays, one each from the areas of phonology, syntax, and historical linguistics, plus one original research paper from an area of the student's choice. The essay questions are to be chosen from a list published by the Curriculum. The research paper topic must be approved by the student's advisor in consultation with a committee of two others. The essays and research paper may be submitted at any time between the passing of the preliminary examination and the completion of course work. Details concerning the essays and research paper may be obtained from the Director of Graduate Studies.

Following successful completion of the written comprehensive examination, the student will undergo an oral examination focusing primarily but not exclusively on the student's dissertation prospectus (a detailed proposal which will have been prepared by the student with the guidance of his or her advisor). The oral examination committee will consist of five faculty members, who will remain members of the dissertation committee until the student has successfully defended the completed dissertation.

The Curriculum will recommend up to a maximum of two years of financial support for M.A. candidates, and up to three years of support beyond the M.A. for doctoral candidates, but such support is always contingent upon satisfactory progress as a graduate student and satisfactory perfor-

mance if the stipend requires service. Research assistantships, language laboratory assistantships, teaching assistantships for linguistics courses, and University nonservice awards are available. Students proficient in a foreign language will be eligible for teaching assistantships in German, French, Italian, Spanish, and other languages. Application for financial support is made in conjunction with application for admission to the Graduate School.

Further information may be obtained by writing to the Director of Graduate Studies, Curriculum in Linguistics, Dey Hall, University of North Carolina at Chapel Hill.

LINGUISTICS

- 100 INTRODUCTION TO GENERAL LINGUISTICS (Anthropology 179) (3). An introduction to the scientific study of language. The nature of language structure. How languages are alike and how they differ. *Fall*. Staff.
- 101 INTRODUCTION TO HISTORICAL AND COMPARATIVE LINGUISTICS (Anthropology 181) (3). Theories and methods of historical and comparative linguistics, with emphasis upon the Indo-European family. *Spring*. Tsiapera.
- 102 APPROACHES TO TEACHING ENGLISH AS A FOREIGN LANGUAGE (3). Methods, theoretical approaches, and techniques in teaching English to speakers of other languages. *On demand*. Howren.
- 104 SYMBOLIC LOGIC (See Philosophy 101) (3).
- 110 PHILOSOPHY OF LANGUAGE (See Philosophy 110) (3).
- 115 TOPICS IN LINGUISTICS (3). Directed readings on linguistic topics not covered in specific courses. *Fall and Spring*. Staff.
- 116X ENGLISH FOR FOREIGN STUDENTS (3). English for non-native speakers. Emphasis on spoken or written English according to needs of students enrolled. Auditors not permitted. *Fall and Spring*. Staff.
- 120 LINGUISTIC PHONETICS (Anthropology 180) (3). Introduction to the general principles of linguistic phonetics; anatomy of vocal tract, physiology of speech production, universal phonetic theory. Practice in the recognition and transcription of speech sounds. *Fall*.
- 123 PHONOLOGY I (Anthropology 183) (3). Prerequisites, Linguistics 100 or equivalent and Linguistics 120. Introduction to the principles of modern generative phonology. Methods and theory of phonological analysis. *Spring*. Howren.
- 124 PHONOLOGY II (3). Prerequisite, Linguistics 123. Intermediate phonological theory and analysis. *Fall*. Howren.
- 127 MORPHOLOGY (3). Prerequisite, Linguistics 30, 100 or permission of instructor. Crosslinguistic investigation of internal word structure: inflection and derivation, word formation rules vs. affixation, autosegmental morphology, morpholexical and morphophonemic rules, and the interaction of morphology with phonology and syntax. *Fall*. Marantz.
- 130 INTRODUCTION TO GRAMMAR I (Anthropology 190) (3). Prerequisite, Linguistics 100 or consent of instructor. Methods and theory of grammatical analysis within the transformational generative framework. Special emphasis on analyzing syntactic and semantic structures of English. *Spring*. Hendrick.
- 133 INTRODUCTION TO GRAMMAR II (Anthropology 193) (3). Prerequisite, Linguistics 130 or equivalent. Methods and theory of grammatical analysis, with special reference to transformational grammar. *Fall*. Hendrick.

- 137 SEMANTICS (3). Prerequisite, Linguistics 30, 100 or permission of instructor. Semantics as a part of linguistic theory: co- and disjoint reference among nominals, "crossover" phenomena, quantifier scope, lexical semantics, Montague Grammar and compositional semantics, and explanatory universals in semantic theory. On demand. Hendrick, Marantz.
- 140 MATHEMATICAL LINGUISTICS (3). Introduction to topics in logic, set theory and modern algebra with emphasis on linguistic application. Automata theory and the formal theory of grammar with special reference to transformational grammars. No previous mathematics assumed. *On demand.* Staff.
- 142 INDO-EUROPEAN CULTURE AND SOCIETY (Folklore 143) (3). Survey of non-material aspects of Indo-European society recoverable by linguistic reconstruction, including law, religion, economics, poetics. Review of the *Urheimat* problem. No knowledge of comparative grammar is assumed. *On demand.* Melchert.
- 145 LANGUAGE AND MIND/LINGUISTICS AND THE BRAIN (3). Prerequisite, Linguistics 30, Linguistics 100, Philosophy 35, English 36, or permission of instructor. The course treats the relationship among linguistics, artificial intelligence, neurobiology, cognitive psychology, and the philosophies of mind, language, and science.
- 150 INTRODUCTION TO INDO-EUROPEAN: PHONOLOGY (3). A survey of the phonological systems of the major Indo-European languages and their development from Proto-Indo-European. *Fall, alternate years.* Melchert.
- 151 INTRODUCTION TO INDO-EUROPEAN: MORPHOLOGY (3). Prerequisite, Linguistics 150 or permission of the instructor. Introduction to the major morphological categories in the Indo-European languages and their development from the proto-language. *Spring, alternate years.* Melchert.
- 162 THE STRUCTURE OF CHINESE (3). Prerequisite, permission of instructor. Introductory linguistic description of Modern Mandarin Chinese. Knowledge of Chinese *not* assumed. For students of linguistics with no knowledge of Chinese and students of Chinese with no knowledge of linguistics. *On demand.* Melchert.
- 170 SOCIOLINGUISTICS (3). Prerequisite, Linguistics 30, 100, or permission of instructor. This topics course in Sociolinguistics treats the microsociolinguistics of everyday interactions, dialect differences, language and sex, language and power, minority rights, and the politics of pornography. *On demand.*
- 171 AFRICAN LANGUAGES AND HISTORY (3). An examination of the linguistics evidence from African history.
- 183 HISTORY AND PHILOSOPHY OF LINGUISTICS (3). Linguistic theories from classical times to the present with special emphasis on the origins of contemporary theories. *Fall.* Tsiapera.
- 184 LANGUAGE AND CULTURE (See Anthropology 184) (3).

Courses for Graduates

- 204 COMPARATIVE GRAMMAR OF GREEK AND LATIN (3). Designed not only for the student of Classics but also a basic course for students of comparative Indo-European grammar. (Alternate years.) Stephens.
- 205 STRUCTURE AND HISTORY OF MODERN GREEK (Greek 205) (3). An introduction to the structure of modern Demotic Greek and its place in Greek linguistic history since Attic-Ionic. Tsiapera.
- 206 THE STRUCTURE OF ARABIC (Arabic 230) (3). Tsiapera.
- 212 ADVANCED PROBLEMS IN PHILOSOPHY OF LANGUAGE (Philosophy 212) (3).
- 215 ADVANCED METHODS IN PHONOLOGY (3). Prerequisite, Linguistics 124. Methods of theoretical argumentation in generative phonology with emphasis on recent proposals in the published literature. *Fall.* Howren.

- 216 ADVANCED METHODS IN SYNTAX (3). Prerequisite, Linguistics 133 or consent of instructor. Examination of recent developments in the theory and methods of syntactic analysis. *Fall*. Hendrick.
- 220 ADVANCED SOCIOLINGUISTICS (3). Prerequisite, Linguistics 170 or consent of instructor. Current issues in sociolinguistic research with emphasis on their implications for linguistic theory.
- 223 SEMINAR IN ANTHROPOLOGICAL LINGUISTICS (Anthropology 223) (3).
- 230 COMPARATIVE GRAMMAR OF ANCIENT LANGUAGES (3). Introductory and advanced work in the earlier stages of extant languages, such as Avestan and Sanskrit, and in extinct languages. *Spring*. Melchert.
- 238 HISTORY OF THE ENGLISH LANGUAGE (English 238) (3). Prerequisite, English 237 or permission of instructor.
- 250 DIALECTOLOGY (3). Principles and methods of areal linguistics and social dialectology. *On demand*. Tsiapera, Howren.
- 283 CURRENT PROBLEMS IN LINGUISTICS (3). To explore relations of linguistics with neighboring fields and theoretical problems of current relevance within linguistics itself; some attention will be given to pedagogical methodology. *Fall and spring*. Staff.
- 293 LINGUISTIC FIELD WORK (3). Analysis and description of a language unknown to the class from data solicited from a native informant. *Alternate years*. Howren.
- 294 LINGUISTIC FIELD WORK II (3).
- 297 SPECIAL READINGS (3). Readings in linguistic topics that are not covered in the existing courses. *Fall and spring*. Staff.
- 360 SEMINAR (3). Topics vary to include specialized areas of linguistics study. *Fall and spring*. Tsiapera.
- 361 SEMINAR (3). Seminar in phonological theory. Howren.
- 362 SEMINAR (3). Seminar in grammatical theory. *Spring*.
- 393 MASTER'S THESIS (3 or more). *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Staff.

Other courses in the University that may be of interest to a graduate student in linguistics:

GENERAL

Computer Science

- 119 Information Systems in Language Research (Linguistics 119) (3). *Spring*. Dillon.
- 171 Natural Language Processing (3). *Fall*. Weiss.
- 181 Models of Languages and Computation (3). *Fall*. Weiss.

Psychology

- 125 Psychology of Language (3). *Fall*. Fillenbaum.
- 128 Development of Language and Thought (3). *Spring*.
- 270 Measurements of Language Behavior (3). *Fall or spring*.

Speech Communication

- 150 Voice and its Production (3). *Fall*. Staff.
- 151 Theories of Human Communication (3). *Fall*. Staff.
- 153 Social Dialects (3). *Spring*. Staff.
- 156 Communication Development in Children (3). *Fall or spring*. Staff.
- 157 Applied Phonetics (3). *Fall or spring*. Staff.
- 158 Introduction to Phonetics (3). *Fall*. Staff.

Speech and Hearing Sciences

- 162 Language Acquisition (3). *Fall*. Layton.
 163 Language Behaviors I (3). *Spring*. Layton.
 184 Speech Pathology I (3). *Spring*. Hadjian.
 206 Speech Processes (3). *Fall or spring*. Staff.
 207 Language Processes (3). *Fall or spring*. Layton.
 241 Biological Processes in Language and Speech (3).
 282 Speech Science (3). *Fall or spring*. Staff.

SPECIFIC LANGUAGE GROUPS**Arabic (See complete listing under Romance Languages)**

- 101 Elementary Arabic I (3).
 102 Elementary Arabic II (3).

Celtic

- 105 Old Irish (Folklore 105) (3). O'Neill.
 106 Readings In Old Irish (Folklore 106) (3). O'Neill.

Chinese (see complete listing under Slavic and Non-Western Languages)

- 110 Advanced Chinese (3).
 111 Advanced Chinese (3) (continuation).
 120 Literary Chinese (3).
 121 Literary Chinese (3) (continuation).

English

- 136 Modern English (3).
 237 Old English Grammar and Readings (3).

French

- 221 Old French (3). *Fall*. Montgomery.

Germanic Languages

- 161 History of the German Language (3). *Fall*. Smith, Roberge.
 202 German Paleography (3). *Fall or spring*. Tax.
 221 Gothic (3). *Fall or spring*. Smith, Roberge.
 222 Old High German (3). *Fall or spring*.
 223 Comparative Germanic Grammar (3). *Fall or spring*. Smith.
 232 Old Saxon (3). *On demand*. Smith.
 233 Old Norse (3). *Fall*. Smith.
 234 Old Norse, continuation (3). *Spring*. Smith.
 235 Middle High German (3). *Spring*.

Greek

- 106 Greek Dialects (Linguistics 106) (3). (Alternate years.)
 201 Greek Epigraphy (3). West.
 204 Greek Paleography (3).

Hebrew

- 113 Elementary Biblical Hebrew (See Religion 113-114) (3).
 114 Elementary Biblical Hebrew (3).

Italian

- 126 History of the Italian Language (3). *Fall*. Staff.
 221 Old Italian (3). *Fall*. Montgomery.
 222 Historical Italian Grammar (3). *Spring*. Staff.

Japanese (see complete listing under Slavic and Non-Western Languages)

- 101 Intensive Japanese (3).
 102 Intensive Japanese (3).

Latin

- 202 Latin Epigraphy (3). Linderski.
 203 Latin Palaeography (3). Ganz.
 210 History of Latin and Italic Dialects (3). Stephens.

Portuguese

- 126 History of the Portuguese Language (3). *On demand*.
 221 Old Portuguese (3). *Spring*.

Romance Languages

- 220 Vulgar Latin (3). *Spring*. Montgomery.
 225 Provençal (3). *Fall*. Montgomery.
 324 Romance Paleography (3). *Spring*. Montgomery.
 370 Minor Romance Tongues (3). *On demand*. Maissen, Montgomery.

Russian

- 101 Structure of Modern Russian (3). *Spring*. Feinberg, Friedman.
 299 History of the Russian Language (3). Feinberg, Friedman.

Sanskrit (see complete listing under Germanic Languages)

- 111 Elementary Sanskrit (3). Grammar and readings from the epic and didactic literature. *Fall, on demand*. Melchert.
 112 Elementary Sanskrit (3). Continuation of 111. *Spring, on demand*. Melchert.
 201 Advanced Sanskrit (3). Extensive reading from the Dharmācāstra, the Sūtras, Brahmanas, and the Vedas. *On demand*. Staff.
 202 Advanced Sanskrit (3). Continuation of 201. *On demand*. Staff.

Slavic Languages

- 105 Introduction to Slavic Linguistics (3). *Spring*. Feinberg, Friedman.
 107 Structure of a Balkan Language (3). *Fall and spring*. Friedman.
 108 Advanced Structure of a Balkan Language (3). Friedman.
 207 Old Church Slavonic (3). *Fall*. Friedman, Feinberg.

Spanish

- 221 Old Spanish (3). *Fall*.
 222 Old Spanish (3). *Spring*.

CURRICULUM IN MARINE SCIENCES

DIRK FRANKENBERG, *Chairman*

Professors

JOHN M. BANE, JR.	(27)	Physical Oceanography, Shelf Circulation
MILES A. CRENSHAW	(32)	Biochemistry, Calcification
DIRK FRANKENBERG	(3)	Biological Oceanography
CHARLES E. JENNER	(6)	Invertebrate Zoology
J. DONALD JOHNSON	(7)	Marine Chemistry, Halogens
JAN J. KOHLMAYER	(22)	Marine Botany, Fungi
EDWARD J. KUENZLER	(8)	Phytoplankton, Nutrient Cycling
CHRISTOPHER S. MARTENS	(10)	Marine Geochemistry
A. CONRAD NEUMANN	(12)	Geological Oceanography
HANS W. PAERL	(39)	Microbial Ecology
CHARLES H. PETERSON	(31)	Ecology, Population Interactions
FREDERIC K. PFAENDER	(13)	Microbiology

Associate Professors

LARRY K. BENNINGER	(41)	Sedimentary Geochemistry
JOSEPH G. CARTER	(34)	Marine Paleocology, Molluscan Systematics
MARK E. HAY	(44)	Marine Algal Ecology
SETH R. REICE	(25)	Ecology
JOHN T. WELLS	(47)	Marine Geology Coastal Geomorphology

Research Assistant Professor

ALAN L. SHANKS	(46)	Marine Ecology Larval Transport
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Adjunct Professors

MAX H. HOMMERSAND	(4)	Marine Botany, Algae
ROY L. INGRAM	(5)	Marine Geology, Sediments
HARVEY E. LEHMAN	(9)	Zoology, Embryology, Morphogenesis
JOHN J. W. ROGERS	(40)	Geochemistry, Crustal Evolution
FRANK J. SCHWARTZ	(15)	Ichthyology
MARK SHUMAN	(16)	Trace Metal Chemistry
MARK D. SOBSEY	(43)	Environmental Health Microbiology
JOSEPH ST. JEAN, JR.	(17)	Marine Geology, Micropaleontology
DANIEL A. TEXTORIS	(18)	Geology, Sedimentary Petrology
CHARLES M. WEISS	(19)	Marine Fouling, Pollution

Professor Emeritus

ALPHONSE F. CHESTNUT

The Curriculum in Marine Sciences brings together the faculties and facilities of several departments of The University of North Carolina at Chapel Hill and the Institute of Marine Sciences at Morehead City to offer broad graduate training in oceanography and marine sciences. The program

gives students a wide choice of faculty advisors, marine science courses, and potential research projects.

Courses at North Carolina State University at Raleigh and at Duke University may also be taken for credit through an inter-institutional program. Courses and facilities (boats, laboratories, libraries, seawater rooms, radio-isotope facilities, experimental marine ponds, dormitories) are available at several coastal laboratories through cooperative agreements.

Oceanographic experience is available through the Duke/UNC Oceanographic Consortium on the 135 foot research vessel Cape Hatteras constructed in 1981, as well as on other ships at other oceanographic institutions through the University National Oceanographic Laboratory System.

Requirements for Admission

For admission to the Curriculum in Marine Sciences, an undergraduate degree is required in a basic science such as physics, chemistry, biology, bacteriology, botany, zoology, or geology, or in engineering. Students are advised to develop a broad undergraduate science major with as many as possible of the following courses:

Mathematics through calculus, information science, physics, general chemistry, analytical chemistry, organic chemistry, invertebrate zoology or paleontology, physical chemistry, geology, botany, zoology, ecology, physiology, and statistics.

Degree Requirements

Doctor of Philosophy. The Ph.D. program for a student will be supervised by a faculty committee of five drawn from the graduate faculties of one or more campuses. Requirements for the Ph.D. degree are determined by the student's supervisory committee. Normally course requirements include all four of the core courses listed below, and one hour of Seminar in Oceanography. Substitutions for these courses can be arranged with approval of the supervisory committee and the Curriculum committee on admission and performance. Additional requirements include a period of study or research at a marine station or on an oceanographic cruise, teaching experience sufficient to develop and demonstrate competence, reading knowledge of one foreign language, and presentation of a satisfactory research seminar. Requirements for the minor (if any), the dissertation, comprehensive examinations, admission to candidacy, residence, and final examinations are provided in the regulations of the Graduate School.

Master of Science. The Master of Science degree program is similar to the doctoral program except that a committee of three will suffice for the master's candidates, and there is no foreign-language requirement.

Requirements for the minor, the thesis, admission to candidacy, residence, and final examinations are as provided in the regulations of the Graduate School.

Marine Science Core Courses

- 103 GEOLOGICAL OCEANOGRAPHY (Geology 188) (4). Prerequisite, Geology 11 or 41, or permission. Ocean basin origin, continental margin development, coastal geology, carbonate platforms and pelagic sediments are subjects covered; paleo-oceanographic reconstructions are emphasized. Field trip to coast. *Three lecture and two laboratory hours a week. Fall.* Neumann.
- 104 BIOLOGICAL OCEANOGRAPHY (Biology 140, Environmental Sciences 136) (4). Prerequisite, Biology 54 or 105 or permission. Physical, chemical and biological factors characterizing estuarine and marine environments emphasizing factors controlling animal and plant populations including methods of analysis, sampling, and identification. *Three lecture and two laboratory hours a week. Summer.* Staff.
- 105 CHEMICAL OCEANOGRAPHY (Environmental Sciences 128) (4). Prerequisite, one semester of physical chemistry or Environmental Sciences 122 or Chemistry 180, or equivalent. Variation and abundance of sea water constituents, the chemical, physical and biological processes contributing to their distribution as well as problems of dispersion of conservative and non-conservative substances are considered. *Three lecture and two laboratory hours a week. Spring.* Martens.
- 122 PHYSICAL OCEANOGRAPHY (4). Prerequisites, Math 31, 32, Physics 24, 25, or permission. Descriptive regional oceanography, equations of motion, the Ekman layer, wind-driven currents, thermohaline circulation, modern observations, waves, tides. *Four lecture and two laboratory hours a week. Fall.* Bane.

Other Marine Sciences Courses

- 101 OCEANOGRAPHY (Biology 126, Environmental Sciences 127) (3). Prerequisites, Biology 11, Chemistry 21, and Physics 25, or permission. An interdisciplinary study of the sea and the interrelationship of marine processes. *Three lecture hours a week. Fall.* Neumann; *Spring.* Frankenberg.
- 114 ALGAE (Biology 111) (3). Prerequisites, Biology 11, 11L. An introduction to the development, biology, ecology, and evolutionary significance of the algae. *Three lecture hours a week. Spring.* Hommersand.
- 114L ALGAE LABORATORY (Biology 111L) (2). Identification, classification, culture techniques, and field experience with algae. *Six laboratory hours a week. Spring.* Hommersand.
- 134 INVERTEBRATE DEVELOPMENT AND EVOLUTION (Biology 134) (3). Prerequisites, Biology 11, 11L. A survey of diversity in animal development and life cycles with emphasis on free-living marine invertebrates. *Three lecture hours a week. Fall.* (Alternate years.) Lehman.
- 134L INVERTEBRATE DEVELOPMENT LABORATORY (Biology 134L) (1 or 2). Prerequisite or corequisite, Biology 134. Laboratory experience in obtaining, culturing and identifying embryonic, larval, and planktonic materials, with emphasis on free-living marine forms. *Three scheduled laboratory hours a week; or, with special permission, three or more additional hours a week on an independent project for one additional unit of credit. With 134.* Lehman.
- 137 ECOLOGY OF WETLANDS (Environmental Sciences 137) (4). Prerequisites, 1 year of biology, 1 year of chemistry, 1 semester of ecology, and permission of instructor. An introduction to the functioning of freshwater and estuarine marsh and swamp ecosystems, with emphasis on systems of the southeastern U.S. *Fall.* Kuenzler.
- 138 ENVIRONMENTAL PROCESSES OF THE COASTAL ZONE (4). Prerequisite, science background and permission. Analysis of processes that create and control coastal zone environments. Topic selection reflecting faculty specialization, emphasis on field study. *Lecture and laboratory hours by arrangement. Fall, spring and summer.* Staff.

- 141S SPECIAL PROBLEMS IN MARINE BIOLOGY (Biology 141S) (3 to 6). Prerequisite, Biology 140 and/or permission of instructor. Comprehensive survey of problems and laboratory methods in any of the following areas: Mollusca (Chestnut), Vertebrate (Fahy, Schwartz), Fungi (Kohlmeyer), Ecology (Peterson). *Hours and credits by prior agreement (with five or more laboratory and conference hours a week per unit credit), first or second summer terms (offered on demand at Morehead City, N.C.)*. Staff of Institute of Marine Sciences.
- 146 MARINE ECOLOGY (Biology 146) (3). Prerequisite, Biology 54, or 105. An introductory study of oceanography as it pertains to the ecology of marine organisms. *Three lecture hours a week. Spring.* (Alternate years.) Peterson.
- 151 FLUID DYNAMICS (Physics 151) (3). Prerequisite, Physics 103 or permission. The physical properties of fluids, kinematics, governing equations, viscous incompressible flow, vorticity dynamics, boundary layers, irrotational incompressible flow. *Three lecture hours a week. Fall.* Bane, Bowers.
- 152 MARINE SYSTEMS MODELING (3). Prerequisite, Math 32 or permission of instructor. Numerical modeling of the flow, nutrient chemistry and lower trophic levels in a marine system; mathematical modeling of sedimentary geochemical processes; the fundamental budget equation; turbulent transport; numerical techniques. *Three lecture hours a week. Spring.* (Alternate years.) Bane.
- 161S PROBLEMS IN MARINE AND ENVIRONMENTAL PHYSIOLOGY (2 or more). Participation in physiological research related to one of the following: mammals in low-pressure atmospheres; mammals in high-pressure atmospheres; high pressure physiology of vertebrates and invertebrates; physical chemistry of protein systems at high pressures; problems in human diving physiology. (Taught at Wrightsville Marine Biomedical Laboratory, Wilmington, N.C.) *Fall and summer.* Brauer.
- 199 SPECIAL TOPICS IN MARINE SCIENCES (2-4). Prerequisite, science background and permission of instructor. Directed readings, laboratory and/or field study of marine science topics not covered in regularly scheduled courses. *Lecture and laboratory hours by arrangement. Fall, spring or summer.* Staff.
- 206 SEMINAR IN OCEANOGRAPHY (1). Discussion of theories and research concerning ocean systems. Topics will stress the interactions between physical, chemical, geological, and biological processes in the sea. Separate sections will be offered at UNC-CH and at the Institute of Marine Sciences, Morehead City. *Fall, spring, and summer.* Staff.
- 215 MARINE MYCOLOGY (Biology 215) (6). Prerequisite, Biology 115. Structure, development, systematics and ecology of marine fungi. Given on demand at the Institute of Marine Sciences, Morehead City. *Seven and one-half lecture and fifteen laboratory or field hours a week, given on demand at the Institute of Marine Sciences, Morehead City.* Kohlmeyer.
- 216 MARINE PHYCOLOGY (Biology 216) (5). Prerequisite, Biology 111. Structure, reproduction, systematics, and ecology of marine algae. The laboratory will include field studies and culture techniques. *Three lecture and six laboratory hours a week. Fall.* (Alternate years.) Hommersand.
- 222 ADVANCED PHYSICAL OCEANOGRAPHY (3). Prerequisite, MASC 122. Geophysical fluid dynamics; ocean circulation theory; instability processes; turbulence; air-sea interaction. *Three lecture hours a week. Spring.* (Alternate years.) Bane.
- 223 MARINE CARBONATE ENVIRONMENTS (Geology 223) (4). Prerequisite, permission of instructor. Chemical and biological origins of calcium carbonate, skeletal structure and chemomineralogy, breakdown, preservation, sedimentation, and early diagenesis are studied in a variety of deep and shallow environmental settings, in order to understand skeletal genesis, limestone origin and carbonate facies variability. Field trip to Florida, Bahamas, or Bermuda. Lab exercises; research report. *Three lecture and three laboratory hours a week. Spring.* (Alternate years.) Neumann.

- 226 SEMINAR IN PHYSICAL OCEANOGRAPHY (2). Prerequisite, MASC 122. Discussion of selected literature in the field of physical oceanography. *Spring*. Bane.
- 245 ECOLOGY OF PHYTOPLANKTON (Biology 245, Environmental Sciences 235) (4). Prerequisites, Environmental Science 127 or 132 and 135 and permission of instructor. Relationships of planktonic algae to an aquatic environment, emphasizing nutrition, productivity, distributions, and impacts on water quality. *Three lecture hours and one seminar hour a week. Spring*. Kuenzler.
- 300 RESEARCH IN MARINE SCIENCES (2 or more).
- 393 MASTER'S THESIS (3 or more).
- 394 DOCTORAL DISSERTATION (3 or more).

Courses in other departments that are considered appropriate for a major in marine sciences:

- Biology 54 Ecology and Population Biology. Staff.
- Biology 109 Introduction to Hydrobiology. Jenner.
- Biology 111 Algae. Hommersand.
- Biology 134 Invertebrate Development and Evolution. Lehman.
- Biology 156 Marine Invertebrate Field Zoology. Jenner.
- Biology 185 Population Ecology. Stiven, White.
- Biology 185L Laboratory in Population Ecology. Stiven, White.
- Biology 213 Advanced Marine Ecology. Jenner and Staff of the Institute of Marine Sciences.
- Biology 219 Algal Physiology. Hommersand.
- Environmental Sciences 122 Water Chemistry. Johnson, Singer.
- Environmental Sciences 132 Limnology and Water Pollution. Weiss.
- Environmental Sciences 134 Environmental Microbiology. Pfaender.
- Environmental Sciences 233 Microbial Ecology. Pfaender.
- Geology 118 Sedimentation. Ingram.
- Geology 151 Geodynamics. Rogers.
- Geology 180 Gravity and Magnetics. Strelitz.
- Geology 206 Marine Paleoecology. Carter.
- Geology 213 Micropaleontology II. St. Jean.
- Geology 221 Sedimentary Petrology. Textoris.
- Geology 250 Marine and Surficial Geochemistry. Martens.

DEPARTMENT OF MATHEMATICS

JOHN A. PFALTZGRAFF, *Chairman*

Professors

THOMAS H. BRYLAWSKI	(2)	Combinatorics
JOSEPH A. CIMA	(4)	Complex Analysis, Functional Analysis
JAMES N. DAMON	(14)	Singularity Theory
PATRICK B. EBERLEIN	(6)	Differential Geometry, Dynamical Systems
ROBERT B. GARDNER	(8)	Differential Geometry, Partial Differential Equations
LADNOR D. GEISSINGER	(9)	Combinatorial Algebra
SUE E. GOODMAN	(3)	Foliations
WILLIAM W. GRAVES	(10)	Functional Analysis
ROBERT G. HEYNEMAN	(12)	Bialgebras and Hopf Algebras
DOUGLAS G. KELLY	(15)	Combinatorics, Probability
NORBERTO KERZMAN	(32)	Several Complex Variables
ANCEL C. MEWBORN	(17)	Ring Theory
SHELDON E. NEWHOUSE	(18)	Dynamical Systems
KARL E. PETERSEN	(20)	Ergodic Theory
JOHN A. PFALTZGRAFF	(22)	Complex Analysis
JOSEPH F. PLANTE	(23)	Foliations and Dynamical Systems
MICHAEL SCHLESSINGER	(24)	Algebraic Geometry, Commutative Algebra
WILLIAM W. SMITH	(25)	Commutative Algebra and Ideal Theory
JOHANN SONNER	(26)	Category Theory
JAMES STASHEFF	(19)	Algebraic Topology
MICHAEL TAYLOR	(40)	Partial Differential Equations, Harmonic Analysis, Operator Theory
JON W. TOLLE	(27)	Optimization Theory
JONATHAN M. WAHL	(28)	Algebraic Geometry
WARREN R. WOGEN	(29)	Operator Theory
FRED B. WRIGHT	(30)	Functional Analysis

Associate Professors

JANE M. HAWKINS	(38)	Ergodic Theory, Dynamical Systems
ROBERT PROCTOR	(38)	Combinatorics; Algebra
DONALD ST. P. RICHARDS	(33)	Multivariate Analysis and Characterization Theory

Assistant Professors

FLORIN DAVID	(35)	Partial Differential Equations
KATHERINE MURPHY	(37)	Parameter Estimation and Control
MARK WILLIAMS	(36)	Partial Differential Equations

Professors Emeriti

EDWARD A. CAMERON
ROBERT L. DAVIS
W. ROBERT MANN

The Department of Mathematics offers graduate training leading to the degrees Master of Arts, Master of Science, and Doctor of Philosophy. A master's degree may be included or bypassed in the doctoral program. All of a student's graduate work may be done within the Department. The M.A.T. degree is also available with a major in mathematics in the School of Education.

The separate departments of Mathematics, Physics and Astronomy, and Statistics are housed in Phillips Hall, as are the Computation Center and the special library for these three departments and for the Department of Computer Science. This departmental library contains an unusually large and complete collection of mathematical books and journals.

The Department of Mathematics offers a number of teaching assistantships and teaching fellowships each year. Applicants for financial aid are considered also for several University fellowships awarded by the Graduate School in the university-wide competition. Applications for admission and financial assistance may be obtained from the Dean of the Graduate School. Applications for financial aid should be filed by February 1.

Degree Requirements

The general regulations of the Graduate School govern the work for graduate degrees in mathematics. Specific requirements are explained below. A graduate student in mathematics may receive credit only for mathematics courses numbered 137 and above.

The requirements for a master's degree are quite flexible, but all aspects of the program must be approved by the Director of Graduate Studies. The requirements include: programming ability at the level of computer science 14; satisfactory completion of 30 semester hours of approved course work; demonstration of either a basic reading knowledge of an approved foreign language (usually French, German or Russian), or demonstration of a working knowledge of an approved computer programming language; completion of a master's project for a Master of Science degree, or a master's thesis for a Master of Arts degree; and successful performance in an oral examination covering both course work and the master's project or thesis. A detailed statement on the master's degree requirements is available from the Department. The Department considers two years as the normal time to complete these requirements. The course schedule for a first-year graduate student will depend upon the student's undergraduate training; one typical schedule is as follows. Fall Semester: Two courses from Mathematics 180, 186, 193, 203, and one elective course from one of the other mathematical or physical sciences. Spring Semester: Two courses from Mathematics 181, 196, 204, 230 and one elective course from one of the other mathematical or physical sciences.

No minimum number of semester hours is required for a Ph.D.; however, doctoral students must satisfactorily complete Mathematics 180, 181, 186,

196, 203, 204, 230, 231, and 271 or 286 and usually complete a total of at least forty-eight semester hours in preparation for writing a dissertation. The Graduate School requires a minimum of 3 hours of Mathematics 394.

Requirements for a Ph.D. include programming ability at the level of Computer Science 14, a reading knowledge of two foreign languages chosen from French, German, Russian, or other language approved by the Director of Graduate Studies; successful performance on a comprehensive examination covering basic course work, a minimum of two semesters' instructional service, successful performance on a doctoral oral examination covering specialized topics in the area of proposed research, and the writing of a dissertation. The department considers four years as the normal time to complete these requirements.

Minor in Mathematics

Graduate students in other departments who plan to offer mathematics as a (complete or partial) minor field for the Ph.D. should consult the Director of Graduate Studies in Mathematics for approval of their programs and for assignment of an advisor in the Department of Mathematics. This should be done at the earliest possible time, in order to prevent disappointment for the student.

Courses for Graduates and Advanced Undergraduates

The name of the instructor who last taught the course appears after the course. It is not necessarily the name of the instructor who will next teach the course.

- 101 MATHEMATICAL CONCEPTS IN ART (3). Prerequisite, Art 37. Mathematical theories of proportion, perspective (projective invariants and the mathematics of visual perception). Symmetry and aesthetics will be expounded and illustrated by examples from painting, architecture and sculpture. (Alternate years.) Brylawski.
- 106 MATHEMATICAL METHODS IN BIostatISTICS (Bios 106) (3). Prerequisite, Mathematics 32 or equivalent. Special mathematical techniques in the theory and methods of biostatistics as related to the life sciences and public health. Includes brief review of calculus, selected topics from intermediate calculus, and introductory matrix theory for applications in biostatistics. *Fall*. Staff.
- 111 DEVELOPING MATHEMATICAL CONCEPTS (3). Prerequisite, consent of instructor. An investigation of various ways elementary concepts in mathematics can be developed. Applications of the mathematics developed will be considered. This course is ordinarily offered as an in-service course for teachers. *Spring*. Staff.
- 115 HISTORY OF MATHEMATICS (3). Prerequisite, calculus and abstract algebra; graduate students by permission only. A brief general survey of the history of Mathematics. Some special problems in depth. Problems in the history of mathematics. *Spring*. Wright.
- 116 LINEAR ALGEBRA (3). An introduction to the theory of vector spaces, linear transformations, systems of linear equations, matrices, determinants, eigenvectors, diagonalizations. Proctor.
- 117 EUCLIDEAN AND NON-EUCLIDEAN GEOMETRIES (3). Prerequisite, Mathematics 32 or permission of instructor. Critical study of basic notions and models of

- Euclidean and non-Euclidean geometries, order, congruence and distance. *Summer and spring*. Goodman.
- 118 BASIC CONCEPTS OF ANALYSIS (3). Prerequisites, Mathematics 32 and consent of instructor. Limits, continuity, differentiability, uniform continuity. Riemann integration. Infinite sequences and series; uniform convergence; power series. A student cannot receive credit for this course after receiving credit for Mathematics 193. *Summer*. Staff.
- 120 PROBABILITY (3). Prerequisite, Mathematics 34. Foundations of probability; random variables and distribution functions; the binomial, Poisson, and normal distributions; expectations, moments, moment-generating functions; compound events and joint distributions; limit theorems; applications. *Spring*. Geissinger.
- 121 ADVANCED CALCULUS I (3). Prerequisite, Mathematics 34. The real numbers; continuity and differentiability of functions of one variable; infinite series; integration. *Fall and spring*. Damon, Smith, Sonner.
- 122 ADVANCED CALCULUS II (3). Prerequisite, Mathematics 121. Functions of several variables; derivative as linear transformation; inverse and implicit function theorems; multiple integration. *Spring*. Peterson, Taylor.
- 123 FUNCTIONS OF A COMPLEX VARIABLE WITH APPLICATIONS (3). Prerequisite, Mathematics 34. The algebra of complex numbers, elementary functions and their mapping properties, complex limits, power series, analytic functions; contour integrals, Cauchy's theorem and formulae, Laurent series and residue calculus, elementary conformal mapping and boundary value problems. Poisson integral formula for the disk and the half plane. *Spring*. Wahl.
- 124 ELEMENTARY DIFFERENTIAL EQUATIONS (3). Prerequisite, Mathematics 33. Introduction to ordinary differential equations, linear differential systems, power series solutions. Laplace transforms, numerical methods. *Fall and spring*. David, Newhouse, Pfaltzgraff, Schlessinger.
- 128 MATHEMATICAL METHODS FOR THE PHYSICAL SCIENCES I (3). Prerequisite, Mathematics 34. Ordinary differential equations, Laplace transform, divergence and Stokes theorems, matrices and determinants. *Fall*. Mann, Richards, Murphy.
- 129 MATHEMATICAL METHODS FOR THE PHYSICAL SCIENCES II (3). Prerequisite, Mathematics 124 or 128. Partial differential equations. Bessel and Legendre functions, orthogonal expansions, Fourier series and integrals. *Spring*. Williams.
- 133 ELEMENTARY THEORY OF NUMBERS (3). Prerequisite, Mathematics 32. Divisibility, Euclidean algorithm, congruences, residue classes, Euler's function, primitive roots, Chinese remainder theorem, quadratic residues, number theoretic functions. Farey and continued fractions, Gaussian integers. *Fall and spring*. Wright.
- 134 ELEMENTS OF MODERN ALGEBRA (3). Prerequisite, Mathematics 32. Sets and functions, rings, ordered integral domains, integers, fields and rational numbers, real and complex numbers, polynomials, groups. *Fall and spring*. Davis.
- 135 NUMBER AND MAGNITUDE (3). Prerequisite, one year of college mathematics or consent of instructor. A historically oriented and mathematically rigorous development of the following topics: Natural numbers; counting; arithmetic; magnitude; classical ratio and proportionality; positive, negative, rational and real numbers. Wright.
- 136 ALGEBRA AND NUMBER (3). Prerequisite, Math 134 or 135 or 137 or 138 or consent of instructor. A historically oriented, rigorous development of polynomial algebra: solution of equations, solvability, Intermediate Value Theorem, Fundamental Theorem of Algebra, theorems of Gauss, Abel and Galois, various notions of real number. Wright.
- 137 LINEAR ALGEBRA (3). Prerequisite, Mathematics 34. Vector spaces, linear transformations, duality, diagonalization, primary and cyclic decomposition, Jordan canonical form, inner product spaces, orthogonal reduction of symmetric matrices, spectral theorem, bilinear forms, multilinear functions. *Fall and spring*. Plante.

- 138 ALGEBRAIC STRUCTURES (3). Prerequisite, Mathematics 137 or 147. Permutation groups, matrix groups, groups of linear transformations, symmetry groups, finite abelian groups; residue class rings, algebra of matrices, linear maps, and polynomials; real and complex numbers, rational functions, quadratic fields, finite fields. *Fall and spring*. Damon.
- 146 INTRODUCTION TO PROBABILITY (Statistics 126) (3). Prerequisite, Mathematics 34. An introduction to the mathematical theory of probability, covering random variables; moments; binomial, Poisson, normal, and related distribution; generating functions; sums and sequences of random variables; combinatorial and statistical applications. *Fall and spring*. Kelly.
- 147 MATRIX THEORY (3). Prerequisites, Math 33 or equivalent. Computational aspects of algebra of matrices with applications; determinants; numerical solution of linear systems; norms and error estimates; eigenvalues; linear programming. Math 116 covers elementary aspects of linear systems and matrices and may not be taken for credit after credit has been granted for Math 147. *Fall, spring and summer*. Staff.
- 148 COMBINATORIAL MATHEMATICS (Statistics 156) (3). Prerequisites, Mathematics 134 or 138, or permission of the instructor. Topics chosen from: Generating functions, Polya's theory of counting, partial orderings and incidence algebras, principle of inclusion-exclusion. Mobius inversion, combinatorial problems in physics and other branches of science. *Fall*. Brylawski.
- 149 INTRODUCTION TO GRAPH THEORY (Statistics 158) (3). Prerequisite, Mathematics 137 or equivalent. Basic concepts of directed and undirected graphs. Partitions and distances in graphs. Planar and non-planar graphs. Matrix representation of graphs. Network flows. Applications of graph theory. *Spring*. Geissinger.
- 151 DETERMINISTIC MODELS IN OPERATIONS RESEARCH (Statistics 181, ORSA 181) (3). Prerequisite, Mathematics 147. Linear, integer, non-linear and dynamic programming; classical optimization problems; net-work theory. *Fall and spring*. Staff.
- 157 TOPICS IN MATRIX THEORY (3). Prerequisites, Mathematics 137 or 147 or equivalent, and some computer programming language. Quadratic and hermitian series; applications to systems of differential equations; nonnegative matrices. Perron-Frobenius Theorem; integer matrices, some applications in combinatorics. *Spring*. Murphy.
- 165 THEORY OF INTEREST (3). Prerequisite, Mathematics 32. Simple and compound interest, annuities, amortization, depreciation, capitalized cost, bonds. This course is designed to prepare students for part 4A of the actuarial examinations. *Spring*. Dunn.
- 166 NUMERICAL ANALYSIS FOR ACTUARIES (3). Prerequisite, Mathematics 34. Finite differences, interpolation, summation, numerical differentiation and integration, numerical approaches to linear systems, linear programming, queuing theory, decision analysis, network analysis, simulation. *Spring*. Mann.
- 167 LIFE CONTINGENCIES (Statistics 107) (3). Prerequisite, Math 32. A detailed study of various actuarial functions. Single-life functions, multiple-life functions, and some population problems. *Fall*. Dunn.
- 171 NUMERICAL COMPUTING (Comp 151) (3). Prerequisites, Computer Science 14, Mathematics 32, and linear algebra. Studies, through mathematical models, the behavior of computers in performing numerical tasks. Efficiency, error generation and propagation, analysis of linear operators, and numerical computing strategies. *Fall and spring*. Pizer.
- 174 THE FINITE ELEMENT METHOD (3). Prerequisites, Intermediate Calculus and ordinary differential equations. Finite difference methods, Hermite interpolation, splines, variational methods, applications to boundary value problems associated with ordinary and partial differential equations. *Spring*. Mann.
- 175 TOPICS IN ANALYSIS (3). Prerequisite, Mathematics 122 or consent of instructor. Topics may include linear spaces, convexity, mathematical programming, duality, algorithms, and other subjects related to the mathematical theory of optimization. *Fall*. Staff.

- 176 TOPICS IN ALGEBRA (3). Prerequisite, consent of instructor. Topics may include number theory, algebraic number theory, field theory, and algebraic geometry. Sonner.
- 177 TOPICS IN GEOMETRY (3). Prerequisite, consent of instructor. Topics may include non-Euclidean geometries, linear geometry, finite geometries, topology and algebraic geometry. Kerzman.
- 180 GEOMETRY OF CURVES AND SURFACES (3). Prerequisite, Advanced calculus. Topics include: (curves) Frenet formulas, isoperimetric inequality, theorems of Crofton, Fenchel, Fary-Milnor; (surfaces) fundamental forms, Gaussian and mean curvature, special surfaces, geodesics, Gauss-Bonnet theorem. *Fall*. Gardner.
- 181 INTRODUCTORY TOPOLOGY (3). Prerequisites, Mathematics 193 and 186 or permission of instructor. Topological spaces, connectedness, separation axioms, product spaces, extension theorems. Classification of surfaces, fundamental group and covering spaces. *Spring*. Goodman.
- 184 FOUNDATIONS OF SET THEORY (3). Prerequisite, Mathematics 137. Formalized mathematics; proof methods; axioms of set theory; products, coproducts, kernels, cokernels, brackets; orders, cardinals, natural numbers; applications of set-theoretical principles to concrete mathematical situations. Sonner.
- 185 ALGEBRAIC LOGIC I (Philosophy 185) (3). Prerequisite, Mathematics 138 (Algebraic Structures) or Philosophy 101 (Symbolic Logic). Basic concepts in logic treated as a branch of mathematics. Topics may include: Boolean algebras, polyadic algebras, cylindrical algebras, ultraproducts. *Spring*. Staff.
- 186 LINEAR ALGEBRA (3). Prerequisite, Mathematics 138 or permission of instructor. Vector spaces, linear maps, determinants; commutative rings, algebras, polynomials; structure of operators; inner products. *Fall*. Schlessinger.
- 190 COMBINATORIAL THEORY (3). Corequisite, Mathematics 186 or permission of instructor. Foundations of combinatorial mathematics; partial orders, lattices. Mobius and incidence algebras, matching theory, Ramsey's theorem, permutation representations and Polya's theory of counting. *Fall*. Proctor.
- 193 INTRODUCTORY ANALYSIS (3). Prerequisite, advanced calculus. Elementary metric space topology; continuous functions; differentiation of vector-valued functions; implicit, inverse function theorem. Topics from: Weierstrass theorem; existence and uniqueness theorems for differential equations, series of functions. *Fall*. Wogen.
- 195 INTERMEDIATE PROBABILITY (Statistics 132) (3). Prerequisite, Statistics 112 or permission of instructor. Foundations of probability theory. Basic classical theorems. Modes of probabilistic convergence. Central limit problem. Generating functions, characteristic functions. Introduction to stochastic processes. *Spring*. Cambanis.
- 196 COMPLEX ANALYSIS (3). Prerequisite, Mathematics 193. A rigorous treatment of complex integration, including the Cauchy theory. Elementary special functions, power series, local behavior of analytic functions. *Spring*. Pfalzgraff.
- 197 QUALITATIVE THEORY OF DIFFERENTIAL EQUATIONS (3). Prerequisite, Linear algebra and Math 193, or consent of instructor. Existence and uniqueness theorems, linear and nonlinear systems, differential equations in the plane and on surfaces, Poincare-Bendixson Theory, Liapounov stability and structural stability, critical point analysis. *Spring*. Plante.

Courses for Graduates

- 201 INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS (3). Prerequisite, Mathematics 193. Basic methods in partial differential equations. Topics may include: Cauchy-Kowalewski Theorem, Holmgren's Uniqueness Theorem, Laplace's equation, Maximum Principle, Dirichlet problem, harmonic functions, wave equation, heat equation. Taylor.

- 203 MEASURE AND INTEGRATION (3). Prerequisite, Mathematics 193 or consent of instructor. Lebesgue and abstract measure and integration, convergence theorems, differentiation, Radon-Nikodym theorem, product measures, Fubini theorem, Lebesgue spaces, invariance under transformations, Haar measure and convolution. *Fall*. Petersen.
- 204 INTRODUCTORY FUNCTIONAL ANALYSIS (3). Prerequisite, Mathematics 203. Hahn-Banach and separation theorems. Hamel basis; normed and locally convex spaces, duals of spaces and maps, weak topologies; closed graph and open mapping theorems, uniform boundedness theorems. *Spring*. Cima.
- 205 ADVANCED COMPLEX ANALYSIS (3). Prerequisite, Mathematics 196. Laurent series; Mittag-Leffler and Weierstrass Theorems; Riemann mapping theorem; Runge's theorem; additional topics chosen from: harmonic, elliptic, univalent, entire, meromorphic functions; Dirichlet problem; Riemann surfaces. *Fall*. Pfaltzgraff.
- 206 SEVERAL COMPLEX VARIABLES (3). Prerequisite, Mathematics 196. Elementary theory, the Cousin problems, domains of holomorphy, Runge domains and polynomial approximation, local theory, complex analytic structures, coherent analytic sheaves and Stein manifolds, Cartan's theorems. *Spring*. (Alternate years). Kerzman.
- 210 TOPICS IN ANALYSIS (3). Prerequisite, consent of the instructor. Subjects may include geometric function theory, Riemann surfaces, Nevanlinna theory, Banach spaces of analytic functions, calculus of variations, distribution theory, partial differential equations, or Fourier Series. *Spring*. Staff.
- 213 ADVANCED FUNCTIONAL ANALYSIS (3). Prerequisite, consent of instructor. Subjects may include operator theory on Hilbert space, operators on Banach spaces, locally convex spaces, vector measures, Banach algebras. *Spring*. (Alternate years.) Staff.
- 224 HARMONIC ANALYSIS (3). Prerequisite, consent of instructor. Subjects may include topological groups, abstract harmonic analysis, Fourier analysis, noncommutative harmonic analysis and group representation, auto-morphic forms and analytic number theory. *Fall*. (Alternate years.) David.
- 230 RINGS AND REPRESENTATIONS (3). Prerequisite, Mathematics 186. Multilinear algebra, groups and modules, fields and Galois theory, representations of finite groups. *Spring*. Mewborn.
- 231 COMMUTATIVE ALGEBRA (3). Prerequisite, Mathematics 230. Field extensions, integral ring extensions, Nullstellensatz and normalization theorem, derivations and separability, local rings, valuations, completions, filtrations and graded rings, dimension theory. *Spring*. Heyneman.
- 234 TOPICS IN ALGEBRA (3). Prerequisite, Mathematics 230. Topics from the theory of rings, theory of bialgebras, homological algebra, algebraic number theory, categories and functions. *Fall*. (Alternate years.) Staff.
- 253 TOPICS IN COMBINATORIAL MATHEMATICS (3). Prerequisite, Mathematics 190 or consent of instructor. Topics may include: combinatorial geometries, coloring and the critical problem, the bracket algebra, reduced incidence algebras and generating functions, binomial enumeration, designs, valuation module of a lattice, lattice theory. *Spring*. (Alternate years.) Staff.
- 257 ALGEBRAIC GEOMETRY (3). Prerequisite, Mathematics 230. Topics may include: algebraic varieties, algebraic functions, abelian varieties, projective and complete varieties, algebraic groups, schemes and the Grothendieck theory, Riemann-Roch theorem. *Spring*. (Alternate years.) McEwan.
- 261 THEORY OF DYNAMICAL SYSTEMS (3). Prerequisite, consent of instructor. Topics may include: ergodic theory, topological dynamics, stability theory of differential equations, classical dynamical systems, differentiable dynamics. Petersen.
- 271 DIFFERENTIABLE MANIFOLDS (3). Prerequisites, Mathematics 181, 186, and 193. Calculus on manifolds, vector bundles, vector fields and differential equations, Lie Groups, connections, de Rham cohomology. *Spring*. Goodman.

- 272 DIFFERENTIAL GEOMETRY (3). Prerequisite, Mathematics 271. Riemannian geometry, first and second variation of area and applications, effect of curvature on homology and homotopy, Chern-Weil theory of characteristic classes, recent applications due to Bott, Chern-Simons, and Baum-Cheeger, *Spring*. Gardner.
- 273 LIE GROUPS AND LIE ALGEBRAS (3 each). Prerequisites, Mathematics 186 and
- 274 271. Relationship between Lie algebras and Lie groups, classification of complex semi-simple Lie algebras, representation theory, applications to geometry, cohomology of Lie algebras, compact groups. *Fall and spring*. (Alternate years.) Heyneman.
- 277 SPECIAL TOPICS IN GEOMETRY (3 each). Prerequisite, Mathematics 271. Topics may include: elliptic operators, complex manifolds, exterior differential systems, homogeneous spaces, integral geometry, submanifolds of Euclidean space. *Fall*. (Alternate years.) Staff.
- 286 ALGEBRAIC TOPOLOGY (3). Prerequisites, Mathematics 181 and 186. Homotopy and homology; simplicial complexes and singular homology; other topics may include: cohomology, universal coefficient theorems, higher homotopy groups, fibre spaces. *Spring*. Stasheff.
- 287 TOPICS IN ALGEBRAIC TOPOLOGY (3). Prerequisite, Mathematics 286 or permission of instructor. Topics primarily from algebraic or differential topology, such as: cohomology operations and the Steenrod algebra, homotopy groups, fibre bundles, spectral sequences, Postnikov systems, K-theory, cobordism, Morse Theory, surgery, topology of singularities. *Fall and spring*. (Alternate years.) Staff.
- 390 SEMINAR (3).
- 393 MASTER'S THESIS (3 or more). (This should not be taken by students electing non-thesis Master's projects.)
- 394 DOCTORAL DISSERTATION (3 or more).
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF MICROBIOLOGY AND IMMUNOLOGY

P. FREDERICK SPARLING, *Chairman*

Professors

- | | | |
|------------------------|------|---|
| KENNETH F. BOTT | (3) | Molecular Biology Bacterial Sporulation, Molecular Cloning |
| WALLACE A. CLYDE | (4) | Infectious Disease, Biology of Mycoplasmas |
| MARSHALL H. EDGELL | (7) | Genetic Engineering, Molecular Biology |
| JAMES D. FOLDS | (9) | Immunology of <i>Treponema pallidum</i> Infection |
| JEFFREY A. FRELINGER | (47) | Immunogenetics; Cellular Immunology |
| HARRY GOODER | (10) | Bacterial Cell Walls and L-forms |
| JACK GRIFFITH | (35) | Chromosome Structure: Viruses and Their Host Cells |
| NORTIN M. HADLER | (26) | Mechanism and Control of Chronic Inflammatory Response |
| J. STEPHEN HASKILL | (38) | Cancer Immunology; Role of Antibody, Macrophages, Chemotherapy |
| GEOFFREY HAUGHTON | (11) | Immunogenetics and Immunology of Tissue Transplantation |
| ENG-SHANG HUANG | (48) | Molecular Biology; Tumor Virology |
| CLYDE A. HUTCHISON III | (12) | Molecular Genetics, Genetic Engineering Virus Structure |
| G. PHILIP MANIRE | (1) | Virology, Growth Cycles and Cell Wall Antigens of <i>Chlamydia</i> |
| JOSEPH S. PAGANO | (14) | Interactions of Animal Virus Nucleic Acid and Mammalian Cells |
| GORDON D. ROSS | (39) | Immunology Leukocyte Membrane Receptor |
| JOHN H. SCHWAB | (15) | Autoimmunity, Cross-Reactive Antigens on Bacterial and Mammalian Membranes |
| P. FREDERICK SPARLING | (18) | Bacterial Pathogenesis; Molecular Biology of Bacteria Membranes |
| WILLIAM J. YOUNT | (25) | Genetic Control of Antibody Response and Gamma Globulin Synthesis in Humans |

Associate Professors

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|-------------------------|------|--|
| STEPHEN L. BACHENHEIMER | (30) | Molecular Biology of Viruses |
| PHILIP J. BASSFORD | (41) | Bacterial Genetics; Mechanism of Protein Secretion and Membrane Biogenesis |
| JEAN H. BOWDRE | (37) | Cellular Mechanisms of Oxygen Toxicity; Role of Iron in Microbial Virulence and Host Defense |
| MYRON S. COHEN | (55) | Biochemistry and Physiology of Phagocytopen |
| PHILIP C. COHEN | (49) | Mechanisms of Autoimmune Disease |

ROBERT A. EISENBERG	(46)	Immunology; Autoimmunity; Rheumatic Diseases
JANET J. FISCHER	(8)	Infectious Disease, Enteric Bacteria Infections of the Urinary Tract
DAVID G. KLAPPER	(33)	Immunochemistry, Immunogenetics; Structure of Proteins of Immunologic Interest
MICHAEL MCGINNIS	(31)	Dermatiaceous Pathogenic Fungi
JOHN E. NEWBOLD	(13)	Molecular Virology, Mechanical Analysis of Eukaryotes
HOWARD M. REISNER	(32)	Immunogenetics of Human Plasma Proteins Particularly IgG and Coagulant Factors VII and IX
ROBERT TWAROG	(21)	Regulation of Synthesis of Amino Acid Biosynthetic Enzymes in Bacteria
PRISCILLA B. WYRICK	(24)	Host-Parasite Relationships, Pathogenesis of Infectious Diseases

Assistant Professors

JANNE CANNON	(43)	Genetics of Pathogens; Pathogenesis of Infectious Disease
STEPHEN H. CLARKE	(53)	Molecular Immunology; Structure and Function of Immunoglobins Genes
PETER H. GILLIGAN	(51)	Bacterial Toxins
DAVID C. LEE	(54)	Extracellular Growth Factors; Oncogenes
JENNY P. TING	(50)	Immunogenetics; Cellular Immunology
NANCY RAAB-TRAUB	(52)	Molecular Virology and Oncogenesis

Lecturer

JAMES J. CRAWFORD	(5)	Oral Microbiology, Anaerobic Bacteriology
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Professors Emeriti

WILLIAM J. CROMARTIE	(6)
D. GORDON SHARP	(16)
MYRON S. SILVERMAN	(17)
WILLIAM R. STRAUGHN	(20)

The Department of Microbiology and Immunology, an administrative division of the School of Medicine, is a unit of the Graduate School. It offers instruction leading to the degrees of Master of Science and Doctor of Philosophy. Research programs supported by funds from the University, National Institutes of Health, National Science Foundation, American Cancer Society, Department of Agriculture, NIH, and private foundations, are being conducted on a wide variety of molecularly oriented programs concerning the nature of bacteria and viruses, host-parasite interaction, pathogenic mechanisms, molecular genetics, and various areas of immunology.

The Department, located in the Faculty Laboratory Office Building, has spacious research laboratories supplemented by special tissue culture facilities, large fermentation capacity, several special-purpose darkrooms, animal care facilities, computer facilities, and a P3 physical containment facility for hazardous recombinant DNA research. All the routine apparatus and instrumentation required for the most sophisticated modern microbiology research is available. Students also have the use of special equipment such as amino acid analyzers, low-background isotope counters, liquid scintillation counters, spectrofluorometers, a flow cytometry facility, ultracentrifuges, and specialized high-voltage electrophoresis apparatus.

Individual faculty members are provided with well-equipped laboratories for their own work and that of postdoctoral fellows, graduate students, technicians, and other personnel.

Funds are available from the University and individual research grants to provide stipends for predoctoral students admitted for graduate work in the Department. At present stipends are \$9550 per year, with an additional amount equal to the in-state tuition rate.

The Department of Microbiology and Immunology considers applications from prospective graduate students who present evidence of superior scholarship and who have completed courses in general, analytical and organic chemistry, mathematics including calculus, and two semesters of physics. Students planning a research career in microbiology are strongly urged to take additional courses in physical chemistry, biochemistry, and biology.

Students admitted to the Graduate Program in the Department are encouraged to schedule several laboratory rotation projects during the first year. During that time they also take an average of two departmental courses each semester. The specific courses to be taken by each student will be determined by a departmental committee selected specifically for the student with his professional objectives in mind. This committee may be modified once a faculty preceptor and specific dissertation topic have been chosen. Although no minor and no language is required, most students take additional courses in Biochemistry. Graduate courses in Anatomy, Pathology, Parasitology and other departments are available for those students seeking special preparation in these areas. Special arrangements can be made with uniquely qualified medical students wishing to pursue a specific M.D.-Ph.D. program.

Students entering in September will usually enroll in one of more of the following: MCRO 105, 190, 110, 114 and 201 in the fall semester. MCRO 120, 130, 202 and a biochemistry course in the spring semester. Additional elective courses including two or three seminar tutorials and two Microbiology seminars may be taken during the second year. The preliminary examination and oral examination scheduled during the second year stress written and oral command of selected scientific disciplines rather than a

broad comprehensive test of the field. Students are usually required to serve as laboratory assistants for one semester each during their second and third year. Although truly exceptional students have completed all requirements for the Ph.D. in three years, most students complete their work in four years.

Courses for Graduates and Advanced Undergraduates

- 105 MOLECULAR AND CELLULAR BASIS OF PROKARYOTIC MICROBIOLOGY (4). Prerequisites, organic chemistry, and permission of department except for departmental majors. Basic concepts of the structure, metabolism, growth and reproduction, genetics and control and regulation of prokaryotes. *Four lecture hours a week, fall.* Bassford; staff.
- 112 INTRODUCTION TO MICROBIOLOGY (2). Open only to dental students. A course covering basic aspects of microbiology including sterilization, disinfection, action of antimicrobial chemotherapeutic agents, concepts of infection and immunity and the study of certain selected infectious agents. *Twenty-eight lecture hours and seven laboratory hours, spring.* Gooder. Staff.
- 114 IMMUNOBIOLOGY (3). Prerequisites, Zoology 11, or Biology 21, or Microbiology 51 or 55, and Chemistry 11, 21. For students with primary focus other than immunology. Immunochemistry; genetic control, regulation and development of cells and cell interactions; hypersensitivity, autoimmunity, resistance to infection. *Two lectures, one seminar, fall.* Ting.
- 115 SPECIAL TOPICS IN BACTERIOLOGY OR IMMUNOLOGY (3 or more each semester). Permission of the Department required except for departmental majors. Designed to introduce the student to research methods. Minor investigative problems are conducted with advice and guidance of the staff. May be repeated for credit two or more semesters. *Hours and credit to be arranged, any term.* Staff.
- 120 MICROBIAL PATHOGENESIS (4). Prerequisites, Microbiology 105, 110. Molecular and biological basis of pathogenic properties of bacteria. *Four lecture hours per week, spring.* Cannon. Staff.
- 130 VIROLOGY (4). Prerequisites, Microbiology 105, 110. Current concepts of the chemistry, structure, replication, genetics and natural history of animal viruses and their host cells. *Four lecture hours a week, spring.* Newbold.
- 189 NUCLEIC ACID TECHNIQUES (Biology 189, Genetics 189) (4). Prerequisites, some molecular biology, permission of instructor. An intense course covering many aspects of recombinant DNA technology such as isolation of nucleic acids, gel analysis, Southern and Northern blotting, cloning in viruses and plasmids, and DNA sequencing. Fee required. *Eight laboratory hours, spring.* Carl.
- 190 EUKARYOTIC GENE ORGANIZATION (Genetics 190) (3). Prerequisites, Organic Chemistry, permission of instructor. Basic concepts of classical chromosomal structure, function and mechanics. Eukaryotic molecular genetics and cellular regulation will be emphasized. Readings, short answer examinations, term project. *Four lecture hours, spring.* Griffith.
- 192 MEDICAL MYCOLOGY (Botany 192, Parasitology 192) (4). Prerequisites, general microbiology or botany and permission of instructor. Isolation, identification, epidemiology, mycoserology, and clinical importance of medically significant fungi. Identification of hyphomycetes and yeasts will be stressed. *Two lecture and four laboratory hours a week, fall.* McGinnis.

Courses for Graduates

- 201 SEMINAR IN MICROBIOLOGY (1 each). Discussion of selected topics in Microbiology. *Fall and spring*. Staff.
- 202
- 210 SEMINAR/TUTORIAL IN MICROBIAL CHEMISTRY AND GENETICS (3). One or two faculty and a small number of students will consider in depth current research of importance. Emphasis will be on current literature, invited speakers, etc., rather than textbooks. *Fall*. Cannon.
- 211 SEMINAR/TUTORIAL IN ANIMAL VIROLOGY (3). One or two faculty and a small number of students will consider in depth current research of importance. Emphasis will be on current literature, invited speakers, etc., rather than textbooks. *Fall*. Raab-Traub.
- 212 SEMINAR/TUTORIAL IN IMMUNOLOGY (3). One or two faculty and a small number of students will consider in depth current research of importance. Emphasis will be on current literature, invited speakers, etc., rather than textbooks. *Spring*. Staff.
- 213 SEMINAR/TUTORIAL IN THE BIOLOGY OF CANCER: VIRUSES AND THE IMMUNE RESPONSE (3). One or two faculty and a small number of students will consider in depth current research of importance. Emphasis will be placed on current literature, invited speakers, etc., rather than textbooks. (Not offered 1984.) *Fall*. Staff.
- 301 RESEARCH IN BACTERIOLOGY OR IMMUNOLOGY (3 or more each semester). Permission of the department required. Designed to introduce the student to research methods and special techniques. Short term problems are conducted with advice and guidance of the staff. May be repeated for credit two or more semesters. *Hours and credit to be arranged, any term*. Staff.
- 393 MASTER'S THESIS (3 or more each semester). Staff.
- 394 DOCTORAL DISSERTATION (3 or more each semester). Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF MUSIC

THOMAS A. WARBURTON, *Acting Chairman*

Professors

JAMES HAAR	(37)	Renaissance Music, Nineteenth-Century Music, History of Music Theory
ROGER D. HANNAY	(7)	Composition, Contemporary Music
RUDOLPH J. KREMER	(10)	Organ, Baroque Music
HOWARD E. SMITHER	(16)	Oratorio and Opera, Baroque Music
THOMAS A. WARBURTON	(17)	Renaissance Music, Twentieth-Century Music, Theory
ANN M. WOODWARD	(5)	Viola, Chamber Music
MICHAEL W. ZENGE	(20)	Piano, Keyboard Music

Associate Professors

HAROLD L. ANDREWS	(2)	Classic Era, Structural Analysis
JON FINSON	(36)	Nineteenth-Century Music, Collegium Musicum
LYNN D. GLASSOCK	(21)	Percussion, Theory
JAMES E. KETCH	(33)	Trumpet, Jazz Band, Jazz History
RICHARD E. LUBY	(41)	Violin, Chamber Music
MARMADUKE S. MILES	(34)	Piano, Piano Pedagogy
DONALD L. OEHLER	(24)	Clarinet, New Music Ensemble
BROOKS DE WETTER-SMITH	(28)	Flute, Music Education
FRANCIS M. WHANG	(18)	Piano
STAFFORD WING	(19)	Voice

Assistant Professors

JAMES H. ARROWOOD	(56)	University Wind Symphony, Conducting
JUDITH KLINGER	(61)	Voice, Opera Workshop
JOHN NÁDAS	(57)	Medieval Music, Nineteenth-century Music, Collegium Musicum

Professors Emeriti

EDGAR H. ALDEN
JOEL J. CARTER
LARA G. HOGGARD
WILTON E. MASON
WILLIAM S. NEWMAN
JAMES W. PRUETT
DAVID SERRINS
EARL SLOCUM

The Graduate Programs of Study

Graduate work in the Department of Music offers programs of study to students who intend to specialize in musicology, in music history and literature, in composition, in performance, and in choral conducting. The

Department also supports other graduate study in the University, particularly in the School of Education.

Special Facilities

The Department of Music has extensive facilities that are favorable to advanced study in music. Performing resources comprise over eighty pianos (including a fortepiano), four organs (including a Schlicker tracker organ and a transposing positiv), five harpsichords, a clavichord, and an array of other historical instruments. A number of orchestral instruments are available for concert and practice use. The electronic music studio includes an Arp Synthesizer and related equipment.

Central to the departmental resources is the Music Library, which ranks high among the nation's music libraries for its collected scholarly editions, scholarly studies, periodicals, early source materials, iconographic aids, microfilm, archives, folk music collections, practical performing editions, and recordings. Several extensive private collections assembled by individual faculty members for special studies are often available to advanced students.

Degrees

The Department offers the degrees of *Master of Arts* (M.A.) in music history and literature; *Master of Music* (M.M.) in composition or performance, including choral conducting; and *Doctor of Philosophy* (Ph.D.) in musicology. It also supports the School of Education's programs leading to the degrees of *Master of Arts in Teaching* (M.A.T.), and *Doctor of Education* (Ed.D.) with a minor or special project in music; application to these programs is made to the School of Education, from which information is available.

Prerequisites for Degree Programs

The usual prerequisite for admission to graduate work leading to the M.A. and Ph.D. degrees is a Bachelor of Arts degree with a major in music, comparable to that given at this University. The B.M. and B.M.Ed. degrees usually lead, respectively, to the M.M. and the graduate music education degrees.

All applicants for graduate study in music are required to take both the verbal and quantitative Aptitude Tests as well as the Advanced Test in Music of the Graduate Record Examinations. These tests should be taken early enough for the scores to be submitted with the application for admission, preferably in the Summer or Fall preceding application for admission. An applicant for the M.A. or the Ph.D. program must submit with the application a thesis or research paper. An applicant for the M.M. program in composition must submit with the application one of more compositions. An applicant for the M.M. program in performance must demonstrate advanced

standing through a qualifying performance, in person or by tape. An applicant for the M.M. program in choral conducting must submit with the application a tape of choral works that he or she has conducted and should consult with the director of this program. For return of tapes, compositions, and papers, a self-addressed, stamped envelope must be provided.

Language and Course Requirements, Examinations

M.M. candidates will normally have had two years of undergraduate study in a modern foreign language before admission; if not, the language requirement may be met by two years of study at the undergraduate level, or by passing the departmental language examination, or by passing the ETS examination. *M.M. candidates* in voice and choral conducting must also pass an examination in diction and song translations. *M.A. candidates* must pass the departmental examination in one modern foreign language; *Ph.D. candidates*, in two.

Music 110, Advanced Musicianship (passed with a grade of P or better), is required in all degree programs; Music 101, Resources and Methods, in all programs except composition. Central to the *M.M. program* is study in the applied music area and a "thesis" requirement that is met by a degree recital, by a composition, or by conducting, as appropriate to the program. Certain other courses and performance activities are specified by each applied music area with the total credit hours for the *M.M. programs* ranging from 33-36; details of each program are available upon request to the Department. *M.A. and Ph.D. candidates* may optionally include courses from other departments that may be organized as a formal minor (9 hours for the *M.A.*, 15 for the *Ph.D.*) or as a "supporting program"; such programs are devised and approved through consultation with the student's advisor and the departments concerned. A formal Minor in Medieval Studies is also available; see the Department of Classics entry in this catalogue.

M.A. candidates will take courses totaling 30 credit hours in addition to Music 110 and will write a thesis that is a revision of a paper prepared for a graduate course. *All candidates for a master's degree* take a final oral examination covering course work; a final written examination is not given.

At the beginning of each spring semester a qualifying examination is given to those who wish to proceed to the *Ph.D. program* after finishing the *M.A.* Students already in the Department's *M.A. program* will be advised to take the examination in the second year. Those who received the *M.A.* at another institution must take the examination in the spring of the first year of study; these students will be evaluated during the second semester of study and advised as to whether they should continue. Following the completion of course work and language requirements, *Ph.D. students* will take a written examination in three areas of specialization to be determined through consultation with the faculty, and an oral examination focused largely on the area of the proposed dissertation.

The *Master of Arts in Teaching degree* is administered by the School of Education. Although primarily for teachers possessing a Class A teaching certificate, candidates who are not already certified to teach may qualify for the first-level teaching certificate (North Carolina "Class A" certificate) as special students and then proceed to the regular M.A.T. program. A minimum of thirty-three semester hours is required, with the following distribution: Music, 18 hours, Music 101, 110, Theory elective, 9 hours; applied Music, 6 hours; other electives, 3 hours; Education, 15 hours; EDCI 200, 287, 306; EDFO 106 or 180 or 285; EDFO 101 or 201 or 223 (see section of this catalogue under School of Education).

Fellowships, Assistantships, and Other Student Aid

Besides campus-wide grants (discussed elsewhere in this catalogue), assistantships and special grants are available to selected graduate students in music. The deadline for all graduate applications is February 1; separate application for aid is not necessary but may be indicated on the general application form for admission to the Graduate School. Selected applicants will be nominated for University-wide awards than range from \$4,800.00 to \$9,500.00. Assistantships awarded by the Department require about ten hours of service per week. Qualified students may teach applied music and thus earn additional income. Awards range from \$3,000.00 to \$4,800.00, and may include consideration for partial tuition remission for out-of-state students. The Edgar Memorial Fund Fellowship of \$4,000.00 plus consideration for partial tuition remission for out-of-state students is awarded by the Department to an incoming graduate student in musicology or composition. The fellowship may be renewed.

Applied Music Fees for 1985-86 are as described below. Please note that all fees are subject to change each year.

PRIVATE INSTRUCTION FEES (per semester)

One hour lesson per week	\$140.00
One half-hour lesson per week	\$ 75.00

PRACTICE ROOM AND FACILITIES FEES (per semester)

Music majors enrolled for private instruction

Piano, organ, voice, and percussion majors	\$ 40.00
All other majors	\$ 30.00

Non-majors enrolled for private instruction

Piano, organ, voice, and percussion (one hour per day)	\$ 20.00
All others (one hour per day)	\$ 10.00

OTHER FEES

Instrument rental, any instrument, for one semester	\$ 30.00
Padlock rental, duration of student's stay in the Department	\$ 5.00

Note: *Fees are subject to change each year.*

The academic course schedule for a school year is planned a year in advance, with selections made from Music 101-176 and 210-337. Prospective students may request a list of courses currently being taught, or the list planned for the succeeding year.

Courses for Graduates and Advanced Undergraduates

- 101 RESOURCES AND METHODS OF MUSICOLOGY (3). Introduction to the scope, methodology, and bibliography of musicology. Extensive use of the music library, preparation for advanced seminars, and proper research procedures are stressed. *Fall*. Pruett.
- 102 SURVEY OF MUSIC STYLE (3). Survey of the chief styles of music history, with emphasis on methods of analysis, examination of representative scores, written exercises, and related readings. Warburton, Kremer.
- 103 PRIMITIVE AND ORIENTAL MUSIC (3). A study of the folk music of primitive peoples throughout the world and of the traditional and folk music in Oriental countries.
- 104 FOLK MUSIC OF EUROPE AND THE NEW WORLD (3). A study of folk music in European countries, emphasizing similarities in the British Isles and southern United States.
- 110 ADVANCED MUSICIANSHIP (3). Advanced study in sight-singing (including techniques related to solfege, reading in clefs), dictation, and keyboard (including figured bass, harmonization, improvisation, and score reading.) *Fall*. Warburton, Kremer.
- 114 20TH-CENTURY HARMONIC TECHNIQUES (3). Prerequisite, Music 38. Hannay.
- 135 AMERICAN MUSIC (3). Its growth and development from the early colonies to the present.
- 136 PERFORMANCE PRACTICES (3). Problems of rhythm, ornamentation, articulation, and expression in both instrumental and vocal music, with emphasis on the period from 1550-1825 and practical applications in an informal collegium musicum.
- 140 ORATORIO (3). The development of the genre from its origins to the present. Smither.
- 141 THE MADRIGAL (3). Its international flowering, especially at the peak of music's Renaissance era. Smither, Haar.
- 142 OPERA (3). A survey of the types, national and international trends, conflicts, and chief masterworks from opera's beginning around 1600 to the present.
- 144 ART SONG (3). A study of the development of this genre, especially during its great flowering in the Lieder, *melodies*, and other national types of the nineteenth century. Moses.
- 147 THE SYMPHONY (3). The growth of the symphony as an independent orchestra genre, especially in the masterworks from Haydn, Mozart, and Beethoven to Prokofiev, Piston, and other 20th-century composers. Andrews.
- 148 KEYBOARD MUSIC (3). A historical survey that follows either stringed keyboard music through the harpsichord, clavichord, and piano, or organ music in its successive stages. Kremer, Zenge, Warburton.
- 149 GENRE STUDIES (3). Other specific surveys of genres, forms, and styles of music in keeping with the series, Music 140-148. Staff.
- 150 FRANZ JOSEPH HAYDN (3). The man and his times, his music and its styles. Andrews.
- 151 J. S. BACH (3). With special attention alternately to the vocal and the instrumental works. Kremer, Smither.

- 152 MOZART (3). Andrews.
- 153 BEETHOVEN (3). Andrews.
- 154 HANDEL (3). Smither.
- 155 BRAHMS (3).
- 156 WAGNER AND VERDI (3).
- 157 DEBUSSY AND RAVEL (3). Warburton.
- 158 STRAVINSKY AND SCHOENBERG (3). Hannay.
- 159 COMPOSER STUDIES (3). Other specific surveys in keeping with Music 150-158.
- 160 PEDAGOGY OF THEORY (3). Techniques of teaching; evaluation of current books, scores, and anthologies covering all aspects of sight-singing, keyboard, analysis, and written approaches to harmony and counterpoint. Practical classroom experience. *Spring*. Hannay.
- 161 STRUCTURAL AND STYLISTIC ANALYSIS (3). Studies in the problems and techniques of musical analysis. Arauco.
- 163 INSTRUMENTAL ARRANGING (3). Exercises in arranging for various combinations of woodwind, brass, and percussion instruments, with practical application.
- 164 CHORAL ARRANGING (3). Theory and practice of arranging music for voice in all standard choral combinations with emphasis on historical traditions and stylistic differences.
- 165 SURVEY OF CONTRAPTUNTAL TECHNIQUES (3). Renaissance, Baroque, and early 20th century; analysis and imitative writing. Haar, Kremer, Warburton.
- 166 COMPOSITION (3). Original compositions in various forms. *Fall and spring*. Hannay.
- 167 THE ELECTRONIC STUDIO (3). Limited to majors in the Division of Fine Arts, with permission of the instructor. An introduction to the technical aspects of electronic music, including familiarization with synthesizers. Hannay.
- 168 BASSO CONTINUO (3). Practical and historical studies in styles of keyboard realizations of basso continuo. Development of keyboard skill.
- 171 INSTRUMENTAL PERFORMANCE REPERTOIRE (3). Survey of solo and ensemble literature. Emphasis may vary among brass, percussion, strings, woodwinds.
- 172 LIEDER PRACTICUM (3). By permission of class instructor and major voice instructors. Extensive analysis and performance study of German art song with special emphasis on textual factors and accompanying skills. Zenge, Moses.
- 173 OPERA DIRECTION PRACTICUM (3). Practical experience in opera direction.
- 174 CHURCH MUSIC PRACTICUM (3). Practical study of church music; church year, hymnody, chant, Roman, Anglican, Protestant services, organ improvisation, and related problems. Kremer.
- 175 ADVANCED CONDUCTING I and II (3 each). Prerequisite, Music 68. *Fall and spring*. Serrins, Klebanow.
- 201- GRADUATE APPLIED MUSIC (3 or 1½). Individual applied music instruction. M.M. in Performance candidates receive 3 hours credit for their major instrument or voice for one hour lesson a week, each semester, and register for at least 18 hours a week of practice, each semester; they will continue to register for individual instruction until the "thesis" requirements (recital and concerto or opera role) have been met. Qualified graduate students in degree programs other than the M.M. degree in Performance may receive like credit for applied music, but such credit will not substitute for course work otherwise required for the M.A. and Ph.D. degrees. After qualifying through audition, graduate students may enroll for 1½ credits (usually, or 3 exceptionally) per semester in applied music. A maximum of 6 hours credit may be applied toward the M.M. in Composition of the M.A.T.; 3 hours credit toward the M.M. in Choral Conducting. Students who have received the allowable number of hours credit, but who desire to continue applied music study, and M.A. and Ph.D. students will enroll in a course with the suffix X. Graduate Music Ensemble carries 1½ hours credit. *Fall and spring*. Staff.

Applied Music

201A	PIANO	204B	OBOE
201B	ORGAN	204C	CLARINET
201C	HARPSICHORD	204D	SAXOPHONE
201X	KEYBOARD INSTRUMENT	204E	BASSOON
	Credit not applicable to a music degree	204F	RECORDER
		204X	WOODWIND INSTRUMENT
202	VOICE		Credit not applicable to a music degree
202X	VOICE	205A	FRENCH HORN
	Credit not applicable to a music degree	205B	TRUMPET
203A	VIOLIN	205C	TROMBONE
203B	VIOLA	205D	TUBA
203C	VIOLONCELLO	205X	BRASS INSTRUMENT
203D	STRING BASS		Credit not applicable to a music degree
203E	HARP	206	PERCUSSION
203F	GUITAR	206X	PERCUSSION
203X	STRING INSTRUMENT		Credit not applicable to a music degree
	Credit not applicable to a music degree		
204A	FLUTE		

Music Ensembles

207A	UNIVERSITY SYMPHONY	207J	MIXED CHAMBER ENSEMBLE
207B	CHAMBER ORCHESTRA	207K	PIANO ENSEMBLE
207C	UNIVERSITY WIND SYMPHONY	207M	GUITAR ENSEMBLE
207D	NEW MUSIC ENSEMBLE	207N	PERCUSSION ENSEMBLE
207E	JAZZ LAB BAND	208A	CAROLINA CHOIR
207F	BRASS CHAMBER GROUPS	208B	UNIVERSITY MIXED CHORUS
207G	WOODWIND CHAMBER GROUPS	208C	UNIVERSITY CHAMBER SINGERS
207H	STRING CHAMBER GROUPS	208D	MEN'S GLEE CLUB
		208E	OPERA THEATRE
		208F	WOMEN'S GLEE CLUB
		208G	COLLEGIUM MUSICUM

- 210 SURVEY OF CHORAL MUSIC (3). Survey and style critical analysis of choral masterworks in the large forms; historical trends; study of composers from Palestrina to the present, using scores, lectures, readings, recordings, and performances.
- 240 PROSEMINAR IN MEDIEVAL MUSIC (3). Study of selected topics in Medieval music. Emphasis on basic stylistic aspects and problems of analysis, and on both primary and secondary sources and bibliography. Independent work is stressed, in preparation for more developed, independent research at the seminar level (Music 337). Lectures and student reports. Nádas.
- 241 PROSEMINAR IN RENAISSANCE MUSIC (3). In keeping with Music 240. Haar, Pruett, Warburton.
- 242 PROSEMINAR IN BAROQUE MUSIC (3). In keeping with Music 240. Smither, Haar.
- 243 PROSEMINAR IN CLASSIC MUSIC (3). In keeping with Music 240. Andrews.
- 244 PROSEMINAR IN ROMANTIC MUSIC (3). In keeping with Music 240. Finson, Haar.

- 245 PROSEMINAR IN MODERN MUSIC (3). In keeping with Music 240. Arauco, Hannay, Warburton.
- 246 PROSEMINAR IN AMERICAN STUDIES (3). Study of selected topics from the musical history of America, from Colonial times to the early twentieth century. Advanced bibliography in American musicology. Research topics relating principally to primary sources. Lectures and student reports.
- 249 PROSEMINAR IN MUSICOLOGY (3). Other specific surveys dealing with the music of a certain limited period or locale, or concerned with some special concept.
- 251 ARS ANTIQUA AND ARS NOVA (3). Notation, performance practices, liturgical functions, social functions, concordances, structural principles, and extramusical influences.
- 252 RENAISSANCE MANUSCRIPT STUDIES (3). Provenance and history, notation, and concordances, including textual studies and edition techniques. Haar, Pruett, Warburton.
- 261 ANALYTICAL TECHNIQUES (3). Techniques of analysis of music from the Middle Ages to the present. Andrews, Warburton.
- 262 ORCHESTRATION (3). Practical orchestral scoring with emphasis on understanding and imitating historical styles for Mozart through Ravel. Hannay, Serrins.
- 264 ADVANCED TONAL COUNTERPOINT (3). Practical exercises, with special emphasis on the techniques of Bach. Hannay, Warburton.
- 265 ADVANCED COMPOSITION (3 each). Designed for the development of creative originality in musical composition. *Fall and spring*. Hannay.
- 266
- 298 SPECIAL STUDIES. The faculty assists and advises graduate students' research or creative work. Hours and credits to be arranged. Staff.
- 337 SEMINAR IN MUSICOLOGY (3). Seminar subjects and staff to be announced. *Fall and spring*.
- 393 MASTER'S THESIS (3 or more). *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

NOTE: The following courses come under the School of Education

- EDCI MUSIC EDUCATION IN THE PUBLIC SCHOOL, K-12 (3). A study of the goals, historical development, and present curricular practices in music education at all levels. Bostley.
- EDCI ADVANCED CHORAL METHODS AND VOCAL DEVELOPMENT PROCEDURES FOR SECONDARY SCHOOL MUSIC (3). The development of the singing voice, ear training, reading, and musicianship, in teaching and conducting. *Summer*. Cook.
- EDCI THE TEACHING OF APPLIED MUSIC: VOICE (3). Analysis, methods, and techniques of vocal pedagogy. *Summers*. Staff.
- EDCI INVESTIGATIONS AND TRENDS IN MUSIC EDUCATION (3). A survey of recent studies in the psychology of music; current practices here and abroad as reported in professional journals; readings and reports on selected topics such as programmed instruction.
- EDCI EDUCATION WORKSHOPS (3 or 6). Music education workshops may be in Piano Pedagogy, Elementary School Music, or other subjects. *Summer, Fall, Spring*. Bostley.

CURRICULUM IN NEUROBIOLOGY

PIERRE MORELL, *Director*

Professors

- | | | |
|----------------------|------|--|
| GEORGE R. BREESE | (2) | Developmental and Peptide Pharmacology; Neuropharmacology; Experimental Alcoholism |
| NORMAN A. COULTER | (4) | Mathematical Modeling of Neural Processes |
| LINDA DYKSTRA | (51) | Behavioral Effects of Opioids |
| FREDERIC L. ELDRIDGE | (74) | Neural Control of Respiration |
| PAUL FAREL | (11) | Spinal Cord Development and Regeneration |
| LAWRENCE I. GILBERT | (79) | Insect Physiology |
| EDWARD GLASSMAN | (13) | Neurochemical Genetics |
| JACOB S. HANKER | (16) | Neurocytochemistry of Diabetes Mellitus and Sensory Neuropathies |
| T. KENDALL HARDEN | (59) | Characterization and Isolation of Receptors; Cyclic Nucleotides |
| JAMES N. HAYWARD | (17) | Neuropeptides; Hypothalamus, Immunocytochemical Studies of Neuroendocrine Cells |
| O. W. HENSON | (63) | Auditory Physiology, Comparative Anatomy of Auditory System |
| DAVID S. JANOWSKY | (94) | Psychopharmacology; Cholinergic Mechanisms and the Neuroendocrine System |
| RICHARD N. JOHNSON | (75) | Biological Control Systems, Analysis and Simulation; Real-Time Data Acquisition |
| RICHARD A. KING | (19) | Brain and Behavior |
| J. STEPHEN KIZER | (64) | Regulation of Neurotransmitter Metabolism; Neuroendocrinology |
| JEAN LAUDER | (71) | Neurotransmitters and Hormone Neurogenesis |
| DAVID L. MCLWAIN | (23) | Chemistry of Regeneration and Degeneration in Spinal Motoneurons |
| GERHARD W. MEISSNER | (55) | Structure, Function and Assembly of Membranes |
| *PIERRE MORELL | (27) | Myelin Metabolism; Axonal Transport; Heavy-Metal Neurotoxicology |
| ROBERT A. MUELLER | (30) | Regulation of Biogenic Amines |
| EDWARD R. PERL | (35) | Nociception; Electrophysiology of Somatosensory Systems |
| PETER PETRUSZ | (36) | Neuropeptides; Neuroendocrinology; Reproductive Biology |
| ARTHUR J. PRANGE | (37) | CNS Effects of Neuropeptides; Affective Disorders |
| ALDO RUSTIONI | (50) | Somatosensory Pathways; Synaptogenesis |
| PAUL G. SHINKMAN | (41) | Receptive Field Properties of Developing Visual System |

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|------------------|------|--|
| ANN E. STUART | (76) | Sensory Processing in Invertebrate Nervous System |
| WALTER E. STUMPF | (42) | Localization of Steroid and Peptide Hormones |
| KUNIIHIKO SUZUKI | (95) | Neurogenetics of Inborn Error of Spingolipid Metabolism |
| KINUKO I. SUZUKI | (96) | Neuropathology of Inborn Errors of Metabolism; Ultrastructural Studies of Myelin Formation |
| MEREDITH J. WEST | (97) | Development of Communication, Learning and Evolution |
| BARRY L. WHITSEL | (46) | Somatosensory Mechanisms |
| R. HAVEN WILEY | (47) | Social Organization and Communication in Invertebrates |
| JOHN E. WILSON | (48) | Effects of Experience on Metabolism of Macromolecules in Brain |

Associate Professors

- | | | |
|-------------------------|-------|---|
| W. E. BOLLENBACHER | (109) | Developmental Neuroendocrinology |
| THOMAS BOULDIN | (98) | Neurotoxicology; Models of Peripheral Demyelinating Disorders |
| LUIGI X. CUBEDDU | (84) | Clinical Pharmacology, Cardiovascular Pharmacology |
| RAYMOND DINGLEDINE, JR. | (72) | Synaptic Mechanisms; Electrophysiology of Drug Action |
| MICHELA GALLAGHER | (80) | Biological Basis of Memory & Learning |
| RICHARD L. GLASSER | (12) | Organization of Respiratory Mechanisms in Brain |
| ROBERT GREENWOOD | (61) | Neuropeptides; Cortical Electrophysiology; Epilepsy |
| JAMES F. HOWARD, JR. | (93) | Electrophysiology of Neuromuscular Disorders; Synaptic Transmission |
| HENRY S. HSIAO | (18) | Mechanics of Phototaxis |
| DOUGLAS LAY | (53) | Auditory Structures |
| RICHARD B. MAILMAN | (82) | Behavioral and Biochemical Neuropharmacology |
| PATRICIA F. MANESS | (90) | Oncogenes in the Developing Nervous System |
| LAWRENCE M. MARSHALL | (81) | Structure and Function of Developing Synapses |
| KEN D. MCCARTHY | (77) | Pharmacology of Astrocytes, Oligodendrocytes & Neurons in Culture |
| DAVID E. MILLHORN | (85) | Central Neural Control of Respiration; Respiratory and Cardiovascular Interaction |
| ROYCE L. MONTGOMERY | (26) | Anatomy of the Limbic System |
| GERRY S. OXFORD | (67) | Biophysics of Excitable Membranes |
| BENJAMIN PENG | (92) | Development of Synapse; Cellular & Developmental Neurobiology |
| TAI-CHAN PENG | (69) | Endocrine Pharmacology |
| ROBERT SEALOCK | (58) | Cell Biology and Biochemistry of Acetylcholine Receptors |

Assistant Professors

BRIAN KAY	(99)	Cloning of Genes Involved in Neuron-Muscle Interactions (or Molecular Embryology)
ALAN R. LIGHT	(89)	Physiology, Anatomy & Immunocytochemistry of Descending Pain Modulation Systems
P. KAY LUND	(88)	Regulation of Biosynthesis of Gastrointestinal Peptides and Neuropeptides using a Recombinant DNA Approach
R.B. MEEKER	(107)	Brain Cholinergic Receptors and Vasopressin Secretion
BARRY S. PALLOTTA	(87)	Stochastic Properties of Single Ion Channels
CORT A. PEDERSEN	(91)	Neuroendocrinology of Parenting Behavior; Testing & Neuroendocrinology of Affective Disorders
JENNY P. TING	(105)	Molecular Regulation of Genes Shared Between the Immune and CNS
ALAN WILLARD	(101)	Neural Development; Mechanisms of Slow Synaptic Transmission

Research Associate Professors

GREGORY K. ESSICK	(106)	Somatosensory Psychophysics and Neurophysiology
MADHABANANDA SAR	(108)	Localization of Hormones, Neurotransmitters and Peptides

Adjunct Professors

HUGH H. TILSON	(102)	Pharmacological Epidemiology
JAMES N. WEAKLY	(45)	Synaptic Transmission, Regeneration & Trophic Interactions

Adjunct Associate Professors

JOHN (JAU-SHYONG) HONG	(103)	Regulation of Opioid Peptide Expression, Regulation and Metabolism
ROBERT C. MACPHAIL	(104)	Behavioral Effects of Drugs and Toxic Chemicals

Professor Emeritus

PAUL L. MUNSOM

**Core Faculty*

The Neurobiology Curriculum of The University of North Carolina at Chapel Hill includes faculty from the Departments of Anatomy, Anesthesiology, Biochemistry and Nutrition, Biostatistics, Medicine, Neurology, Oral Biology, Oral Surgery, Pathology, Pharmacology, Physiology, Psychiatry, Psychology, Surgery, Biology, and from the Curricula in Genetics and in

Biomedical Engineering and Mathematics, and the Program in Molecular Biology and Biotechnology. The theme unifying members of these diverse departments is a desire to understand the mechanisms through which the nervous system functions. While sharing this fundamental interest in the nervous system, research techniques used by members of the Curriculum are quite diverse and provide the student with the opportunity to master a wide variety of laboratory skills.

Graduate students working toward the Ph.D. in Neurobiology must take Neurobiology 101a, 111, 112, 200, 201a or 202, 203, 227, 290, 302, and 394 as well as other courses suggested by the Associate Director of Training.

The minor in Neurobiology consists of a minimum of 15 hours of courses selected from the list below with the approval of the Associate Director.

Fellowships, commensurate with usual grants-in-aid, are available to support graduate students who are working toward the Ph.D. degree under the direction of a faculty member in the Neurobiology Curriculum and who major in Neurobiology. After the first year, graduate students are to receive travel awards to attend national scientific meetings.

Applicants are urged to complete their applications by January 15th.

Courses for Graduates and Advanced Undergraduates

- 100 BIOCHEMISTRY FOR STUDENTS OF BIOLOGY AND CHEMISTRY (Biochemistry 100, Biology 107) (3). Prerequisites, Chemistry 61 and one course in biology. Lectures on the mechanism and regulation of reactions in living organisms with emphasis on general principles. Protein structure and enzyme function; central pathways in intermediary metabolism; metabolic control; expression of genetic information; active transports; molecular disease. *Fall*. Wolfenden; Staff.
- 101a NEUROANATOMY (Anatomy 101) (5). The central nervous system and organs of special sense. *Three lecture and four laboratory hours a week, spring*. Rustioni, Lauder.
- 101c CONDITIONING AND LEARNING (Psychology 101) (3). Prerequisites, Psychology 10 and 22. A comprehensive survey of the methods, findings, and theories of classical and operant conditioning. Skills necessary to evaluate, integrate and summarize significant original literature will be developed. *Fall*. Dykstra, Eckerman, Waller.
- 102 BIOLOGICAL FOUNDATIONS OF BEHAVIOR (Psychology 102) (4). Prerequisite, Psychology 22 or Biology 11. Ethological, genetic and physiological variables will be studied in relation to their behavior effects. *Two lecture and three laboratory hours a week, on occasion*. Staff.
- 106 PHYSIOLOGICAL PSYCHOLOGY (Psychology 106) (3). Prerequisite, Psychology 10, or a course in Biology. Elements of neurophysiology, neuroanatomy, and neurochemistry as they apply to the understanding of behavior and conscious experience. *Fall and spring*. King, Gallagher.
- 110 TECHNIQUES IN PHYSIOLOGICAL PHARMACOLOGY (Pharmacology 110) (3). Prerequisites, Pharmacology 202 and permission of the instructor. Students will learn and perform a variety of physiological techniques often used in classical pharmacological research. *One lecture and six laboratory hours a week, spring*. Staff. As announced.
- 111 NEUROBIOLOGY LABORATORY APPRENTICESHIP (3-9). Prerequisite, permission of the Director of Training in the Neurobiology Curriculum. A laboratory-tutorial course to acquaint the student with methods used in several areas of neurobiology. *Fall, spring*. Faculty of the Neurobiology Curriculum.
- 113 ANIMAL BEHAVIOR (Biology 73) (3). Prerequisites, Zoology 11, 11L, or permission

- 113L of the instructor. An introduction to animal behavior including the ontogeny, physiology, ecology and evolution of behavior. *Three lecture and three laboratory hours a week, fall and spring.* Mueller, Wiley.
- 118 NEUROENDOCRINOLOGY (Anatomy 118) (Pharmacology 118) (2). Prerequisite, permission of the instructor. A review of presently held concepts in neuroendocrinology with emphasis on topographical aspects of brain structures related to hormone action. *Two lecture hours a week, spring.* (1988 and alternate years.) Stumpf, Sar.
- 122 DEVELOPMENTAL NEUROBIOLOGY (Anatomy 122) (3). Prerequisite, permission of instructor. A comprehensive overview of nervous system development including detailed analysis of selected research topics in developmental neuroanatomy. *Three lecture hours a week, spring.* 1987 and alternate years. Lauder.
- 123 BEHAVIORAL PHARMACOLOGY (Pharmacology 123, Psychology 123) (3). Prerequisites, Pharmacology 202, or Psychology 101 and 106, or their equivalent. Basic principles of pharmacology and the experimental analysis of animal behavior will be considered in relation to drugs that affect the central nervous system. *Three lecture hours a week, spring.* As announced. Staff.
- 125 INTRODUCTION TO NEUROPHYSIOLOGY (Biology 121) (3). Prerequisite, Biology 53 or permission of the instructor. The neurophysiological basis of behavior with emphasis on structure and function of membranes, neurons, synapses and complex functional units of nervous system. *Three lecture hours a week, on occasion.* Staff.
- 140 CELL AND ORGAN SYSTEM PHYSIOLOGY (Physiology 140) (5). Prerequisite, permission of the instructor. Principles of cell and organ system physiology suitable for students with a biology and chemistry background. *Fall.* Sealock, Staff.
- 150 NEUROBIOLOGY (3). Prerequisite, permission of the instructor. A tutorial in selected topics in neurobiology tailored to meet interests of the students and competencies of instructors. *Fall and spring.* Staff.

Courses for Graduates

- 200 ADVANCED NEUROPHYSIOLOGY (Physiology 204) (4). Prerequisite, Physiology 140, working knowledge of mammalian neuroanatomy and permission of the Course Director. A course designed to provide detailed analysis of selected areas of neurophysiology such as synaptic transmission, sensory and motor systems, and higher integrative mechanisms. *Three lectures, two laboratory hours per week. Fall.* Staff, Marshall.
- 201a BEHAVIOR AND ITS BIOLOGICAL BASES I (Psychology 201) (3). A survey of psychological and biological approaches to the study of basic learning and higher integrative processing. *Fall.* Eckerman, Gallagher, King, and Dykstra.
- 201c BIOMEDICAL INSTRUMENTATION (BMME 111) (3). Prerequisites, Physics 101 or equivalent, or permission of the instructor. Topics include analysis of medical instrumentation with emphasis on pressure, flow, bioelectric, and ultrasonic transducers. This course includes a laboratory and interfaces microprocessors with transducers. Students are given the opportunity to design and fabricate original devices. *Spring.* Hsiao, Buchanan.
- 202 BEHAVIOR AND ITS BIOLOGICAL BASES II (Psychology 202) (3). A survey of psychological and biological approaches to the study of sensory and perceptual information processing and of attention and arousal; comparative, ethological, and developmental perspectives on behavior; behavioral medicine. *Spring.* Shinkman, Hollins, West.
- 203 SYNAPTIC PHARMACOLOGY (Pharmacology 203) (3). Prerequisite, Pharmacology 202 or permission of instructor. An in-depth consideration of biochemical and physiological bases for actions of neuroactive drugs and their possible sites of action in terms of identified pathways and synapses in the brain. *Three lecture hours per week, fall.* Dingleline, Harden and McCarthy.
- 204 ADVANCED BIOLOGICAL PSYCHOLOGY: CENTRAL NERVOUS SYSTEM (Psychology 204) (3). Prerequisite, Psychology 106 or equivalent. Each fall one specific

- topic will be covered in depth, e.g., neural bases of memory storage, homeostasis, and perception. Format will include lecture and seminar meetings with student presentations. *Fall*. Shinkman.
- 205 ADVANCED BIOLOGICAL PSYCHOLOGY: AUTONOMIC NERVOUS SYSTEM (Psychology 205) (3). Prerequisites, Psychology 106 and/or 202, or permission of the instructor. Autonomic nervous system bases of emotion, motivation, and learning. *Two lecture and two laboratory hours a week, on demand*. Obrist.
- 211 SPECIAL TOPICS IN PHYSIOLOGY (Physiology 211, 212) (3-5). Prerequisite, permission of the instructor. Individually arranged programs of in depth study of selected topics such as membrane function, transport physiology, renal physiology, etc. *Fall and spring*. Staff.
- 218 EXPERIMENTAL ENDOCRINOLOGY (Biology 218) (2). Prerequisite, permission of the instructor. *Six laboratory hours per week, spring*. (Alternate years.) Staff.
- 221 NEURAL INFORMATION PROCESSING (BMME 221) (3). Prerequisites, Biomedical Engineering-Biomedical Mathematics 103 and Physiology 140 or equivalent. This course approaches the nervous system as a data-processing network, and the brain as the computer for a homeostat. On occasion. Coulter.
- 225 EXPERIMENTAL NEUROPHYSIOLOGY (Biology 225) (3). Prerequisite, permission of the instructor. *Six or more laboratory hours a week. On occasion*. Staff.
- 227 NEUROCHEMISTRY (Biochemistry 227) (3). Prerequisite, two semesters of Biochemistry. An introductory course in the biochemistry of the nervous system. Topics include aspects of energy metabolism, ion movement, neurotransmitters, intermediary metabolism, and the metabolism of macromolecules in the nervous system. *Fall*. Wilson, Morell. (1988 and alternate years.)
- 235 SEMINAR IN CHEMICAL NEUROBIOLOGY (Biochemistry 235) (3). Prerequisite, 2 semesters of Biochemistry. *Fall*. (1987 and alternate years.) Wilson, Morell.
- 259 SEMINAR IN COMPARATIVE ANIMAL BEHAVIOR (Biology 259) (2). Prerequisite, permission of instructor. *Fall*. McMahan, Mueller, Wiley.
- 260 SEMINAR IN COMPARATIVE PHYSIOLOGY (Biology 260) (2). Prerequisite, Zoology 120, or permission of the instructor. *Spring*. Staff.
- 290 SEMINAR IN NEUROBIOLOGY (Biochemistry 290) (2). (Physiology 290) (Pathology 290) (Pharmacology 290) (Psychology 290) (3). Prerequisite, permission of the Director of Training of the Neurobiology Curriculum. An intensive consideration of selected topics and problems. Participation required of Neurobiology Trainees. *Spring*. Faculty of the Neurobiology Curriculum.
- 302 SEMINAR IN THE BIOLOGICAL FOUNDATIONS OF PSYCHOLOGY (Psychology 302) (3). Prerequisite, permission of instructor. Limited to graduate students in psychology and neurobiology. Lectures and seminar presentations on a wide range of topics in the area of physiological psychology. *Fall and spring*. King, Gallagher.
- 310 RESEARCH IN NEUROBIOLOGY (Biochemistry 310) (Pathology 310) (Pharmacology 310) (Physiology 310) (Biology 302) (Psychology 310) (3-12). Prerequisite, permission of a staff member. Research in various aspects of neurobiology. *Six to twenty-four hours a week, fall and spring*. Faculty of the Neurobiology Curriculum.
- 394 DOCTORAL DISSERTATION (0 or more). *Fall, spring, summer*. Research adviser.
- 400 GENERAL REGISTRATION (0).

SCHOOL OF NURSING

LAUREL ARCHER COPP, *Dean*

Professors

LAUREL ARCHER COPP	(22)	Administration; Pain Management
MARGERY A. DUFFEY	(42)	Education; Curriculum, Measurement and Evaluation
MARGARET S. MILES	(52)	Secondary Care; Child Health
NANCY MILIO	(28)	Health Policy; Health Services Research

Associate Professors

ELEANOR M. BROWNING	(14)	Secondary Care; Adult Health, Gerontology
BARBARA J. BUNKER	(15)	Secondary Care; Adult Critical Care, Trauma and Burns
MARGARET E. CAMPBELL	(16)	Secondary Care; Adult Health
JO ANN DALTON	(23)	Secondary Care; Adult Health, Oncology
MARY C. DOWE	(31)	Education; Secondary Care
LAURICE FERRIS	(7)	Health Policy; Administration
ANNE H. FISHEL	(2)	Secondary Care; Mental Health
CATHERINE I. FOGEL	(4)	Primary Care; Women's Health
JUDITH FORKER	(61)	Primary Care; Community Mental Health
ANNETTE FRAUMAN	(53)	Primary Care; Family Health
CYNTHIA FREUND	(17)	Management; Health Policy and Economics
SANDRA G. FUNK	(32)	Research Methodology; Statistics
BARBARA GERMINO	(49)	Secondary Care; Thanatology, Oncology
CAROL HOGUE	(65)	Research Methodology; Gerontology
CATHEE J. HUBER	(9)	Primary Care; Child Health
MARGARET F. HUDSON	(10)	Primary Care; Gerontology
BETTY LANDSBERGER	(27)	Health Policy; Human Development, Aging
PATRICIA A. LAWRENCE	(11)	Primary Care; Health of Diabetics
CLARA M. LEWIS	(1)	Nutrition
SHIRLEY MASON	(12)	Primary Care; Adult Health
HELEN M. MURPHY	(25)	Health Policy; Family Health
VIRGINIA J. NEELON	(13)	Secondary Care; Adult Health, Physiology
FAYE D. PICKARD	(5)	Administration; Management
SUSAN F. PIERCE	(26)	Secondary Care; Adult Health
BARBARA C. RYNERSON	(19)	Primary Care; Mental Health
MARGARETE SANDELOWSKI	(64)	Secondary Care; Women's Health
MARIAN SMALLEGAN	(20)	Education; Gerontology
INGRID E. SWENSON	(39)	Research Methodology; Epidemiology, Women's Health
JOAN E. UHL	()	Administration; Health Promotion
PRISCILLA ULIN	(51)	Primary Care; Sociomedical Science

Assistant Professors

BARBARA BORDEAUX	(56)	Secondary Care; Family and Child Relations
MARY CHAMPAGNE	(49)	Secondary Care; Adult Health, Critical Care
INGE CORLESS	(66)	Secondary Care; Oncology, Psychoneuroimmunology
DIANE DAVIS	(60)	Secondary Care; Pediatrics, Neonatology
JUDITH FORKER	(61)	Primary Care; Community Mental Health
BONNIE J. FRIEDMAN	(43)	Primary Care; Community Health
JOANNE HARRELL	(54)	Secondary Care; Adult Health, Administration
BETTY HARRIS	(44)	Secondary Care; Women's Health
LORNA HARRIS	(63)	Primary Care; Community Health
CAROLYN MCCAIN	(36)	Secondary Care; Maternity
BARBARA NETTLES-CARLSON	(37)	Primary Care; Family Health
M.E. BONNIE ROGERS	(55)	Health Policy; Epidemiology, Occupational Health
LINDA SMITH	(29)	Primary Care; Adult Health
ELEANOR TAGGART	(34)	Secondary Care; Oncology, Neurology
INEZ TUCK	(47)	Secondary Care; Mental Health

Lecturer

ELIZABETH M. TORNQVIST	(21)	Research Methodology; Scientific Writing
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Clinical Associate Professors

BEVERLY FERREIRO	(35)	Secondary Care; Mental Health
CLARA WALTERS	(8)	Primary Care; Community Health

Clinical Assistant Professors

DEITRA LOWDERMILK	(57)	Secondary Care; Obstetrics
MARY ANN MATTESON	(58)	Secondary Care; Adult Geriatrics
DEBORAH THOMPSON	(59)	Secondary Care; Adult Health, Orthopedics

Research Professor

MARGARET ARLENE PAYNE	(46)	Research Methodology; Measurement and Evaluation
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Research Assistant Professor

JEAN NORBURN	(45)	Research Methodology
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Professors Emeritae

AUDREY J. BOOTH
 ROSE GEORGE
 KATHERINE NUCKOLLS
 MARION WOODS

Master of Science in Nursing

The School of Nursing offers a curriculum leading to the degree of Master of Science in Nursing. The theme—"Toward Health Improvement"—sets the direction for the graduate curriculum, which is designed to prepare graduates to respond to contemporary health problems and rapidly changing methods for improving health. The program of study includes three components: Core Studies, Area of Concentration, and Functional Option. Students designate an area of concentration in either Primary Care or Secondary Care. All students complete the Core Studies component and select a functional option in either management or education.

In core studies, students examine the scope of contemporary health problems and health improvement interventions. This lays the foundation for in-depth study of health improvement strategies in either primary or secondary care. Students also learn research methods that are appropriate for working with the problems of contemporary health and illness. The program in primary care prepares the graduate for ambulatory health care, delivering a range of services that promote and restore health for individuals and groups. The program in secondary care provides nurses with expertise in the care of patients with intensive and medically complicated problems. Graduates of both the primary and secondary care programs are prepared to function as researchers and are introduced to principles of education and management in nursing.

The program requirements can be completed in four semesters of full-time enrollment or on a part-time basis within five years. An effort is also made to provide courses in a sequence and at a time of day that will enable students to complete these requirements through part-time enrollment.

The School of Nursing is committed to the principle of equal opportunity and does not discriminate on the basis of age, race, sex, color, national origin, religion, or handicap. Minority students, older students and male students are encouraged to apply.

Core Studies

The core studies component of the curriculum includes three areas: (1) perspectives on contemporary health problems, (2) research and (3) management or education option. Courses exploring perspectives on contemporary health problems focus on the nursing professional's role in organizations and in policy-making for health improvement. The student learns to understand the nature of contemporary health problems by examining the effect of the environment on health, analyzing the profile of contemporary health problems, and assessing the impact of personal health services and ecological interventions on the health of individuals and groups.

Environment and socioeconomic strategies directed at improving the health of selected population groups are analyzed and compared to personal health service strategies. The student analyzes the efficacy of the health

delivery system and policy and program decision-making that determine current and potential health improvement interventions, comparing methods of influencing decision-making at both intra- and interorganizational levels.

In the four-course research sequence, the student learns methods and approaches to research that are appropriate for analyzing problems of contemporary health and illness. The process of clinical inquiry is emphasized. During the sequence, students are expected to identify a researchable problem, conduct a study and prepare a written report of the investigation. Students elect to fulfill the research requirement through either a thesis or group research project. The purpose of both the thesis and project is to foster the use of research in expanding nursing knowledge and contributing to the resolution of clinical practice problems. In the thesis, students work individually under the guidance of graduate faculty; in the project, students work in a group under the guidance of graduate faculty. The thesis is written as a formal document of the study, whereas the project is written as an article for publication.

In the education or management option, students learn basic principles of teaching or management in relation to their clinical major. The education option is for those students interested in teaching in post-secondary programs, inservice and staff development departments and patient education. The management option is designed for students interested in first-line and middle-level management roles in all types of settings. Nine credits, three of which must be practicum credits, are required for secondary care students; six credits are required for primary care students. With the guidance of their advisors, students choose to fulfill the option requirement by taking courses offered in the School of Nursing or appropriate courses in education or management offered by other departments.

Core Studies Course Descriptions

Contemporary Health Problems:

NURS 255 CONTEMPORARY HEALTH PROBLEMS AND HEALTH IMPROVEMENT INTERVENTIONS I (3). Examines contemporary health problems and health improvement interventions within a broad context. An epidemiological approach is utilized in examining the health and illness of various at risk populations. The focus is on understanding the nature of contemporary health problems by examining the effects of the environment on health; understanding the profile of contemporary health problems; and analyzing the effectiveness of personal health services in improving health. The conceptual framework for the total curriculum is introduced at the outset of the course as a basis for study. *Fall; summer, even years.*

NURS 355 CONTEMPORARY HEALTH PROBLEMS AND HEALTH IMPROVEMENT INTERVENTIONS II (3). Prerequisite, Nursing 255. Emphasis is placed on examining policy and program decision-making processes at intra- and inter-organizational levels. Environmental strategies are contrasted with personal health service strategies relative to their potential for improving health of populations. *Spring; summer, odd years.*

Research:

- NURS 274 RESEARCH METHODS I (2). Prerequisites, undergraduate statistics and undergraduate research methods. Focuses on the steps of the research process including formulation of a researchable problem and hypothesis, sampling, design, data collection and analysis, and ethical consideration in research. *Fall; summer, even years.*
- NURS 275 RESEARCH METHODS II (1). Prerequisite, Nursing 274. Prepares the student to begin their own research study including writing a research proposal and obtaining funding for student research. *Spring, occasionally offered other academic terms.*
- NURS 374 RESEARCH METHODS III (3). Prerequisites, Nursing 274 and Nursing 275. Focuses on analysis of research data, including descriptive and inferential statistics, basic computer skills and methods of data presentation and interpretation. *Fall.*
- NURS 375 RESEARCH METHODS IV (1). Prerequisites, Nursing 274, Nursing 275, and Nursing 374. Instruction in the aspects of research presentation and dissemination; specifically the written research project or thesis and oral presentation and critical evaluation of published research. *Spring, occasionally offered other academic terms.*
- NURS 392 GROUP RESEARCH PROJECT (1-6). Prerequisite, Nursing 274. Students develop a research project focusing on a nursing problem, design a study, collect and analyze data, and present the findings in a format for a professional journal. *Fall, spring, summer.*
- NURS 393 MASTER'S THESIS (1-6). Through the thesis, opportunity is provided for pursuit of knowledge and understanding, for the development of competence in solving nursing problems, and for increasing recognition of responsibility to contribute to professional knowledge by systematic investigation. *Fall, spring, summer.*

Functional Options:

- NURS 216 MANAGEMENT: THE ORGANIZATIONAL CONTEXT (3). Examines basic management theories, concepts and principles as applied to nursing systems. The needs of organizations and understanding how to work within organizations will be emphasized. *Spring.*
- NURS 217 NURSING MANAGEMENT AT THE DEPARTMENT AND UNIT LEVEL (3). For first-line and mid-level managers in primary and secondary settings. Selected issues related to leadership, departmental structure, planning, and human resource management in nursing are explored. *Fall, summer, odd years.*
- NURS 236 SECONDARY CARE NURSING MANAGEMENT PRACTICUM (3). The course will provide students with an opportunity to increase their knowledge of principles of nursing management in secondary care institutions and to continue to develop complex leadership behaviors necessary for the delivery of nursing care in secondary care institutions. *Spring.*
- NURS 290 PRINCIPLES OF TEACHING APPLIED TO NURSING (3). Provides students who have had no previous teaching experience with educational principles necessary to teach nursing. Opportunities for observation and analysis of undergraduate instruction are provided. *Spring.*
- NURS 291 CURRICULA IN NURSING (3). This course focuses on the structure of the discipline of nursing as a basis for curriculum development and evaluation.
- NURS 306 PRACTICUM IN CURRICULUM AND INSTRUCTION (3). Students will demonstrate proficiency in teaching by working with and delivering instruction with a selected preceptor in one's specialty. An integrative seminar will be conducted. *Spring.*

Primary Care

Primary care includes a range of services delivered mostly in ambulatory and home settings to meet the majority of needs for health care of individuals and groups. It focuses on assessment of health status, health promotion, the prevention of diseases and disabilities, and maintenance of health. Clients are assisted in the management of significant life events, minor illnesses, chronic diseases and nonspecific symptomatic complaints, with referral for specialty care as needed.

The master's program in primary care prepares graduates for clinical practice where they may also function in coordinative, educational or investigative roles in primary care settings. As nurse practitioners, graduates are prepared to deliver personal health services to individuals, including assessment of the state of health, health promotion, identification of present or potential problems, and implementation of a plan of care. Their scope of practice also includes concern for the health needs of families and communities. They have acquired skill in teaching lay and professional individuals and groups, and are prepared to work collaboratively with professionals of other disciplines in planning, implementing, and evaluating strategies to maintain or improve the functioning of institutions or agencies. Their research training enables them to use the methods of systematic inquiry in the evaluation of health services and the solution of clinical or administrative problems.

Clinical Expectations

The clinical requirements of the graduate program in primary care include approximately 500 hours of preceptored practice in various clinical settings. Upon completion of the program, the graduate is eligible for ANA certification and for approval to practice as a nurse practitioner in North Carolina.

Primary Care Course Descriptions

- NURS 215 ADVANCED ISSUES IN PRIMARY CARE (1). Focuses on issues and trends in primary health care delivery systems. Emphasis is placed on the role and responsibility of the master's prepared FNP in our present health care system. *Fall.*
- NURS 245 ADVANCED DIAGNOSTIC PROCESS (4). Focuses on the techniques of interviewing, history taking, physical examination and selected diagnostic and screening measures in the assessment maintenance, and promotion of health and the diagnosis of illness. *Fall.*
- NURS 265 ADVANCED CONCEPTS OF PRIMARY CARE I (2). Focuses on mental health and developmental concepts. Emphasis is placed on operationalizing strategies for dealing with mental health needs and problems in ambulatory settings. *Fall.*
- NURS 266 ADVANCED CONCEPTS OF PRIMARY CARE II (6). Prerequisites, Nursing 245, 265. Continuation of Advanced Concepts of Primary Care I. Focus remains on methods of health promotion and assessment of common health problems. Continues emphasis on applicability of research to clinical practice.
- NURS 267 ADVANCED CONCEPTS OF PRIMARY CARE III (6). Prerequisite, Nursing 266. Focuses on methods of health promotion and assessment and treatment of common

health problems in all age groups. Emphasis is on the application of research findings in clinical settings.

- NURS 268 ADVANCED PRIMARY CARE PRACTICUM (2). Prerequisites, Nursing 266, 267. This course integrates primary care clinical content with knowledge of research and contemporary health problems. Separate seminars explore primary health delivery to specific segments of the population. Includes clinical practicum.
- NURS 269 CLINICAL PRACTICUM IN PRIMARY CARE I (1-5). Prerequisites, Nursing 245, 265. Introduction to supervised clinical practice in primary health care with emphasis on use of history, physical examination, and laboratory data to plan interventions for promoting and restoring health.
- NURS 270 CLINICAL PRACTICUM IN PRIMARY CARE II (1-5). Prerequisites, Nursing 269 or concurrent. Builds on NURS 269 with continued supervised clinical practice and increasing responsibility for comprehensive health status evaluation, health promotion, illness prevention, and management of common acute and stable chronic problems.

Secondary Care

Secondary care may be defined as a range of health services to persons with health problems that are intensive and medically complicated. Secondary care nursing, which is one aspect of the care of such patients, takes place in a variety of settings—hospitals, nursing homes, patients' homes, etc.—and focuses on the comprehensive care of clients with acute and chronic illnesses.

The master's program in secondary care is designed to develop nurses with expertise in the care of patients with these intensive and medically complicated problems. Students choose a clinical focus from specialty areas—including women's health, gerontology, pediatrics, or mental health/mental illness—or emphasize a major secondary care health problem in their studies—such as cancer, cardiovascular disease or trauma.

In the theory portion of their combined theory/clinical courses students analyze selected concepts from the behavioral sciences and from critical components of the biophysiological sciences to develop and test a theoretical framework for secondary care practice.

Graduates are skilled in the comprehensive assessment of groups of patients as well as the individual patient, and are prepared to implement and evaluate intervention strategies for complex health problems requiring a range of nursing care. They have acquired the interpersonal and communication skills needed for effective interaction with patients and families, and are prepared to collaborate with other health care providers. Graduates are able to analyze care through clinical inquiry and research and to function in clinical, educational and management roles.

Clinical Expectations

The clinical practice requirement of the master's program in secondary care is six hours a week each semester for four semesters.

Secondary Care Course Descriptions

- NURS 220 SECONDARY CARE NURSING I (3). Prerequisite, Nursing 222. A general systems approach is utilized as the framework for (1) the analytical study of concepts from the behavioral sciences and (2) their clinical application by students to patients with secondary care health problems. *Fall, occasionally offered other academic terms.*
- NURS 222 ADVANCED DIAGNOSTIC PROCESS IN SECONDARY CARE (4). Prerequisite, Permission of the instructor required. The diagnostic reasoning process is used to synthesize psychosocial theories, physiology, and clinical data in formulating nursing diagnoses for secondary care clients. *Fall, occasionally offered other academic terms.*
- NURS 225 SECONDARY CARE NURSING II (3). Prerequisite, Nursing 222. Through analysis of critical components of the biophysical sciences and their clinical application to patients with secondary care health problems, students continue to develop a theoretical framework for practice. *Spring, occasionally offered other academic terms.*
- NURS 235 ANALYSIS OF NURSING PRACTICE (3). Prerequisite, Nursing 222, Nursing 220, Nursing 225. Through a critical evaluation of secondary care nursing practices and selected conceptual models for nursing practice, students formulate a theoretical base for practice and test it clinically. *Spring, occasionally offered other academic terms.*

A graduate level elective is required from the social sciences or the biophysical sciences. The elective course needs to be a theory course—i.e., not clinical. “Science” can be broadly defined to include any course with “a systematically combined and tested body of knowledge” which may or may not be part of the traditional, natural, or social sciences-base (e.g., would also include nursing science, history, philosophy). The course must contribute to the student’s “special clinical interest area.”

Electives

The School of Nursing offers the following graduate electives in nursing. These courses may be offered in either fall, spring or summer.

- NURS 113-114 SPECIAL PROBLEMS (2-6). These courses are available to advanced undergraduate and graduate students. Their goal is to provide the student with opportunities to individualize work in an area of interest not regularly provided for by the ongoing nursing courses. The student studies under the direction of one or more faculty members who are knowledgeable in the area of the student’s need and/or interest.
- NURS 169 HUMAN SEXUALITY FOR NURSES (3). A course designed to introduce the student to the general field of human sexuality. The purpose is threefold: to impart knowledge of human sexuality, to assist the student in becoming comfortable with his or her own sexuality, and to increase the student’s understanding of clients’ sexual needs and concerns. Students explore sexuality throughout the life cycle including the wide range of normal variations, deviations, and dysfunctions of several behaviors. These are considered from psycho-biophysical-social perspectives.
- NURS 176 WOMEN OVER 50 IN CONTEMPORARY SOCIETY (3). Permission of instructor. Course will view the population group of women over 50 from several perspectives—sociological, economic, political and psychological—looking at their health and their roles in family, work, and community.
- NURS 177 WOMEN’S HEALTH CARE ISSUES (3). This course is designed to introduce the student to issues involving the health care of women. The purpose is twofold: to increase the student’s knowledge of women’s bodies and to increase the student’s understanding of common health-illness concerns which affect women.

- NURS 181 PAIN COPING, PAIN MANAGEMENT, AND THE PAIN EXPERIENCE (2). Students learn to take a history, attend to pain cues, pain assessment, and nursing interventions. Topics include coping strategies, ethics and pharmacological approaches, and the literature of pain.
- NURS 183 GERONTOLOGICAL NURSING (2). Prerequisites, Nursing 60, 82 and permission of instructor. Provides a study of the process of human aging with a focus on nursing care issues in the secondary care setting. *Spring*. Matteson.
- NURS 184 WOMEN, SCIENCE, AND TECHNOLOGY (3). Permission of instructor. Examines women as creators and beneficiaries of science and technology. Considers women as scientists and inventors. Gender biases in scientific theories; reproductive, household, child care technologies; feminist approaches to inquiry.
- NURS 356 CURRENT ISSUES IN HEALTH POLICY AND MASS COMMUNICATIONS (2-3). Permission of instructor. Provides an analytic skill in a real-world context for those who will participate in the broad process of policy formulation through their positions in the health professions and mass communications field.

Prerequisites

Students are expected to have completed an undergraduate statistics course before enrolling in the first graduate research course. Questions regarding these prerequisites should be directed to the Student Services Office of the School of Nursing.

Admission Requirements

1. Evidence of current state licensure. For legal reasons, students must have North Carolina licensure for laboratory placement in clinical facilities.
(For information on how to obtain North Carolina registration, contact the North Carolina Board of Nursing, P.O. Box 2129, Raleigh, North Carolina 27602 or call 919-828-0740.)
2. An official transcript reflecting the B.S.N. degree, as well as transcripts of any other undergraduate and graduate work.
3. A strong overall academic record with an average of B or better, both in nursing courses and during the last two years of undergraduate work.
4. Official copy of scores received on the aptitude tests of the Graduate Record Examination. Applicants should take these tests well in advance of—but not more than five years before—the anticipated admission date.
5. Three letters of recommendation (one recent or current work reference and two academic references).
6. Completion of the Personal Statement Form and Personal Data Sheet.
7. A record of at least one year's previous work experience as a registered nurse.
8. A personal interview may be required. Scheduling of the interview will be initiated by the School of Nursing upon receipt of all written materials.
9. Foreign applicants must submit passing scores on the Test of English as a Foreign Language and the Commission on Graduates of Foreign

Nursing Schools exams. The tests must be taken before a decision can be made on the application.

When completing the application, applicants should indicate which area of concentration, Primary Care or Secondary care, they are applying for and indicate which functional option, Education or Management, they wish to pursue.

All students enrolled in the School of Nursing must carry professional liability (malpractice) insurance coverage.

Applicants are admitted for both full-time or part-time study and can begin in fall, spring or summer. We encourage all applicants to complete the application as soon as possible. The admissions committee acts on applications throughout the academic year.

Degree Requirements

Removal of any provisions of the original admission to the Graduate School.

Observation of the degree time limit (5 years).

Satisfactory completion of required semester hours of graduate credit,* with due regard to the removal of all temporary grades (Incompletes, Absences, No Reports, and S grades on all course work except N-392 or N-393); registration for N-392 or N-393 for at least 3 hours; and approval through the Graduate School of transfer credit.

Written comprehensive examination.

A thesis or group research project.

Oral defense of the thesis/project.

*43-49 semester hours, including core courses, required courses in the area of concentration and courses selected to meet the functional option, registration for a thesis or research project. The number of semester hours will vary depending upon area of concentration.

DIVISION OF OCCUPATIONAL THERAPY

CATHERINE NIELSON, *Director*

Professor

MARLYS M. MITCHELL (1) Administration, Communications,
Exceptional Children

Assistant Professor

RUTH HUMPHRY (20) Human Growth and Development,
Pediatrics and Developmental
Disabilities

Instructors

CATHERINE NIELSON (14) Psychosocial Dysfunction,
Administration

MARY JO PELLAND (15) Physical Disabilities, Theory, Adult
Rehabilitation

Clinical Assistant Professor

JANE D. ROURK (9) Developmental Disabilities, Public
Schools

Visiting Assistant Professor

EVE TAYLOR Psychosocial Dysfunction

The Division of Occupational Therapy in the Department of Medical Allied Health Professions offers a graduate program leading to the Master of Science degree with a major in occupational therapy. The program is a two year program planned for individuals with a baccalaureate degree in a field other than occupational therapy.

Requirements for Admission

1. A bachelor's degree from an accredited institution.
2. Submission of scores from the Graduate Record Examination.
3. An overall grade point average of B or better.
4. Three letters of recommendation.

The Occupational Therapy Division requires each applicant to complete the division's application packet.

The M.S. program has the following prerequisites:

1. Vertebrate Anatomy (with lab)
2. Introductory Human Physiology (with lab)
3. Developmental Psychology Across the Life Span
4. Abnormal Psychology
5. Sociology, Social Problems, or Anthropology

6. Statistics

7. Courses in Three Manual Skills (woodworking, sewing and a third skill, chosen by the applicant with faculty approval)

The Master of Science Program requires a minimum of 62 semester credit hours. The program is two years in length and includes substantial field experience. A thesis or research project is required.

Occupational Therapy courses are available to graduate students enrolled in other areas of the University. Many require permission of the instructor.

Courses for Graduates

- 160 FOUNDATIONS OF OCCUPATIONAL THERAPY (2). A study of the value systems, concepts, current theories, and treatment methodologies in occupational therapy, with application to treatment situations. *Summer*. Nielson.
- 180 INTRODUCTION TO HUMAN GROWTH AND DEVELOPMENT (4). Study of normal development throughout the life span, with discussion of deviations due to disease and/or development aberrations. Application to occupational therapy. *Summer*. Humphry.
- 191 GROSS ANATOMY FOR PHYSICAL AND OCCUPATIONAL THERAPISTS (6). Prerequisites, Biology 63, 63L and permission of the instructor. Fundamental principles and concepts of human gross anatomy for physical and occupational therapists taught by lectures and cadaver dissection. Emphasis on functional anatomy. *Fall*. Lay.
- 200 PROFESSIONAL SKILLS IN OCCUPATIONAL THERAPY (1). Development of skills of observation and written, verbal and nonverbal communication specific to occupational therapy. Recording observed behavior, writing professional reports, and public speaking are included. *Fall*. Taylor.
- 211 KINESIOLOGY/BIOMECHANICS FOR OCCUPATIONAL THERAPISTS (3). Functional aspects of the human body with application to occupational therapy. Normal and abnormal considerations in lecture and lab. Permission required for non-OT. majors. *Fall*. Pelland.
- 220 NEUROLOGICAL SCIENCES FOR OCCUPATIONAL THERAPY (4). Prerequisites, Human Anatomy 41; Human Physiology 94. Neuroanatomy and neurophysiology of peripheral and central nervous systems, including motor control and sensory systems. Application to occupational therapy evaluation and treatment of dysfunction. *Spring*. Humphry.
- 220L NEUROLOGICAL SCIENCES FOR OCCUPATIONAL THERAPY LABORATORY (1). Neuroanatomy and neurophysiology of peripheral and central nervous systems; application to occupational therapy evaluation and treatment stressed in lab. *Spring*. Humphry.
- 230 THERAPEUTIC PROCEDURES IN OCCUPATIONAL THERAPY (3). Course will present activity concepts and skills used as treatment tools in occupational therapy. Remediation strategies of analysis, adaptation and application of activities for development of function. *Spring*. Pelland.
- 230L THERAPEUTIC PROCEDURES IN OCCUPATIONAL THERAPY LABORATORY (3). Activity concepts and skills used as treatment tools in occupational therapy; remediation strategies and functional activities stressed in lab. *Spring*. Pelland.
- 290 PROGRAM PLANNING, MANAGEMENT, AND SUPERVISION IN OCCUPATIONAL THERAPY (3). Principles of program planning, management and supervision applied to occupational therapy services. *Fall*. Nielson.

- 300 PROFESSIONAL SKILLS IN OCCUPATIONAL THERAPY (1). Planning and writing research proposal or thesis in occupational therapy. Professional writing skills for papers, projects and grants will be developed. *Spring*. Mitchell.
- 320 FIELD EXPERIENCE IN OCCUPATIONAL THERAPY (6 & 2). Direct experience with clients/patients in varied service and treatment settings. May be repeated for credit. *Summer, spring, fall*. Mitchell.
- 330 RESEARCH IN OCCUPATIONAL THERAPY (3). Independent project in occupational therapy. Faculty supervision. May be repeated for credit. *Fall, spring, summer*. Staff.
- 340 ISSUES AND PROBLEMS IN OCCUPATIONAL THERAPY (3). Seminar discussions on selected issues and problems related to occupational therapy. (May be repeated for credit.) *Fall*. Mitchell.
- 350 INDEPENDENT STUDY: SPECIAL TOPICS IN OCCUPATIONAL THERAPY (1-3). Independent study to pursue specific interests and topics. Faculty supervision. May be repeated for credit. *Fall, spring, summer*. Staff.
- 360 THEORY DEVELOPMENT IN OCCUPATIONAL THERAPY (3). Prerequisite, OCCT 160 and permission of instructor. Study of the nature of theory; theory in a practice profession; criteria for assessing theories; the development of scientific thought; general systems theory; theory building in occupational therapy. Seminar. *Fall*. Pelland, Nielson.
- 393 THESIS (3). Independent research project in occupational therapy. Faculty supervision. May be repeated for credit. *Fall, spring, summer*. Mitchell, Humphry.

Medical Allied Health Professions Courses (MAHP)

- MAHP MEDICAL ASPECTS OF REHABILITATION (3). Medical, psychological and life aid systems in rehabilitation and counseling of individuals with medical and/or physical disabilities. *Fall*. Taylor.
- MAHP PSYCHOSOCIAL DISABILITIES: TREATMENT AND REHABILITATION (4). 212 Psycho-social adaptive behaviors and psychiatric pathology will be presented by lectures. Occupational therapy theory and program development for prevention and remediation will be stressed and augmented by clinical experiences and seminars. *Spring*. Taylor.
- MAHP PSYCHOSOCIAL DISABILITIES: TREATMENT AND REHABILITATION LAB- 212L ORATORY (1). Psychosocial adaptive behaviors and psychiatric pathology; Occupational Therapy theory and program development for prevention and remediation stressed in lab. *Spring*. Taylor.
- MAHP STATISTICS AND RESEARCH DESIGN IN ALLIED HEALTH (3). Prerequisite, 304 Beginning statistics. Research methodologies and research designs. Descriptive statistics and statistical inference. Application to Medical Allied Health. *Fall*. Mitchell.

DEPARTMENT OF OPERATIONS RESEARCH

GEORGE S. FISHMAN, *Chairman*

Professors

*GEORGE S. FISHMAN	(10)	Simulation Methodology, Network Reliability
DAVID S. RUBIN	(3)	Integer Programming, Networks
RICHARD H. SHACHTMAN	(4)	Decision Theory, Stochastic Processes, Health Applications
DONALD F. STANAT	(5)	Theory of Computation, Formal Languages, Artificial Intelligence
*SHALER STIDHAM, JR.	(21)	Stochastic Processes, Control of Queues, Queueing Theory, Markov Decision Processes
*JON W. TOLLE	(6)	Optimization Theory
HARVEY M. WAGNER	(19)	Management, Strategic Thinking, Modeling

Associate Professors

*VIDYADHAR G. KULKARNI	(16)	Stochastic Models
ALAN W. NEEBE	(11)	Networks, Integer Programming, Location Theory
*J. SCOTT PROVAN	(20)	Networks, Computational Complexity, Combinatorial Optimization

*Core Faculty

Operations Research is concerned with the process of decision making for the purpose of optimal resource allocation. The spectrum of related activities includes basic research in optimization theory, development of deterministic and stochastic mathematical models as aids for decision making, and application of these models to real world problems. The principal steps in modeling consist of analyzing relationships that determine the probable future consequences of decision choices and devising appropriate measures of effectiveness in order to evaluate the relative merits of alternative actions. During the past forty years, Operations Research has developed into a discipline whose methods of analysis are regularly employed in many diverse industries and governmental agencies.

The Department of Operations Research consists of a resident faculty and an interdisciplinary faculty with programs of study that offer considerable opportunity for the pursuit of individual student interests. Both the M.S. and Ph.D. degrees are offered, with specialization possible in deterministic optimization theory (such as nonlinear programming) in stochastic processes and applied probability (such as queueing theory and simulation), or in an approved area of application (such as management science). The

M.S. program is intended for the student who is preparing for a career in industry, government, or consulting. The Ph.D. program emphasizes theoretic depth and is tailored primarily to the student who is preparing for a research teaching career. Each program includes study of the mathematical foundations of Operations Research. In either case the specific program of study for each student is determined to a large extent on an individual basis through consultations with a faculty advisor to obtain a balance between application and theory. Although it is possible for the well-prepared student to complete the M.S. requirements in three semesters, it more typically requires four semesters. The Department also offers a course sequence that enables qualified UNC-Chapel Hill undergraduates in the Mathematical Sciences B.S. degree program to fulfill the requirements for the M.S. degree in Operations Research in one additional academic year beyond the four years required for the undergraduate degree. The Ph.D. program, including the dissertation, generally requires four or five years past the bachelor's degree.

Requirements for Admission to Graduate Study

Applicants must have demonstrated a high level of scholastic ability in their undergraduate studies and must satisfy the entrance requirements of the Graduate School. No restrictions are placed on the undergraduate major for admission to the Department. However, to be prepared adequately for study in Operations Research, an applicant should have a good mathematical background including courses in advanced calculus, linear or matrix algebra, and probability, and the knowledge of a computer language. A student admitted with a deficiency in one of more of these topics must remove it at the beginning of her or his graduate work. If the deficiency is not severe, this can be accomplished without interrupting the normal program.

Degree Requirements

Candidates for degrees in Operations Research must meet the general requirements of the Graduate School. Course selections for a degree in Operations Research are taken from the Department's offerings and from regular offerings of related departments. In addition to the following courses, selections can be made from the departments of Biostatistics, City and Regional Planning, Computer Science, Epidemiology, Economics, Health Administration, Library Science, Mathematics, Psychology, Statistics and the School of Business Administration.

Additional information may be obtained by request from the Admissions Chairman, Department of Operations Research, CB# 3180, Smith Building, The University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-3180.

Courses for Graduates and Advanced Undergraduates

- 180 STOCHASTIC MODELS IN OPERATIONS RESEARCH (Statistics 180) (3). Prerequisite, Biostatistics 160 or Statistics 126. Introduction to queueing theory (substantial). Markovian sequential decision processes, inventory theory and topics from stochastic linear programming, simulation, scheduling, game theory. Kulkarni, Stidham.
- 181 DETERMINISTIC MODELS IN OPERATIONS RESEARCH (Mathematics 151) (Statistics 181) (3). Prerequisite, Mathematics 147. Linear, integer, nonlinear and dynamic programming, classical optimization problems, network theory. *Fall*. Provan, Tolle.
- 182 NONLINEAR AND DISCRETE OPTIMIZATION (Mathematics 152) (3). Nonlinear optimization; quadratic programming. Newton's and other methods in unconstrained optimization, constrained optimization including Lagrange multipliers and Kuhn-Tucker conditions. Discrete optimization; transportation problems and other network problems. *Spring*. Staff.
- 183 STOCHASTIC MODELS IN OPERATIONS RESEARCH (3). Prerequisite, Biostatistics 160 or Statistics 126. Introduction to Markov chains, Poisson process, continuous-time Markov chains, renewal theory. Applications to queueing systems inventory, and reliability, with emphasis on systems modelling, design, and control. *Spring*. Kulkarni, Stidham.

Courses for Graduates

- 210 DETERMINISTIC METHODS IN OPERATIONS RESEARCH I (3). Prerequisite, calculus of several variables, linear or matrix algebra. A study of the basic principles of linear programming, including the simplex algorithm, duality, and postoptimality analysis, and an introduction to nonlinear programming. *Fall*. Rubin, Tolle.
- 211 DETERMINISTIC METHODS IN OPERATIONS RESEARCH II (3). Prerequisite, ORSA 210 or consent of the instructor. Modeling and solution techniques for problems in integer programming, networks, and dynamic programming. *Spring*. Rubin, Wagner.
- 212 NONLINEAR OPTIMIZATION (3). Prerequisite, ORSA 210 and advanced calculus or consent of instructor. Convexity, necessary and sufficient conditions for optimality, sensitivity analysis, and algorithms for unconstrained and constrained problems. *Spring*. Tolle.
- 213 COMPUTATIONAL METHODS IN MATHEMATICAL PROGRAMMING (3). Prerequisite, ORSA 210 or equivalent. Issues related to special structures and numerical techniques for mathematical programming, including decomposition, generalized upper bounds, generalized networks, sparse matrix techniques, and large scale systems. *Fall*. (Alternate years). Rubin, Tolle.
- 214 INTEGER PROGRAMMING (3). Prerequisite, ORSA 210. Techniques for formulating and solving discrete-valued and combinatorial problems. Topics include enumerative and cutting plane methods, Lagrangian relaxation, Bender's decomposition, group theoretical approaches, location models, knapsack problems, matching and covering problems. *Fall*. (Alternate years). Mazzola, Provan.

- 215 NETWORK FLOWS (Business Administration 310) (3). Prerequisite, permission of the instructor. Network flow problems and solution algorithms; maximum flow, shortest route, assignment, and minimum cost flow problems; Hungarian and out-of-kilter algorithms. Combinatorial and scheduling (CPM and PERT) applications. *Spring*. Provan.
- 216 DISCRETE OPTIMIZATION: ALGORITHMS AND COMPLEXITY (Computer Science 286) (3). Prerequisite, ORSA 215 and permission of instructor. Study of optimization problems with emphasis on discrete methods and the analysis of solution algorithms. Topics include: polynomial algorithms, NP-completeness, ellipsoid method, Karmarkar's method, matching, traveling salesman problem. *Fall*. (Alternate years.) Provan.
- 220 STOCHASTIC MODELS IN OPERATIONS RESEARCH I (3). Prerequisite, Statistics 126 or equivalent. Discrete and continuous time Markov chains modelling and analysis. Poisson, branching, birth and death, and renewal processes. Applications of queues and inventories. *Fall*. Kulkarni, Stidham.
- 221 STOCHASTIC MODELS IN OPERATIONS RESEARCH II (3). Prerequisite, ORSA 220 or equivalent. Introduction to mathematical models for decision-making under uncertainty. Specific topics include reliability theory, inventory models, queueing theory, optimization in queues, and Markov decision processes. *Spring*. Kulkarni, Stidham.
- 223 OPTIMIZATION UNDER UNCERTAINTY (3). Prerequisite, ORSA 220 and STAT 129. This course provides a rigorous development of the tools for optimization under uncertainty. The topics include finite horizon Markov decision processes, positive and negative dynamic programming, and an introduction to control theory. *Spring*. (Alternate years.) Kulkarni.
- 224 CONTROL OF STOCHASTIC SYSTEMS IN OPERATIONS RESEARCH (3). Prerequisites, ORSA 220 and ORS 221. Review of Markov decision processes. Monotone control policies. Algorithms. Examples: control of admission, service, routing, and scheduling in queues and networks of queues. Applications: manufacturing systems, computer, communication systems. *Fall*.
- 225 INTRODUCTION TO INVENTORY THEORY (Business Administration 309) (3). Prerequisite, permission of instructor. Introduction to the techniques of constructing and analyzing mathematical models of inventory systems. *Fall*. Wagner.
- 227 THEORY OF RELIABILITY (3). Prerequisites, STAT 127 and either STAT 129 or ORSA 220. Study of component and system reliability. Mathematical and statistical properties of coherent systems. Reliability of coherent systems. Life distributions. Life testing procedures. Reliability, availability and maintainability measures. Maintenance and replacement models. *Spring*. Fishman, Kulkarni.
- 233 DISCRETE EVENT SIMULATION (3). Prerequisites, STAT 127 and ORSA 220, or the equivalent and familiarity with computer programming. Introduces students to modeling, programming and statistical concepts applicable to discrete event simulation on digital computers. Emphasizes statistical analysis of simulation output. Students model, program and run simulations. *Fall*. Fishman.
- 234 DISCRETE EVENT SIMULATION (3). Prerequisite, ORSA 233 or its equivalent. Continuation of ORSA 233. Describes random number and stochastic variate generation, estimation of input parameters and design of simulation experiments. *Spring*. Fishman.
- 241 SCHEDULING THEORY (3). Prerequisites, ORSA 181 or 210; and ORSA 183, ORSA 220 or STAT 129. Sequencing in flow and job shops. Stochastic scheduling. Buffers, setups, just-in-time policies. Emphasis on formulation of mathematical models. Applications to production lines, flexible manufacturing, and computer/communication systems. *Spring*. Stidham.
- 245 DECISION THEORY (Business Administration 206) (3). Prerequisite, ORSA 211 or equivalent. Axiomatic development of subjective probability and utility theory. Introduction to decision analysis, statistical decision theory, and game theory. *Fall*.

- 250 DECISION ANALYSIS (3). Prerequisite, Statistics 126 or equivalent. Material on Decision Analysis from texts and papers of Howard, Raiffa and others. Extensive, normal forms of analysis, subjective probability, utility theory. Analysis of specific decision problems. Orientation to applications. *Spring*.
- 321 DIRECTED READING IN OPERATIONS RESEARCH AND SYSTEMS ANALYSIS (Variable). Prerequisite, permission of Operations Research faculty member. *Fall and spring*. Staff.
- 350 OPERATIONS RESEARCH PRACTICE (3). Prerequisites, ORSA 210, 220, 233, and permission of the instructor. Gives students an opportunity to work on an actual operations research project from start to finish under supervision of a faculty member. Intended exclusively for Operations Research students. *Spring*.
- 351 SPECIAL TOPICS IN OPERATIONS RESEARCH AND SYSTEMS ANALYSIS (Variable). Prerequisite, permission of instructor. *Fall and spring*. Staff.
- 389 OPERATIONS RESEARCH AND SYSTEMS ANALYSIS STUDENT SEMINAR (1). Survey of literature in operations research and systems analysis. *Spring*. Staff.
- 393 MASTER'S THESIS (3 or more). Prerequisite, permission of the student's adviser. *Fall*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). Prerequisite, permission of the student's adviser. *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF PATHOLOGY

JOE W. GRISHAM, *Chairman*

Professors

FREDERIC B. ASKIN	(80)	Surgical Pathology
HERBERT A. COOPER	(6)	Experimental Pathology, Hemophilia
FREDERIC G. DALLDORF	(4)	Ultrastructure of Microcirculation, Anatomic Pathology, Infectious Diseases
DONALD T. FORMAN	(59)	Clinical Biochemistry, Cell Injury
J. DIETER GERATZ	(5)	Surgical Pathology, Enzymology
JOE W. GRISHAM	(1)	General and Experimental Pathology, Cell Cycle Regulation, Mechanisms of Carcinogenesis
WILLIAM D. HUFFINES	(9)	Anatomic Pathology, Renal Pathology
DAVID G. KAUFMAN	(34)	Molecular and Cellular Biology of Chemical Carcinogenesis
ROBERT D. LANGDELL	(11)	Hematopathology, Blood Banking
ROGER L. LUNDBLAD	(22)	Thrombosis and Hemostasis, Saliva and Salivary Glands
ARTHUR J. MCBAY	(14)	Forensic Toxicology
WILLIAM W. MCLENDON	(12)	Automation and Data Processing in Laboratory Medicine, Endocrine Pathology
JAMES R. PICK	(20)	Laboratory Animal Medicine, Animal Models of Human Diseases
HAROLD R. ROBERTS	(15)	Thrombosis and Hemorrhage Research and Therapy, Hematology
KINUKO I. SUZUKI	(110)	Neuropathology, Genetic Neurological Disorders
WILLIAM P. WEBSTER	(18)	Oral Pathology, Transplantation

Associate Professors

NADIA MALOUF ANDERSON	(26)	Muscle Diseases, Membrane Repair in Muscle Injury
STUART A. BENTLEY	(88)	Hematopathology, Cell Biology, Regulation of Hematopoiesis
THOMAS W. BOULDIN	(72)	Neuropathology, Ocular Pathology, Neurotoxicology
JOHN D. BUTTS	(70)	Forensic Pathology
CHARLES N. CARNEY	(23)	Surgical Pathology, Cytology
JOHN F. CHAPMAN, JR.	(79)	Clinical Chemistry, Automation in Laboratory Medicine
ROBERT E. CROSS	(46)	Clinical Chemistry
THOMAS R. GRIGGS	(50)	Blood Coagulation, Atherosclerosis
JOHN E. HAMMOND	(47)	Clinical Chemistry, RIA Endocrinology
J. CHARLES JENNETTE	(61)	Renal Pathology, Immunopathology
ROBERT L. REDDICK	(63)	General Pathology, Electron Microscopy, Soft Tumor Tissue
HOWARD M. REISNER	(38)	Immunogenetics of Blood Coagulation

DENNIS W. ROSS	(64)	Hematopathology, Cell Kinetics, Molecular Biology
RICHARD W. SHERMER	(30)	Surgical Pathology, Cytology
LAWRENCE M. SILVERMAN	(73)	Clinical Chemistry, Genetic Diseases, Multiple Sclerosis
ROBERT L. THOMPSON	(100)	Forensic Pathology
RICHARD R. TIDWELL	(42)	Medicinal Chemistry, Antiviral/Antimi- crobial Agents, Protease Inhibitors
MICHAEL D. TOPAL	(41)	Molecular Genetics, Chemical Muta- genesis/Carcinogenesis

Assistant Professors

DWIGHT A. BELLINGER	(89)	Laboratory Animal Medicine, Thrombo- sis and Atherosclerosis
JERJANG CHANG	(87)	Comparative Pathology
FRANK C. CHURCH	(107)	Blood Coagulation, Protein Chemistry
MYRA L. COLLINS	(97)	Transfusion Medicine
MARILA CORDEIRO-STONE	(96)	DNA Replication and Mechanisms of Chemical Carcinogenesis
CORA-JEAN S. EDGELL	(84)	Somatic Cell Genetics of Endothelium
DANA M. FOWLKES	(92)	Genetics, Recombinant DNA, Protein Structure/Function
KATHERINE A. HIGH	(113)	Molecular Genetics, Blood Coagulation
WILLIAM K. KAUFMANN	(95)	DNA Metabolism, Hepatocarcinogenesis
SUSAN T. LORD	(94)	Macromolecular Structure/Function, Molecular Genetics
GENE P. SIEGAL	(93)	Carcinogenesis, Tumor Invasion/ Metastasis, Immunohistochemistry
GARY J. SMITH	(85)	Carcinogenesis, Mutagenesis
THEA D. TLSTY	(108)	Molecular Pathology, Chemical Carcino- genesis, Regulation of Genetic Instability

Research Assistant Professors

C. ROBERT BAGNELL, JR.	(109)	Digital Processing of Images, Light and Electron Microscopy
KATHERINE PRYZWANSKI	(86)	Cell Biology of Phagocyte Functions
MARJORIE S. READ	(106)	Platelets, Thrombosis and Hemostasis

Adjunct Professors

FREDERICK J. DE SERRES	(53)	Environmental Mutagenesis
JOHN W. DRAKE	(101)	Molecular Genetics
HEINRICH B. MALLING	(90)	Genetic Pathology
PAUL NETTESHEIM	(65)	Pulmonary Function and Toxicology
JAMES A. SWENBERG	(66)	Chemical Carcinogenesis

Adjunct Associate Professors

JAMES C. BARRETT	(75)	Environmental Carcinogenesis
BYRON BUTTERWORTH	(67)	Toxicology
STEPHEN C. NESNOW	(39)	Chemical Carcinogenesis, Environmental Toxicology

Adjunct Assistant Professors

GARY A. BOORMAN	(102)	Toxicological Pathology, Myelotoxicology
MARC J. MASS	(104)	Respiratory Carcinogenesis, Carcinogen Metabolism
KEVIN T. MORGAN	(103)	Toxicology
JAMES A. POPP	(76)	Hepatocarcinogenesis, Hepatotoxicity

Professors Emeriti

KENNETH M. BRINKHOUS
 JOHN B. GRAHAM
 ROBERT H. WAGNER

Graduate work in the Department of Pathology is offered to those interested in acquiring a more extensive basic knowledge of diseases and their effects at different levels of molecular and cellular organization. Major emphasis is given to investigation of molecular mechanisms responsible for disease processes. Students are given the opportunity to undertake candidacy for the Master of Science and Doctor of Philosophy degrees.

Prospective candidates must hold a bachelor's degree from an accredited college.

The Department is located in the Brinkhous-Bullitt Building. There are well-equipped laboratories for research and advance work in pathology.

As a part of the essential training, prospective candidates are required to assist in teaching. Participation in research activities leading to an original thesis (M.S.) or dissertation (Ph.D.) is required of all advanced degree candidates.

Courses for Graduates and Advanced Undergraduates

- 140 INTRODUCTION TO CHEMICAL PATHOLOGY (Biochemistry 140) (3). Prerequisite, undergraduate or graduate course in Biochemistry; permission of instructor. Introduction to chemical pathology including biochemical basis, methods of analysis, and clinical application of selected biochemical tests. Topics may include enzymology, endocrinology, clinical toxicology, pharmacology, immunochemistry, or other related areas. *One seminar of three hours a week, spring.* Chapman and staff.
- 161f GENERAL PATHOLOGY (5). Prerequisites, Anatomy 102 and permission of instructor. Basic aspects of pathology, including cell injury, cell death, tissue inflammation, necrosis, repair and carcinogenesis. Circulatory, respiratory, renal and immune systems will also be studied. *Two lecture, one seminar and seven laboratory hours a week.* Dalldorf and staff.
- 161s SYSTEMIC PATHOLOGY (2). Prerequisites, Anatomy 102, Pathology 161f and permission of instructor. Pathology of the nervous system, the digestive system and reproductive organs. *One lecture, one conference and one laboratory hour a week.* Dalldorf and staff.
- 162 EXPERIMENTAL PATHOLOGY. Hours, credits and instructor to be arranged. May be repeated.
- 163 ELECTRON MICROSCOPY (4). Prerequisite, permission of instructor. Theoretical and practical aspects of electron microscopy. Application of transmission and scanning

- electron microscopy to pathology, with emphasis on ultrastructure of cells and organelles. *Two lecture and six laboratory hours a week, fall and spring.* Staff.
- 166 MOLECULAR BIOLOGY OF BLOOD COAGULATION (3). Prerequisite, Biochemistry 100 or Biochemistry 105 or permission of instructor. A comprehensive presentation of the chemistry and molecular biology of the blood coagulation mechanisms including consideration of component proteins, lipids, cofactors, interaction with other homeostatic systems, and control. *Three lectures per week, first summer session.* (1987 and alternate years.) Staff.
- 169 INTRODUCTION TO HUMAN IMMUNOGENETICS (Genetics 169) (3). Prerequisite, permission of the instructor. A seminar course using immunological techniques to familiarize participants with genetic systems defined in humans. Includes discussion of methodology and its application to problems of interest to participants. *Three lectures, fall.* (1988 and alternate years.) Staff.
- 170 GENERAL, SYSTEMIC AND CLINICAL PATHOLOGY (2). Prerequisite, permission of the instructor. A consideration of the nature of disease from a number of aspects, emphasizing particularly the chemical, physiologic and genetic as well as the morphologic. Designed for dental students. *One lecture and two laboratory hours a week, fall.* Staff.
- 171 GENERAL, SYSTEMIC AND CLINICAL PATHOLOGY (4). Prerequisite, Pathology 170. A consideration of the nature of disease from a number of aspects, emphasizing particularly the chemical, physiologic and genetic as well as the morphologic. Designed for dental students. *Two lecture and four laboratory hours a week, spring.* Staff.
- 178 DNA REPLICATION, RECOMBINATION AND REPAIR (2). Prerequisites, Biochemistry 100. The course will examine the molecular biology of DNA replication, recombination and repair as these processes occur in human cells. *Spring 1988 and alternate years.* Kaufmann.
- 179 HUMAN PATHOBIOLOGY (3). Prerequisite, permission of instructor. This course is an introduction to the pathological basis of disease and will examine etiologies of human diseases such as atherosclerosis and cancer with emphasis on both pathological and biological features. *Three lectures. Spring 1989 and alternate years.* Staff.
- 180 DNA AND CELL PATHOLOGY (Genetics 180) (Biochemistry 180) (3). Prerequisites, Biochemistry 100 and permission of the instructor. The basic chemistry of DNA and its associated structural and replicative proteins as it relates to mechanisms of mutagenesis and carcinogenesis. *Three lecture hours a week, spring.* (1989 and alternate years.) Staff. Topal.
- 195 FUNDAMENTALS OF CANCER BIOLOGY (Epidemiology 195) (3). A survey of basic information on the biology of cancer. It is designed for students and health professionals interested in an overview of current information on cancer development. *Three lecture hours per week, fall.* Siegal and staff.
- 197 FUNDAMENTALS OF CLINICAL ONCOLOGY (Epidemiology 197) (3). Overview of clinical management, diagnosis, and treatment of cancer. It is directed to students and health professionals interested in the interdisciplinary aspects of cancer. *Three lecture hours per week, spring.* Siegal and staff.

Courses for Graduates

- 213 PATHOLOGY FOR GRADUATE STUDENTS (5). Prerequisites, Pathology 161f or 170 and permission of the instructors. A tutorial course in human pathology. *Two seminar and six laboratory hours a week, fall and spring.* Staff.
- 214 ETIOLOGY AND PATHOGENESIS OF HUMAN DISEASE (3). Prerequisite, permission of instructor. A tutorial course covering topics such as cell injury, cell death, tissue inflammation, necrosis, repair, and carcinogenesis. Covers basic aspects of pathology in greater depth than Pathology 161f. *Two lecture and one seminar hours a week, fall.* Staff.

- 216 MODELS AND METHODS IN EXPERIMENTAL PATHOLOGY (3). Prerequisite, permission of instructor. An introduction to the use of *in vivo* and *in vitro* models in the study of disease. Special methods such as tissue culture, cell fractionation, and immunochemical procedures will be considered. *Two lecture and one seminar hours a week, fall.* Staff.
- 217 LABORATORY ANIMALS IN RESEARCH (3). Prerequisite, permission of instructor. Topics covered include the humane and legal responsibilities of researchers, selected animal models of human diseases, impact on environment and diseases on research and principles of animal surgery. *Fall.* Bellinger, Pick and Chang.
- 221 HEMATOPATHOLOGY (4). Prerequisites, Pathology 161f and permission of instructor. A tutorial course to introduce the advanced student to techniques and problems of disorders of the blood. This will cover many aspects of immunohematology, disorders of erythrocytes, disorders of leukocytes and bone marrow studies. *Two conference and six laboratory hours a week, fall.* Staff.
- 223 SPECIAL METHODS IN PATHOLOGY (2-5). Prerequisite, permission of the instructor. Conducted on a tutorial basis, with the aim of providing experience with specialized techniques including histochemistry, electron microscopy, fluorescent and phase microscopy, chromatography, electrophoresis, and ultracentrifugation. *Two conferences (optional six laboratory hours a week), spring.* Staff.
- 228 ADVANCED TOPICS IN PROTEIN CHEMISTRY (Biochemistry 228) (3). Prerequisite, Biochemistry 100 or equivalent. Chemical approaches to the elucidation of simple and complex proteins. Special topics will include normal and abnormal hemoglobins, proteins involved in biological matrices and glycoproteins. *Three lecture hours a week, spring.* Staff.
- 241 SPECIAL TOPICS IN GENETICS (Genetics 241) (2). Prerequisite, permission of the instructor. Introduction to human immunogenetics. *Two lecture hours a week, spring.* (1988 and alternate years.) Staff.
- 275 GENETICS SYSTEMS (Biochemistry 275, Biology 275, Genetics 275, Microbiology 275) (3). An advanced course in genetics emphasizing the genetics and molecular biology of viruses, bacteria, fungi, insects and mammals and based upon the personal research of the staff. *Fall.* (1988 and alternate years.) Staff of the Genetics Curriculum.
- 290 SEMINAR IN NEUROBIOLOGY (Biochemistry 290) (Neurobiology 290) (Pharmacology 290) (Physiology 290) (Biology 290) (3). Prerequisites, one graduate course in the biological sciences and permission of the Director of Neurobiology Program. An integrative consideration of selected topics and problems associated with the nervous system and behavior. *Three lecture hours a week. Spring.* Staff of the Neurobiology Program.
- 291 SEMINAR IN BLOOD COAGULATION (2). Prerequisite, Pathology 166 or permission of the instructor. An in-depth analysis of the current state-of-the-art in hemostasis research with emphasis on the molecular pathology of the clotting factors, fibrinolytic system, and platelet function. *Two hours a week, fall and spring.* Staff.
- 292 SEMINAR IN CARCINOGENESIS (2). Prerequisite, permission of the instructor. Survey of classical and current literature on selected critical issues in carcinogenesis. Discussions consider experimental methods and observations as well as theories and generalizations. *Two seminar hours a week, fall.* (1988 and alternate years.) Staff.
- 301 SEMINAR IN PATHOLOGY (2). Prerequisite, Pathology 161f. This course consists of seminars designed to acquaint the student with recent literature in pathology, particularly as it relates to research activities carried on within the Department. *Hours to be arranged.* May be repeated. Staff.
- 302 RESEARCH IN PATHOLOGY (3 or more each). Prerequisite, permission of the
303 Department. These courses are designed to give advanced students in pathology an
304 opportunity to carry on investigations on the mechanism of disease. Current research programs deal with blood coagulation, hemorrhagic diathesis, thrombosis, cold injury, human genetics, pulmonary pathology, chemical carcinogenesis, hepatic injury and

recovery, and immunohematology. *Ten or more laboratory hours a week, to be arranged.* May be repeated. Staff.

- 310 RESEARCH IN NEUROBIOLOGY (Biochemistry 310) (Neurobiology 310) (Pharmacology 310) (Physiology 310) (Biology 310) (3-12). Prerequisites, permission of a staff member and the Director of the Neurobiology Program. Research in various aspects of Neurobiology. *Six to twenty-four hours a week.* Staff of the Neurobiology Program.
- 393 MASTER'S THESIS (0-6). *Fall, spring, and summer.* May be repeated. (Total maximum of 6 credits). Staff.
- 394 DOCTORAL DISSERTATION (0-9) *Fall, spring, and summer.* May be repeated. Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF PHARMACOLOGY

RUDOLPH L. JULIANO, *Chairman*

Professors

GEORGE R. BREESE	(15)	Drugs and Neurotransmitters, Brain Development
YUNG-CHI CHENG	(41)	Cancer and Viral Chemotherapy, Deoxynucleotide Folate and DNA Metabolism
KENNETH H. DUDLEY	(28)	Drug Biotransformation, Penicillin Hypersensitivity
JOHN T. GATZY, JR.	(6)	Cellular Toxicology of Heavy Metals
T. KENNEY GRAY	(21)	Intestinal Absorption, Clinical Endocrinology
T. KENDALL HARDEN	(37)	Receptors for Neurotransmitters, Neuronal Regulation
PHILIP F. HIRSCH	(7)	Endocrine Pharmacology, Calcium Metabolism
RUDOLPH L. JULIANO	(62)	Membrane Biochemistry, Cell Interactions, Drug Delivery Systems
J. STEPHEN KIZER	(34)	Basic and Clinical Endocrinology
TOM S. MIYA	(54)	Pharmacodynamics and Biochemical Pharmacology and Toxicology of CNS Drugs
ROBERT A. MUELLER	(32)	Synthesis and Inactivation of Biogenic Amines
DAVID A. ONTJES	(30)	Endocrine Pharmacology, Clinical Endocrinology
GENE A. SCARBOROUGH	(36)	Molecular Basis of Plasma Membrane Structure and Function
WALTER E. STUMPF	(25)	Drug Distribution, Autoradiography
RONALD G. THURMAN	(38)	Biochemical Pharmacology, Drug and Alcohol Metabolism
SVEIN U. TOVERUD	(14)	Endocrine and Nutritional Pharmacology

Associate Professors

HUGH J. BURFORD	(3)	Educational Methods, Fetal Alcohol Syndrome
LUIGI X. CUBEDDU	(53)	Clinical Pharmacology, Cardiovascular Pharmacology
RAYMOND J. DINGLEDDINE	(40)	Excitatory Amino Acid Receptors, Epilepsy, Opiates
H. SHELTON EARP	(63)	Growth Regulation, Growth Factor and Protein Kinases
BARRY GOZ	(29)	Virus and Cancer Chemotherapy
CURTIS HARPER	(22)	Pulmonary Drug Metabolism, Toxicology
KENNY D. MCCARTHY	(42)	Pharmacology of Specific Cell Classes
RICHARD B. MAILMAN	(52)	Molecular and Biochemical Pharmacology
TAI-CHAN PENG	(11)	Endocrine and Morphological Pharmacology
DORIS T. POOLE	(12)	Intracellular pH, Tumors

Assistant Professors

JANE C. AZIZKHAN	(67)	Regulation of Gene Expression, DNA Protein Interactions
RYSZARD KOLE	(57)	RNA Processing, RNA-Protein Interactions
GAYLE E. LESTER	(60)	Vitamin D Metabolism, Mineral Homeostasis
WILLIAM MAIXNER	(64)	Pain Research and Autonomic Nervous System Research
BARRY S. PALLOTTA	(58)	Stochastic Properties of Single Ion Channels, Synaptic Transmission

Research Professor

LINDA DYKSTRA	(55)	Behavioral Pharmacology
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Research Associate Professor

PHILIP L. CARL	(59)	Molecular Biology, Cancer Chemotherapy
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Adjunct Professors

GERTRUDE B. ELION	(43)	Chemotherapy
JAMES R. FOUTS	(16)	Drug Metabolism, Developmental Pharmacology
ROBERT A. MAXWELL	(19)	Autonomic and Cardiovascular Pharmacology
CLIFFORD L. MITCHELL	(46)	Behavioral Toxicology
DAVID P. RALL	(23)	Toxicology, Drug Distribution, Cancer Chemotherapy

Adjunct Associate Professors

EMMANUEL J. DILIBERTO, JR.	(61)	Neuropharmacology
DONALD J. NELSON	(48)	Chemotherapy
THOMAS SPECTOR	(51)	Enzymology

Professors Emeriti

THOMAS CULLOM BUTLER
FRED WILSON ELLIS
GEORGE H. HITCHINGS
PAUL L. MUNSON
WILLIAM HENRY PEARLMAN
BETSY J. STOVER
ROY V. TALMAGE

The Department of Pharmacology offers a program of study which leads to the degree of Doctor of Philosophy. The curriculum is individualized in recognition of the diverse backgrounds and interests of students and the broad scope of the discipline of pharmacology. The basic course requirements for the Ph.D. degree include introductory and advanced courses in pharmacology and related programs in accord with the principal interest

of the students in biochemical, physiological, or behavioral pharmacology or in toxicology. In addition, in order to satisfy the requirements of the Department and the Graduate School, the student must pass written and oral doctoral examinations, write a dissertation which is based on original research, and submit to a final oral examination. Under special circumstances, the Department will offer a program leading to the M.S. degree. The requirements are appropriate course work, a written comprehensive examination, a thesis which is based on original research, and a final oral examination.

The Department offers a variety of research areas for the dissertation research including biochemical, cardiovascular, autonomic, endocrine, chemotherapy, and behavioral pharmacology, pharmacology of the central nervous system, pharmacology of ethanol, drug metabolism, toxicology, and molecular aspects of cell function. The student is expected to begin independent research early in his training and to participate in an intensive program of research seminars. Close personal contact between preceptor and trainee is encouraged.

Research Facilities

Laboratory facilities and a wide variety of research equipment are available in the department, which is located in the Faculty Laboratory and Office Building where it occupies approximately 26,000 square feet exclusive of classrooms and animal facilities.

Assistantships and Other Student Aid

Financial assistance is available to a limited number of students on a competitive basis. The stipend is approximately \$8,200 per year, and there is an allowance for tuition and fees.

Requirements for Admission

The Department of Pharmacology will consider applications from interested students who have or expect to receive a bachelor's degree in a scientific discipline. Applications may be made at any time during the year, but in order to receive favorable consideration for financial aid, they should be sent by February 1.

Courses for Graduates and Advanced Undergraduates

- 105 TECHNIQUES IN MOLECULAR ENDOCRINOLOGY (2). Prerequisites, Biochemistry 100L, 105, or equivalent and permission of the instructor. A guide to techniques for the estimation of hormones in tissues, hormone-protein interactions, isolation and characterization of hormones and hormone-binding proteins, and hormone dynamics. *Two lecture hours a week, fall.* (As announced.) Staff.
- 106 CURRENT CONCEPTS IN MOLECULAR ENDOCRINOLOGY (2). Prerequisites, Biochemistry 100 or equivalent, and permission of the instructor. Recent research in

- chemical endocrinology, bearing on the biology of reproduction, normal growth and development, and cancer; mechanisms of hormone action and other topics. *Two lecture hours a week, fall.* (As announced.) Staff.
- 110 TECHNIQUES IN PHYSIOLOGICAL PHARMACOLOGY (Neurobiology 110) (3). Prerequisites, Pharmacology 202, and permission of the instructor. Students will learn and perform a variety of physiological techniques often used in classical pharmacology research. *One lecture and six laboratory hours a week, spring.* (As announced.) Staff.
- 118 NEUROENDOCRINOLOGY (Anatomy 118) (2). Prerequisite, permission of the instructor. A review of presently held concepts in neuroendocrinology with emphasis on topographical aspects of brain structures related to hormone action. Emphasis on endocrine functions as related to neuropharmacology, behavior, consolidation of memory, psychopathology, neurophysiology and neuroanatomy. *Two lecture hours a week, spring.* (1986 and alternate years.) Stumpf.
- 123 BEHAVIORAL PHARMACOLOGY (Neurobiology 123) (Psychology 123) (3). Prerequisites, Pharmacology 202, or Psychology 101 and 106, or their equivalents. Basic principles of pharmacology and of the experimental analysis of animal behavior will be considered in relation to drugs that affect the central nervous system. *Three hours a week, spring.* (As announced.) Staff.
- 134 PHARMACOLOGY (DENT 123) (3). A course for second-year students in the School of Dentistry. *Two lecture hours a week and special assignments, fall.* Toverud; associates.
- 135 BIOLOGICAL SCIENCES LABORATORY (DENT 124) (3). "In-depth" laboratory experiences in pharmacology for students in the School of Dentistry. *Five laboratory and conference hours a week, fall and spring.* Toverud; associates.

Courses for Graduates

- 201 BASIC PRINCIPLES OF PHARMACOLOGY (1). Prerequisite, permission of the instructor. Dose-effect relationships and the concept, kinetics, isolation and identification of receptors. *One lecture hour a week, fall.* Gatzky, Harden.
- 202 PRINCIPLES OF PHARMACOLOGY AND TOXICOLOGY (Toxicology 202) (5). Prerequisites, Biochemistry 100 and Physiology 140, or their equivalents and permission of the instructor. Introduces the major areas of pharmacology and toxicology and serves as a basis for more advanced courses such as Pharmacology 203 or 204. *Five lecture hours a week, spring.* Goz; associates.
- 203 SYNAPTIC PHARMACOLOGY (Neurobiology 203) (3). Prerequisite, Pharmacology 202 or permission of the instructor. An in depth consideration of biochemical and physiological bases for actions of neuroactive drugs and their possible sites of action in terms of identified pathways and synapse in the brain. *Three lecture hours a week, fall.* Dingleline, Harden, McCarthy.
- 204 CARDIOVASCULAR AND RENAL PHARMACOLOGY (2). Prerequisites, Pharmacology 202 and permission of the instructor. Recent advances in the elucidation of the mechanisms by which cardiotonic, antidysrhythmic and diuretic agents alter cardiac and renal function. *Two lecture hours a week, spring.* Poole; associates.
- 205 INHIBITORS OF NUCLEIC ACID AND PROTEIN METABOLISM: MECHANISMS AND APPLICATIONS (2). Prerequisites, Pharmacology 202 and permission of the instructor. The mechanisms of action of inhibitors of nucleic acid and protein metabolism and how they may be used to further understanding of cellular replicatory processes, antibacterial, antiviral and anticancer chemotherapy. *Two lecture hours a week, fall.* Kole.
- 206 PHARMACOLOGY OF HORMONES AND VITAMINS AFFECTING MINERAL HOMEOSTASIS AND BONE METABOLISM (2). Prerequisites, Pharmacology 202 and permission of the instructor. Concepts and current research concerning the roles of parathyroid hormone, calcitonin, steroid hormones and vitamins A, C, and D in calcium homeostasis and bone mineral metabolism. *Two lecture hours a week, spring.* Toverud.

- 207 RECENT ADVANCES IN TOXICOLOGY (Toxicology 207) (2). Prerequisites, Pharmacology 202 and permission of the instructor. Recent advances in teratogenesis, mutagenesis, cardio-, hepato-, and pulmonary toxicology and the modes of action of toxic chemicals that are found in the environment. *Two lecture hours a week, fall.* Gatzky; associates.
- 208 CELLULAR REGULATORY MECHANISMS (2). Prerequisites, Pharmacology 202 and permission of the instructor. Recent advances in the area of cellular regulatory mechanisms: specifically, regulation of enzyme activity, protein synthesis, plasma membrane protein turnover, and cell growth. *Two lecture hours a week, spring.* (As announced.) Staff.
- 209 BIOTRANSFORMATION OF XENOBIOTICS (Toxicology 209) (2). Prerequisites, Biochemistry 100 or equivalent and permission of the instructor. Recent advances in the mechanisms by which drugs and other foreign chemicals are metabolized to active or inactive products. The importance of metabolic pathways to therapy/toxicity. *Two lecture hours a week, fall.* Harper; associates.
- 211 INTRODUCTION TO PHARMACOLOGICAL RESEARCH (4 each). A course for
212 first-year graduate students majoring in Pharmacology. A series of research projects of limited scope, each pursued for an 8 to 10 week period under the supervision of a different faculty member. *Twelve laboratory hours a week, fall and spring.* Dingleline, Pallotta.
- 213 INTRODUCTION TO PHARMACOLOGICAL RESEARCH (2). Prerequisites, Pharmacology 211 and 212. This is a continuation of Pharmacology 211 and 212. *Six laboratory hours a week, first summer session.* Dingleline, Pallotta.
- 214 INTRODUCTION TO PHARMACOLOGICAL RESEARCH (2). Prerequisites, Pharmacology 211, 212, and 213. This is a continuation of Pharmacology 211, 212, and 213. *Six laboratory hours a week, second summer session.* Dingleline, Pallotta.
- 215 THE STRUCTURE AND FUNCTION OF CELL SURFACE MEMBRANES (2). Prerequisites, Biochemistry 100 or equivalent and permission of the instructor. Lecture course covering current concepts of the molecular nature of the cell plasma membrane and its components. *Two lecture hours a week, fall.* Scarborough.
- 221 TUTORIAL IN PHARMACOLOGY (3 or more). Prerequisites, Pharmacology 202 or its equivalent, and permission of the staff. Students will spend 4-6 week periods with selected instructors reading in depth in specialized fields of pharmacology. Oral presentations and written reports will be required. *Fall, spring, and summer.* Staff.
- 231 THEORY OF RATE PROCESSES IN PHARMACOLOGY (3). Prerequisites, Pharmacology 202, or its equivalent, or physical chemistry, and permission of the instructor. Theory of the effects of temperature, pressure, chemical environment (including drugs), and time on biochemical and living systems. *Three lecture hours a week, fall.* (As announced.) Stover.
- 290 SEMINAR IN NEUROBIOLOGY (Biochemistry 290) (Neurobiology 290) (Pathology 290) (Physiology 290) (3). Prerequisites, one graduate course in the biological sciences and permission of the Director of the Neurobiology Program. An intensive consideration of selected topics and problems. *Spring.* Members of the Neurobiology Program.
- 301 RESEARCH IN PHARMACOLOGY (5 or more). Prerequisite, permission of the staff. *Fall, spring, and summer.* Staff.
- 310 RESEARCH IN NEUROBIOLOGY (Biochemistry 310) (Neurobiology 310) (Pathology 310) (Physiology 310) (Psychology 310) (Biology 310) (3-12). Prerequisite, permission of a staff member of the Neurobiology Program. Research in various aspects of neurobiology. *Six to twenty-four hours a week, fall and spring.* Members of the Neurobiology Program.
- 330 SEMINAR IN RECENT ADVANCES IN PHARMACOLOGY (1). Students will meet as a group with faculty members to summarize and discuss the important current pharmacological literature. *One hour a week, fall and spring.* Gatzky, Goz.

- 331 SEMINAR IN GENERAL PHARMACOLOGY (1). A series of weekly lecture-seminars by graduate students, faculty members, and visiting scientists on current research in pharmacology. *One hour a week, fall and spring.* Peng.
- 393 THESIS FOR MASTER'S DEGREE (3 or more). Prerequisite, permission of the staff. *Fall, spring and summer.* Staff.
- 394 DOCTORAL DISSERTATION (3 or more). Prerequisite, permission of the staff. *Fall, spring, and summer.* Staff.
- 400 GENERAL REGISTRATION (0).

SCHOOL OF PHARMACY

TOM S. MIYA, *Dean*

Professors

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|--------------------|------|--|
| GEORGE H. COCOLAS | (2) | Stereochemistry of Drug-Receptor Interactions, CNS Cholinergic Mechanisms |
| FREDERICK M. ECKEL | (9) | Exploration and Role Development of Pharmacist as Health Team Member |
| JEAN PAUL GAGNON | (22) | Administrative and Socioeconomic Research in Pharmacy |
| IRIS H. HALL | (15) | Screening and Mechanism of Action of Potential Hypolipidemic, Antifertility and Anticancer Drugs |
| KUO-HSIUNG LEE | (13) | Cancer Chemotherapy and Chemistry of Natural Products of Biomedical Significance |
| ARTHUR J. MCBAY | (4) | Analytical Toxicology |
| TOM S. MIYA | (27) | Pharmacodynamics and Biochemical Pharmacology and Toxicology of CNS Drugs |
| CLAUDE PIANTADOSI | (6) | Lipid Chemistry |
| JAMES SWARBRICK | (41) | Physical Pharmacy and Biopharmaceutics |

Associate Professors

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|----------------------|------|--|
| STEPHEN M. CAIOLA | (14) | Evaluation of Pharmacy Service Delivery Models and Therapeutic Regimens in Ambulatory Care Settings |
| GEORGE E. DUKES | (55) | Clinical Pharmacology and Toxicology Involving the Gastrointestinal and Hepatic Systems |
| B. W. HADZILJA | (19) | Pharmacokinetic Studies of Drugs and Their Metabolic Degradation |
| LAWRENCE J. HAK | (24) | Inpatient Clinical Services with Special Interest in Chronic Renal Failure and Nutrition |
| KHALID S. ISHAQ | (21) | Synthesis of Glycerylethers and Their Sulfur Analogs, Protease Inhibitors, Radioactive Synthesis and Cancer Chemotherapy |
| RICHARD J. KOWALSKY | (26) | Radiopharmaceuticals |
| A. WAYNE PITTMAN | (30) | Hypertension, Clinical Pharmacokinetics, Cardiology and Drug Administration |
| RALPH H. RAASCH | (32) | Clinical Pharmacokinetics and Parenteral Nutrition |
| WILLIAM T. SAWYER | (56) | Coagulation; Pharmacodynamics of Anticoagulant Drugs |
| ROBERT P. SHREWSBURY | (39) | Biopharmaceutics and Pharmacokinetics |

Assistant Professors

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|----------------------|-------|--|
| JOEL P. BOWEN | (61) | Drug Design and Molecular Modeling |
| KIM L.R. BROUWER | (62) | Biopharmaceutics and Pharmacokinetics |
| JERRY L. BROWNE | (57) | Evaluation of the Pharmacodynamics of Psychotropic Drugs |
| ABRAHAM G. HARTZEMA | (42) | Behavioral Pharmacy, Health Services Research, Program Evaluation |
| CATHY M. KLECH | (64) | Physical Pharmacy and Biopharmaceutics |
| CELESTE M. LINDLEY | (58) | Immunomodulation and Its Role in Cancer Therapy; Adjunctive Therapy in Cancer Patients |
| JAMES LONGSTRETH | (49) | Biopharmaceutics and Pharmacokinetics |
| JOHN I. MACKOWIAK | (50) | Pharmacy Administration and Socioeconomics |
| JAMES H. MAGUIRE | (46) | Structure/Metabolism Relationships and Their Use in Drug Design; Stereochemistry of Drug Metabolism; Drug Toxicity Studies |
| MICHAEL V. MILES | (59) | Pediatric Anticonvulsant Therapy |
| J. HERBERT PATTERSON | -(47) | Pharmacokinetic Evaluation of Cardiovascular Drugs |
| JAN H. PHILLIPS | (63) | Health Care Systems Research, Marketing and Pharmacy Administration |
| GARY M. POLLACK | (53) | Biopharmaceutics and Pharmacokinetics |
| CHARLES C. PULLIAM | (35) | Epidemiology of Drug Use and Misuse, Drug Therapy in the Elderly |
| JOSEPH T. RUBINO | (54) | Physical Pharmacy and Biopharmaceutics |
| STEVEN D. WYRICK | (48) | Design and Synthesis of Novel Antidopaminergic-Antipsychotic Agents; Synthesis of Agents for the Treatment of Brain Injury, and Synthesis of High Specific Activity Site-Specific Radio-Labelled and Mass Labelled Compounds of Biological and Pharmacological Interests |

Clinical Professor

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|-------------------|---|
| ARNOLD D. KALUZNY | Organizational Behavior, Innovation Diffusion, Medical Care |
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Clinical Associate Professors

- | | |
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| JAMES A. BUSTRACK | Cardiovascular and Sickle Cell Disease |
| ALLEN E. CATO | Clinical Drug Trials, Pediatric Diseases and Pulmonary Medicine |
| J. ROBERT POWELL | Clinical Pharmacokinetics and Drug Metabolism |
| WILLIAM N. ZELMAN | Health Finance |

Clinical Assistant Professors

COLLEEN GRESHAM
 THOMAS F. HUGHES
 JOHN M. KESSLER
 DEBORAH MONTAGUE
 ALLEN E. ROSMAN

Drug Utilization Review
 Hospital Pharmacy Administration

Cardiovascular Drug Therapy
 Health Policy and Administration

Clinical Instructor

KIMBERLY H. DELOATCH

Educational Media and Instructional
 Design

Adjunct Professors

C. EDGAR COOK

Steroid and Flavonoid Synthesis;
 Isolation and Structure of Naturally
 Occurring, Biologically Active Com-
 pounds; Drug Metabolism and
 Analysis

MICHAEL CORY

Design, Synthesis and Binding Studies
 of DNA Intercalating Agents; Quan-
 titative Structure-activity Relation-
 ships; Computer Applications to
 Drug Design

VLADIMIR PETROW

Metabolic Endocrinological Diseases,
 Aspects of Steroid Biochemistry in
 Reproduction and Contraception

HUGH H. TILSON

Drug Product Surveillance

RICHARD WELCH

Drug Metabolism

ROBERT L. WYKLE

Metabolism and Function of Ether-
 linked Lipids in Normal and Trans-
 formed Cells; Mechanisms of Action
 and Metabolism of Platelet Activating
 Factor (PAF) and Arachidonic Acid;
 Lung Surfactant Biosynthesis

Adjunct Associate Professors

M. ROBERT BLUM

Basic and Clinical Pharmacokinetics
 and Bioavailability

DAVID MILLINGTON

Mass Spectral [Gen. (EI, CI) and
 GCMS] Analysis

ROLLAND I. POUST

Drug Product Development

Adjunct Assistant Professors

KUN CHAE

Receptor Binding Involving Estrogen and
 Other Synthetic Estrogenic Compounds

RICHARD J. FLECK

Clinical Pharmacokinetics

ALLEN A. LAI

Applications of Pharmacokinetics to
 Clinical Drug Research

Professors Emeriti

MELVIN A. CHAMBERS

GEORGE P. HAGER

LARRY J. LOEFFLER

ALBERT M. MATTOCKS

JACK K. WIER

The School of Pharmacy offers graduate courses which lead to the degrees of Master of Science and Doctor of Philosophy. Graduate degrees in four separate divisions are described below. The School of Pharmacy is located in a major health science complex together with the Schools of Dentistry, Nursing, Medicine and Public Health.

Instruction emphasizes research and is given by means of lectures, recitations, and seminars combined with appropriate work in the laboratories. Because of the excellent rapport that exists between Schools, Departments, Institutes and Centers and the graduate programs in the School of Pharmacy, the graduate student has the opportunity for interdisciplinary cooperative research. The graduate degree programs also benefit from the relations of the faculty with the Research Triangle Institute, Burroughs Wellcome Pharmaceutical Research Laboratories, Glaxo, Inc., Oak Ridge Associated Universities, Duke University and Bowman Gray School of Medicine.

The pharmacy profession, the pharmaceutical industry, government agencies, and academic institutions provide many and varied opportunities for men and women in the pharmaceutical sciences as offered at The University of North Carolina at Chapel Hill.

The School of Pharmacy occupies Beard Hall, with laboratory facilities that are well adapted to graduate instruction. The Health Sciences Library has an outstanding collection of books and journals and offers many library support services. Appropriate use also is made of the library and laboratory facilities offered by the Departments of Biochemistry, Botany, Chemistry, Pharmacology, and Physiology.

Medicinal Chemistry and Natural Products

Research involves synthetic and natural products with special implications for neurochemistry, enzymology, drug mechanisms, lipid chemistry, radioactive labeling, cancer chemotherapy and biochemical mechanisms. M.S. and Ph.D. offered.

The field of Medicinal Chemistry is interdisciplinary. It applies and extends the basic concepts of chemistry, biochemistry and pharmacology to the investigation of biomedical problems. Areas of study can include structure-activity relationships, drug receptor interactions and synthetic design using computer assisted molecular mechanics, *ab initio*, and semi-empirical calculations with state-of-the-art graphics support. Also included are biochemical mechanism of drug action and drug toxicity, problems of

isolation of chemicals from natural sources and elucidation of their chemical structure and the development of analytical methods that apply to all of the above areas of research.

Pharmaceutics

Both M.S. and Ph.D. degrees are offered in the area of Pharmaceutics. While there are several areas of concentration within the Division, all students are required to take a common core designed to give a background of experience and expertise that will permit the graduate flexibility in terms of employment opportunity. Building on this common core, graduate students in Pharmaceutics become involved in areas of study that concentrate on the physical aspects of pharmaceutics, biopharmaceutics and pharmacokinetics, pharmaceutical technology and radiopharmaceutics. Invariably, research problems involve more than one of these areas, and so the overall approach is interdisciplinary in nature.

Current research projects involve drug transport and diffusion across membranes, dosage form design, with particular emphasis on controlled release, and the factors affecting drug absorption, distribution, metabolism and excretion, particularly as these processes affect the activity and toxicity of drugs in living systems.

Pharmacy Administration

Pharmacy Administration focuses on the research skills necessary to address the socio-economic aspects of pharmacy. The objective of the graduate program in Pharmacy Administration is to educate students to perform research and teaching in the areas of socio-economics and management as they relate to pharmacy, drugs, or drug distribution systems. Graduates exposed to management and behavioral concepts and principles will find employment opportunities in the drug industry, public and private drug programs, chain pharmacy and research organizations. In addition to a core curriculum, the student minors in an area of interest with offerings from the School of Business, the Departments of Sociology, Psychology, and Economics, or the School of Public Health.

The education received in Pharmacy Administration culminates in a research paper or thesis on some facet of pharmacy or drug distribution. This program leads to the Master of Science degree in Pharmacy Administration. A B.S. in Pharmacy is not a prerequisite.

The School of Pharmacy, in collaboration with the Department of Health Policy and Administration of the School of Public Health, participates in a program leading to the Ph.D. in Health Policy and Administration. The emphasis for Pharmacy Administration students is on pharmacy management. The program is designed to prepare researchers and academicians for careers in policy and management of pharmacy services.

To be eligible for admission to the doctoral program, applicants must hold a master's degree in Pharmacy Administration, or an M.P.H. equivalent degree. Building on this academic background, the collaborative doctoral program focuses on development of theoretical and methodological understanding of the health services system, particularly that segment of the system concerned with pharmacy. Students select one disciplinary area—e.g. finance, operations research, economics, planning and evaluation, political studies and policy analysis, or organizational management—to provide the core theoretical and methodological focus for their coursework. Upon completion of course requirements, the student develops a doctoral research project with collaborative advisement by faculty in the School of Pharmacy and the School of Public Health.

Pharmacy Practice

The School of Pharmacy offers a graduate program in Pharmacy Practice, with several different tracks. Candidates for the hospital pharmacy administration track must have an undergraduate degree in Pharmacy. This program includes an ASHP accredited residency at the North Carolina Memorial Hospital, the training hospital of The University of North Carolina at Chapel Hill. The program leads to the Master of Science degree in Pharmacy with specialization in hospital pharmacy and a Certificate of Residency. During the summer, the resident spends full-time working for the residency. The opportunity is provided to specialize in various areas of pharmacy practice during the second year of the program. The program begins on July 1. The student should become licensed to practice in the State of North Carolina by the second year in the program.

A wide variety of courses are available at the School of Pharmacy, the School of Public Health, and other University schools and departments from which to develop a student's program. The rotation of students among practice sites as part of the residency provides opportunities for gaining a knowledge base in such nonhospital settings as community health centers, health education centers, and mental health centers as well as pharmaceutical industry or organizational pharmacy, thus providing valuable experience in new areas of pharmacy practice.

The Division also offers a drug development/clinical research track. Candidates for this program are not required to have a degree in pharmacy. A residency program in drug development is available in the pharmaceutical companies in the Research Triangle Park. In lieu of the residency requirement, the graduate student may complete a thesis.

Requirements for Admission

Admission to candidacy for the graduate program in the School of Pharmacy presupposes the completion of a standard collegiate curriculum in pharmacy, chemistry, biochemistry, biology, zoology, or in an allied field

in the University, or in other universities or colleges having curricula acceptable to the Graduate School. Applications for admission must be supported by scores on the Graduate Record Examination Aptitude Test.

Inquiries and requests for application forms from predoctoral candidates should be directed to: Chairman, Committee on Graduate Studies, School of Pharmacy, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27599.

Graduate Assistantships and Fellowships in the School of Pharmacy

Graduate teaching assistantships in the School of Pharmacy provide a stipend averaging \$7500–8500 for twelve months' service. The time required in teaching is from twelve to fifteen hours per week.

The Pharmacy Foundation of North Carolina, Inc. offers several research fellowships carrying various stipends, plus an allowance for special supplies, to graduate students who major in pharmacy or medicinal chemistry.

A residency in pharmacy practice is offered through the Division of Pharmacy Practice. Also, there is a residency in hospital pharmacy offered at NC Memorial Hospital. A yearly stipend is awarded in both residencies.

All awards are given on a competitive basis with consideration given to the applicant's academic record and Graduate Record Examination scores. Information concerning these assistantships, fellowships, and traineeships may be obtained by writing directly to the Dean of the School of Pharmacy.

MEDICINAL CHEMISTRY

Courses for Graduates and Advanced Undergraduates

- 121 CHEMISTRY OF NATURAL PRODUCTS (3). Prerequisites, Chemistry 166 or equivalent and permission of the instructor. An introduction to the isolation, structure determination, biosynthesis, and synthesis of natural products; emphasis on aspects relating to medicinal chemistry. *Three hours a week, spring or fall.* Lee; staff.
- 141 INTRODUCTION TO RESEARCH IN MEDICINAL CHEMISTRY (1-3). Prerequisites, Chemistry 61, 62 and permission of the professor. *One conference and three or more laboratory hours a week, fall and spring.* Staff.
- 151 BIOMEDICINAL CHEMISTRY (3). Prerequisites, Medicinal Chemistry 68, 69 or permission of instructor. Principles of genetic regulation and disease which alter drug handling by the body. The effects of drugs on the regulatory mechanisms of cell metabolism, immunodefense, reproduction and disease states. *Three lecture hours per week, fall or spring.* Hall.
- 152 MECHANISM OF ADVERSE DRUG REACTIONS (3). Prerequisites, Pharmacology 55, 56, Pharmacy Practice 77, Medicinal Chemistry 68, 69, or equivalent. Introduction to mechanisms of drug interactions using major drug groups as examples with some case histories. *Three lecture hours per week, fall.* Hall; staff.
- 153 BASIC CONCEPTS OF CANCER AND ITS THERAPY (3). Prerequisites, Medicinal Chemistry 66 or Biochemistry 100, Pharmacology 55, 56, 216, Pharmacy Practice 76, 77, Physiology 93 or equivalents. The etiology, pathogenesis, types, metabolic and biochemical differences, detection, prevention, management, therapy, adverse effects of cancer are discussed. *Three lecture hours per week, fall or spring.* Hall.

- 165 HUMAN DRUG METABOLISM (2). Prerequisites, PHCO 55/56, or PHCO 202. Human enzyme systems responsible for drug metabolism; clinical implications of competitive metabolism, effects of inducers, diet, disease, and age; pharmacogenetic studies of human populations. *Two lecture hours per week, spring.* Maguire; staff.
- 168 MEDICINAL CHEMISTRY (2). Prerequisites, Chemistry 61, 62, Biochemistry 100 or equivalent, permission of instructor. Basic concepts of structure-activity-relationships of chemotherapeutic agents and drugs affecting metabolic disorders. A survey of the important drug classes, discussion of their mechanism of action and rationale of molecular modification of prototype drugs. *Three lecture hours per week, fall.* Ishaq, Lee, Wyrick.
- 169 MEDICINAL CHEMISTRY (2). Prerequisites, Chemistry 62, Physiology 102 or equivalent, permission of instructor. Basic concepts of structure-activity-relationships of pharmacodynamic agents. A study of mechanism of action, metabolism and synthesis of prototype drugs acting on the autonomic central and nervous systems and the cardiovascular system. *Three lecture hours per week, spring.* Wyrick, Ishaq, Cocolas.

Courses for Graduates

- 202 MEDICINAL CHEMISTRY TUTORIAL (TBA). Prerequisites, none. Tutorial in Medicinal Chemistry based upon variable credit taken in other appropriate courses. *Fall and Spring (on request).*
- 241 SPECIAL PROBLEMS IN MEDICINAL CHEMISTRY (1 or more). Prerequisites, 242 Chemistry 61, 62 and permission of the professors. *One conference and three or more laboratory hours a week, fall and spring.* Staff.
- 243 SELECTED TOPICS IN SYNTHETIC ORGANIC MEDICINAL CHEMISTRY (2). Prerequisite, Chemistry 160 or equivalent. Discussions from current literature on the strategy and techniques involved in the synthesis of biologically active compounds. *Two lecture hours per week, spring and fall.* Lee and staff.
- 244 SELECTED TOPICS IN NATURAL PRODUCTS (2). Prerequisites, Chemistry 166 and 168. Discussions of important recent developments in the chemistry of natural products of biomedical significance. *Spring. (1982 and alternate years.)* Lee; staff.
- 270 ADVANCED MEDICINAL CHEMISTRY (2). Prerequisite, Medicinal Chemistry 168, 169 or equivalent or permission of instructor. Student presentations and discussions of pertinent scientific literature. *Two lecture hours each week, Fall.* Staff.
- 275 MOLECULAR MODELING (3). Prerequisites, Math 31-32, Chemistry 181 and permission of instructor. Introduction to Computer Assisted Molecular Design (CAMD) techniques and theory, with an emphasis on the practical use of molecular and quantum mechanics programs (MM2, MNDO, GAUSSIAN). *Two lecture and three-four laboratory hours each week, Spring.* Bowen.
- 361 SEMINAR (1 each). *Fall and spring.* Staff.
- 362
- 391 RESEARCH IN MEDICINAL CHEMISTRY (1-5). *One conference and nine laboratory hours a week per course, fall or spring.* Staff.
- 392
- 393 MASTER'S THESIS (3). *Fall and spring.* Staff.
- 394 DOCTORAL DISSERTATION (3-5). *Fall and spring.* Staff.
- 400 GENERAL REGISTRATION (0).

PHARMACEUTICS

Courses for Graduates and Advanced Undergraduates

- 103 STERILE PHARMACEUTICAL PRODUCTS (3). Prerequisite, permission of instructor. A study of the preparation and properties of parenteral drug forms along with required control procedures. *Three lecture hours a week, spring.* Kowalsky, Rubino.
- 104 TOXICOLOGY AND DRUG ABUSE (3). Prerequisites, Medicinal Chemistry 69, Biochemistry 66. Introduction to drug and chemical adverse reactions including important aspects of toxicology and industrial hygiene. *Fall.* McBay.
- 105 ANALYTICAL TOXICOLOGY (2). Prerequisite, permission of the instructor. *One lecture and three laboratory hours a week, spring.* McBay.
- 106 RADIOPHARMACEUTICALS (3). Prerequisite, Pharmacy 53, permission of instructor. Principles and techniques of radioisotopes, the dispensing and control of radiopharmaceuticals. *Three lectures a week, fall.* Kowalsky.
- 106L RADIOPHARMACEUTICALS LABORATORY (2). Co-requisite, Pharmacy 106. *One lecture, one three-hour lab a week, fall.* Kowalsky.
- 162 PHARMACEUTICAL TECHNOLOGY (3). Prerequisite, Pharmacy 53. Study and manufacture of pharmaceuticals on a large and semicommercial scale. *Two lecture and three laboratory hours a week, fall.* Staff.
- 163 ADVANCES IN DRUG DELIVERY (3). Prerequisites, Pharmacy 53, permission of instructor. Discussion of modern therapeutic systems and their use in various routes of administration. Application of these systems to prescription, non-prescription and veterinary drug products will be emphasized. *Three lecture hours per week, spring.* Shrewsbury, Staff.
- 171 INTRODUCTION TO RESEARCH IN PHARMACEUTICS (1-3). Prerequisites, permission of instructor. Students participate in special research projects designed to introduce them to research opportunities in pharmaceuticals. *Three to nine lab hours/week. Fall, spring, and summer.* Staff.
- 172
- 182 CLINICAL PHARMACOKINETICS (4). Prerequisite, Pharmacy 54 or equivalent. Application of pharmacokinetic principles to the rational design of dosage regimes of specific drugs based upon individual patient parameters. *Spring.* Brouwer, Dupuis, Powell, Pollack.
- 191 PRODUCT FORMULATION (5). Prerequisite, permission of instructor. Development and evaluation of pharmaceutical and cosmetic products. *Two lecture and six laboratory hours a week, fall, alternate years.* Staff.
- 192 COSMETIC SCIENCE AND TECHNOLOGY (3). Prerequisites, Pharmacy 53, permission of instructor. An introduction to the science and technology of cosmetic products, with particular emphasis on the properties of skin and topically applied products. *Three lecture hours per week, spring.* Hadzija, Staff.

Courses for Graduates

- 251 ADVANCED PHARMACEUTICAL TECHNOLOGY I. (3). Prerequisites, Pharmacy 52, 53, permission of instructor. Principles of unit operations, including heat transfer, filtration, fluid mechanics, comminution, blending and compression. *Three lecture hours a week. Fall, alternate years.* Staff.
- 252 ADVANCED PHARMACEUTICAL TECHNOLOGY II (3). Prerequisites, Pharmacy 52, 53, permission of instructor. Principles of pharmaceutical manufacture, including liquid, solid and semisolid dosage forms, sterile products, scale up operations and evaluation. *Three lecture hours a week. Fall, alternate years.* Staff.
- 253 SPECIAL TOPICS IN ADVANCED PHARMACEUTICS (0-4). Prerequisite, permission of instructor. A lecture and/or laboratory course designed to present new concepts

- and innovations in the area of pharmaceuticals. *0-2 lecture hours and 0-6 lab hours a week. Fall, Spring.* Staff.
- 254 SPECIAL TOPICS IN ADVANCED PHARMACEUTICS (0-4). Prerequisite, permission of instructor. A lecture and/or laboratory course designed to present new concepts and innovations in the area of pharmaceuticals. *0-2 lecture hours and 0-6 lab hours a week. Spring.* Staff.
- 255 ADVANCED BIOPHARMACEUTICS (3). Prerequisites, Pharmacy 54 and permission of instructor. Study of drug absorption mechanisms; influence of route of absorption on drug disposition; design and evaluation of bioavailability studies. *Three lecture hours a week. Spring, alternate years.* Staff.
- 256 ADVANCED PHARMACOKINETICS (3). Prerequisites, Pharmacy 54 and permission of instructor. Classical linear modeling; physiological modeling; kinetics of pharmacologic effect; computer analysis of pharmacokinetic data; nonlinear and metabolite kinetics. *Three lecture hours a week. Fall, alternate years.* Staff.
- 291 ADVANCED PHYSICAL PHARMACY I (3). Prerequisites, Pharmacy 53 and permission of instructor. Application of physicochemical principles to pharmaceutical systems with emphasis on solutions. Topics include kinetics, stability, dissolution, diffusion, colligative properties, surface chemistry and ionic equilibria. *Three lecture hours a week. Spring, alternate years.* Staff.
- 292 ADVANCED PHYSICAL PHARMACY II (3). Prerequisites, Pharmacy 53 and permission of instructor. Application of physicochemical principles to pharmaceutical systems, with emphasis on heterogeneous systems. Topics include colloids, surface active agents, phase rule, complexation, rheology and preformulation. *Three lecture hours a week. Spring, alternate years.* Staff.
- 361 SEMINAR (1). *Fall and spring.* Staff.
- 362
- 391 RESEARCH IN PHARMACY (1-5). Graduate course consisting of laboratory work, conferences with the major professor, and library investigations relating to research. *One conference and nine laboratory hours a week per course. Fall and spring.* Staff.
- 392
- 393 MASTER'S THESIS (3 or more). *Fall and spring.* Staff.
- 394 DOCTORAL DISSERTATION (3-5). *Fall and spring.* Staff.
- 400 GENERAL REGISTRATION (0).

PHARMACY ADMINISTRATION

Courses for Graduates

- 179 BEHAVIORAL FOUNDATION OF CLINICAL PRACTICE (3). Prerequisites, Pharmacy Practice 21, PhAd 89. Provides students with a broad understanding of issues facing the clinical practitioner. The influence of the demands of the bureaucratic practice setting, as well as patient demands made on practice, will be discussed. *Three lecture hours a week. Fall.* Hartzema.
- 180 PHARMACEUTICAL MARKETING AND ECONOMICS (3). A survey of the U.S. drug distribution system from pharmaceutical manufacturer to community pharmacy. Marketing strategies, management practices, pricing, research and development, promotion and advertising, and the structure of the drug industry are analyzed. *Three lecture hours per week, fall.* Gagnon.
- 190 SELECTED TOPICS IN PHARMACY ADMINISTRATION (3). A reading and/or special projects course for both undergraduate and graduate students interested in pursuing additional work in the administration and social sciences as they pertain to pharmacy practice. *Three-nine hours per week. Spring, Fall, Summer.* Staff.
- 201 PHARMACEUTICAL SERVICES AND HEALTH CARE SYSTEMS (3). Pharmacy's current and future position in America's health care system is the underlying topic of this course. Special emphasis is placed on evaluative studies and pharmacy's role

- in third-party prescription plans, drug utilization review, governmental programs and other health organizations. *Three lecture hours per week, fall.* Phillips.
- 203 ATTITUDINAL RESEARCH METHODS (3). The principles and theories of attitudinal research in the evaluation of services delivered in pharmacy practices are presented. Included in this course are lectures on survey and questionnaire development and use of various attitudinal measurement devices, e.g. semantic differential, likert scale, etc. *Three lecture hours per week.* Hartzema and staff.
- 251 PHARMACY MANAGEMENT I (2). Prerequisites or co-requisites, Pharmacy Administration 201, permission of instructor. Lecture, background readings, analyses of case studies and group discussions regarding contemporary issues in personal development and personnel management pertinent to pharmacy. *Two lecture hours per week. Fall.* Mackowiak.
- 252 PHARMACY MANAGEMENT II (2). Prerequisites PhAd 251, permission of instructor. Lecture, background readings, analyses of case studies and group discussions regarding contemporary issues in financial and operations management pertinent to pharmacy. *Two lecture hours per week, Spring.* Mackowiak.
- 361 PHARMACY ADMINISTRATION SEMINAR (1 each). Prerequisites, enrollment
362 in master's program. *Fall, spring, and summer.* Staff.
- 391 RESEARCH IN PHARMACY ADMINISTRATION (1-6). Consists of laboratory
392 work, conferences with the major professor and library investigations relating to research. *Fall, spring and summer.* Staff.

PHARMACY PRACTICE

Courses for Graduates and Advanced Undergraduates

- 108 CLINICAL PHARMACY CLERKSHIP (3-6). Prerequisite, permission of the instructor. Through assigned responsibility in Clinical Pharmacy Services students are exposed to and learn how to solve drug therapy problems. *Fall and spring.* Eckel; staff.
- 109 TOPICS IN ACUTE CARE PHARMACY PRACTICE (3). Prerequisites, Pharmacy Practice 76, 77, permission of instructor. Focus is made upon choice and rationale for drug therapy, dosing guidelines, and monitoring parameters for assessment of drug efficacy and toxicity. Lectures and seminars concentrate on pathophysiology and drug management of problems commonly seen in acute care settings. *One lecture and two lab hours a week. Fall and spring.* Dennis, Patterson, staff.
- 110 AMBULATORY CARE PHARMACY PRACTICE (3). Prerequisites, Pharmacy Practice 76, 77 and permission of instructor. Didactic instruction is provided on selected subjects in therapeutics relevant in ambulatory patient care. Proficiency in ambulatory clinical pharmacy practice is gained through discussion sessions and laboratory experiences in specific ambulatory patient care environments. *Three lectures per week, fall and spring.* Williams.
- 132 TOPICS IN HOSPITAL PHARMACY (1-3). Prerequisites, Pharm.D., graduate standing,
133 permission of instructor. Various topics of interest to the students and faculty are presented in seminar format. Topics presented are related to pharmacy management and/or clinical practice. *Fall and spring.* Sawyer, staff.
- 134 CLINICAL THERAPEUTICS CONFERENCE (3). Prerequisites, Physiology 93,
Pharmacy Practice 76, 77. Utilizes lectures, seminars and case presentations to introduce the student to the knowledge system of clinical pharmacy. Didactic skills in laboratory methods, physical assessment, medical terminology and utilization of the medical record are taught. Individual case presentations are utilized to emphasize oral and written communication skills. *Fall and spring.* Sawyer, staff.
- 135 INTRODUCTION TO RESEARCH IN PHARMACY PRACTICE (1-3). Prerequisite,
136 permission of the instructor. Students participate in ongoing faculty projects. Involve-

- ment varies from laboratory work, literature searches, to patient studies. *Fall and spring.* Eckel; staff.
- 156 CLINICAL AND ANALYTICAL PRINCIPLES OF TOXICOLOGY (1-3). Prerequisites, Pharm. D., graduate standing, permission of instructor. General concepts of drug toxicity including routes of exposure, safety and efficacy evaluation, antidotal treatment, common poisons, pesticides, vitamins, metal, etc. and analytical methods for measuring these agents in biological fluids. *Three lecture hours a week. Spring.* Miya, staff.
- 175 IATROGENIC DISEASES (3). Prerequisites, Pharmacy Practice 76, 77, Pharm. D., permission of instructor. This course presents the toxic effects of drugs upon various organ systems, and provides the student with a practical, working knowledge of adverse drug effects. Methods to avoid, delay, modify and treat these side effects are also discussed. *Three lecture hours a week. Spring.* Patterson, Raasch, staff.
- 178 DRUG INFORMATION RETRIEVAL AND ANALYSIS (2). Prerequisites, Pharm. D., graduate standing. Concepts of drug information practice will be presented including types of drug information requests, drug information sources and drug literature evaluation. Drug utilization review, adverse drug reaction surveillance, and the impact of the medical literature on rational therapeutics and prescribing will also be examined. *One lecture hour and three lab hours a week. Fall.* Rosman, Kessler, staff.
- 179 MONITORING DRUG THERAPY (3). Prerequisites, Pharm. D. or graduate standing, permission of instructor. Skills in the assessment of a patient's physical findings assist the pharmacist in drug therapy evaluation and monitoring. The student will be able to interview a patient to gain an accurate medication history, record findings in a medical record, and determine improvement or ill effect in a patient due to drug therapy. The role of the pharmacist in a triage role can be greatly enhanced by skill in physical assessment. Such skills can augment the ability to judge success and failure to drug therapy and provide the ability to evaluate complications of drug therapy. Moreover, it facilitates pharmacist interaction with physicians on the health care team, provides essential research skills and improves his ability to act as a paramedical health provider. *Two lecture hours and two lab hours a week. Summer.* Staff.
- 193 INTRODUCTION TO RESEARCH METHODS IN PHARMACY PRACTICE (3). Prerequisites, Biostatistics 105 and permission of instructor. An introductory course on research methods focusing on the components of research in health service, epidemiologic and clinical aspects of pharmacy practice. *Spring.* Pulliam.
- 201 ADVANCED CLINICAL PHARMACY (3). Prerequisite, graduate standing. Discussions, workshops and lectures to develop the student's skills and abilities to make therapeutic recommendations, utilize the drug literature, educate patients and health professionals and record observations, plans and actions in a problem-oriented record. *Three lectures per week, fall and spring.* Staff.
- 202
- 203 METABOLIC MANAGEMENT OF THE HOSPITALIZED PATIENT (2). Prerequisite, graduate standing. Presents a comprehensive discussion of the fluid, electrolyte, acidbase and nutritional management of the hospitalized patient. *Spring.* Hak.
- 210 THE DEVELOPMENT AND CLINICAL INVESTIGATION OF DRUGS (2). Includes preclinical drug safety evaluation, preclinical pharmacology, design of protocols for Phases I-IV, FDA guidelines for clinical study, preparation of study plan, statistics in clinical trials, data analyzing and FDA interactions with industry. *Two lectures per week, fall.* Cato.
- 211 DESIGN & ANALYSIS OF CLINICAL DRUG TRIALS (2). Pre- or co-requisites, Bios 115 and 145 or equivalent courses, permission of instructor. Discussion of approaches to data analysis of clinical drug studies. Common study designs and their implementation are reviewed. *Two lecture hours per week, spring.* Hull, Bustrack.
- 249 HOSPITAL PHARMACY AND THE HOSPITAL ORGANIZATION (3). This course discusses the principles in health care delivery and their impact on the role of the hospital. The hospital as an organized unit for the delivery of health care is discussed. How

- the pharmacist might contribute to the hospital's role is reviewed. *Three lectures per week, fall.* Eckel.
- 250 PRINCIPLES OF PHARMACY PRACTICE (3). Prerequisite, Pharmacy Practice 249. The modern role of the hospital pharmacist and how it integrates progressive management with innovative services offered are discussed. The problems with implementing these programs are evaluated. *Three lectures per week, spring.* Eckel.
- 251 CASE STUDIES IN INSTITUTIONAL PHARMACY PRACTICE I: PERSONAL DEVELOPMENT AND HUMAN RESOURCE MANAGEMENT (2). Prerequisites, (or co-requisites), Pharmacy Practice 249 and 250, permission of instructor. Lecture, background readings, analyses of case studies and group discussions regarding contemporary issues in personal development and personnel management pertinent to pharmacy services in inpatient and ambulatory health care facilities. *Two lecture hours per week, fall.* Caiola.
- 252 CASE STUDIES IN INSTITUTIONAL PHARMACY PRACTICE II: FINANCIAL AND OPERATIONS MANAGEMENT (2). Prerequisites, (or co-requisites), Pharmacy Practice 249 and 250, permission of instructor. Lecture, background readings, analyses of case studies and group discussions regarding contemporary issues in financial and operations management pertinent to pharmacy services in inpatient and ambulatory health care facilities. *Two lecture hours per week, spring.* Hughes.
- 361 SEMINAR (1 each). Hughes; staff.
- 362
- 391 RESEARCH IN PHARMACY PRACTICE (1-5). Consists of conferences with major professor; library, laboratory and/or field investigations relating to research. Professor in charge is responsible for the assignments and approval of the subject and character of the degree paper. Staff.
- 392
- 393 MASTER'S THESIS (3 or more). *Fall and spring.* Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF PHILOSOPHY

JAY F. ROSENBERG, *Chairman*

Professors

E.M. ADAMS	(1)	Epistemology, Metaphysics, Value Theory
BERNARD BOXILL	(26)	Social and Political Philosophy
THOMAS E. HILL, JR.	(24)	Ethics, Political Philosophy
DOUGLAS C. LONG	(8)	Philosophy of Mind, Ethics, Epistemology
WILLIAM G. LYCAN	(22)	Philosophy of Mind, Philosophy of Language, Epistemology
STANLEY MUNSAT	(9)	Philosophy of Mind, Epistemology
MICHAEL D. RESNIK	(11)	Logic, Philosophy of Mathematics, Decision Theory
JAY F. ROSENBERG	(12)	Epistemology, Metaphysics, Recent Analytic Philosophy
GEORGE SCHLESINGER	(13)	Philosophy and History of Science
RICHARD A. SMYTH	(14)	History of Modern Philosophy, Logic of Science
PAUL ZIFF	(17)	Aesthetics, Philosophy of Language

Associate Professors

EDWARD M. GALLIGAN	(5)	Ancient, Medieval, Recent Analytic Philosophy
GERALD J. POSTEMA	(20)	Ethics, Political Philosophy, Legal Philosophy

Assistant Professors

GEOFFREY SAYRE McCORD	(25)	Moral Theory, Epistemology
KEITH SIMMONS	(27)	Logic, Philosophy of Language, Ethics
LYNNE TIRRELL	(28)	Philosophy of Language, Philosophy of Art, Nietzsche
GREGORY W. TRIANOSKY	(19)	Ethics, History of Ethics
ROBERT D. VANCE	(15)	Philosophy of Mind, History of Modern Philosophy
RICHARD H. ZAFFRON	(16)	Philosophy of the Social Sciences

Professor Emeritus

W. D. FALK	(4)	Ethics, Value Theory, Political Philosophy
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The graduate courses in philosophy are designed to present and discuss its classics, current literature, and basic problems; to stimulate critical and original philosophical thought; to prepare students for college and university positions in philosophy.

The Department offers programs of study leading to the degrees of Master of Arts and Doctor of Philosophy. Prerequisite for admission to graduate work in the Department is a B.A. degree or equivalent, normally with a major in philosophy, with courses in logic, ethics, ancient and modern philosophy.

Candidates for the master's degree must satisfactorily complete thirty semester hours of graduate work. They are normally required to participate in a first-year program including Philosophy 300 and, for students intending to proceed to the doctorate, Philosophy 101; there may be adjustments with the consent of the Department. Successfully passing a written comprehensive examination is a condition for receiving the degree of Master of Arts.

Candidates for the doctoral degree must satisfactorily complete fifty-four semester hours of graduate work, including three hours of Ph.D. dissertation credit.

There are three examinations, which must be passed by the candidate for the degree of Doctor of Philosophy. First, the student must pass the comprehensive examination for the degree of Master of Arts, mentioned above, and complete an M.A. thesis. Second, there is the Admission to Candidacy examination which will normally be taken in the third year and must be taken at least one academic year before the degree is to be conferred. This examination consists of a written general portion and a special oral portion. The written is in the student's field of specialization. The oral is on the feasibility of the dissertation proposal and will be taken after the general portion. Finally, there is an oral defense of the dissertation. For further details on degree requirements, see pages 101-8 of this catalogue.

The Department has several nonservice fellowships. They include a Graham Kenan Fellowship and the Mary Taylor Williams and Bertha Colton Williams Fellowships. The Department has available teaching assistantships with stipends of \$6,400. Also the Graduate School offers a variety of fellowships and assistantships with stipends up to \$9,000 which are open to students in philosophy.

Close relations are maintained with the Department of Philosophy at Duke University. Graduate students in either institution may register for credit in graduate courses or seminars at the other institution for a nominal fee and without special matriculation. Combined library facilities are available to students at each institution.

Courses for Graduates and Advanced Undergraduates

(Prerequisite, one course below 100, or consent of instructor)

- 101 SYMBOLIC LOGIC (Linguistics 104) (3). *Fall*. Resnik, Simmons.
- 102 SELECTED TOPICS IN THE HISTORY OF MORAL PHILOSOPHY (3). *Spring*. Trianosky, Hill.
- 103 PHILOSOPHY OF ART (3). *Spring*. Vance, Tirrell.
- 104 HEGEL, MARX AND THE PHILOSOPHICAL CRITIQUE OF SOCIETY (3). Postema.

- 105 POLITICAL PHILOSOPHY FROM HOBBS TO ROUSSEAU (3). *Fall*. Postema, Boxill.
- 106 PHILOSOPHY OF MATHEMATICS (3). Prerequisite, Philosophy 101 or equivalent background in logic or mathematics. *Fall or spring*. Resnik.
- 107 PHILOSOPHY, HISTORY AND THE SOCIAL SCIENCES (3). *Fall or spring*. Zaffron.
- 108 PHILOSOPHY OF NATURAL SCIENCES (3). *Fall*. Schlesinger.
- 109 PHILOSOPHICAL PROBLEMS IN PSYCHOLOGY (3). *Fall or spring*. Zaffron.
- 110 PHILOSOPHY OF LANGUAGE (Linguistics 110) (3). *Fall or spring*. Ziff, Munsat, Lycan, Tirrell.
- 111 ADVANCED SYMBOLIC LOGIC (3). *Spring*. Resnik, Simmons.
- 112 CONTEMPORARY MORAL PHILOSOPHY (3). *Fall or spring*. Long, Hill, Sayre McCord.
- 113 PHILOSOPHY OF LAW (3). *Fall*. Postema.
- 114 THE BEGINNINGS OF ANALYTIC PHILOSOPHY (3). *Fall or spring*. Rosenberg, Lycan.
- 115 FOUNDATIONS OF MATHEMATICS (3). *Fall or spring*. Resnik.
- 116 CURRENT ISSUES IN ANALYTIC PHILOSOPHY (3). *Spring*. Schlesinger.
- 120 CONTEMPORARY MORAL AND SOCIAL PROBLEMS (3). *Fall or spring*. Long, Sayre McCord, Boxill.
- 121 SPACE AND TIME (Physics 113) (3). *Spring*. Schlesinger, Van Dam.
- 130 RECENT DEVELOPMENTS IN POLITICAL PHILOSOPHY (3). *Spring*. Postema, Trianosky, Boxill.
- 142 PHILOSOPHY IN LITERATURE (Comparative Literature 142) (3). *Spring*. Smyth, Trianosky.
- 150 PLATO (3). *Fall*. Galligan.
- 151 ARISTOTLE (3). *Spring*. Galligan.
- 152 TOPICS IN MEDIEVAL PHILOSOPHY (Religion 132) (3). *Spring*. Galligan.
- 153 CONTINENTAL RATIONALISM (3). *Fall*. Smyth.
- 154 BRITISH EMPIRICISM (3). *Spring*. Munsat, Vance.
- 155 KANT (3). *Fall*. Rosenberg, Smyth, Vance, Hill.
- 156 HEGEL (3). *Spring*. Smyth.
- 158 EXISTENTIALISM AND PHENOMENOLOGY (3). *Spring*. Smyth.
- 159 TOPICS IN AMERICAN PHILOSOPHY (3). *Spring*. Smyth.
- 178 HEALTH CARE, SCIENCE AND PHILOSOPHY (Physical Therapy 178) (3). *Fall*. Schlesinger, Mitchell.
- 185 ALGEBRAIC LOGIC I (Mathematics 185) (3). *Spring*. (Not offered in 1987-1988.)
- 190 SET THEORY AND LOGIC (3). *Spring*. Resnik.

Courses for Graduates

- 201 STUDIES IN LOGIC (3). Advanced. Prerequisite, Philosophy 101 or equivalent; Philosophy 111 recommended. May be repeated for credit. *Spring*. Resnik, Simmons.
- 203 METAPHYSICS (3). May be repeated for credit. *Spring*. Adams, Rosenberg.
- 204 EPISTEMOLOGY (3). May be repeated for credit. *Fall*. Adams, Long, Lycan.
- 205 VALUE THEORY (3). May be repeated for credit. *Spring*. Adams.
- 206 STUDIES IN CONTEMPORARY ANALYTIC PHILOSOPHY (3). May be repeated for credit. *Fall and spring*. Rosenberg, Munsat, Schlesinger, Lycan.
- 207 STUDIES IN THE PHILOSOPHY OF SCIENCE (3). May be repeated for credit. *Fall or spring*. Schlesinger, Lycan, Rosenberg.
- 208 NORMATIVE ETHICAL THEORY (3). May be repeated for credit. *Fall or spring*. Trianosky, Hill.
- 212 ADVANCED PROBLEMS IN PHILOSOPHY OF LANGUAGE (Linguistics 212) (3). *Fall or spring*. Munsat, Ziff, Lycan, Tirrell.

- 300 PROTO-SEMINAR IN PHILOSOPHY (3). For first-year graduate students in the Department. *Spring*. Staff.
- 304 SEMINAR IN HISTORY OF PHILOSOPHY (3). May be repeated for credit. Staff.
- 305 SEMINAR IN SYSTEMATIC PHILOSOPHY (3). May be repeated for credit. *Fall and spring*. Staff.
- 311 READINGS IN PHILOSOPHY (3). May be repeated for credit. *Fall and spring*. Staff.
- 393 MASTER'S THESIS (3 or more). *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF PHYSICAL EDUCATION

JOHN E. BILLING, *Chairman*

Professors

JOHN E. BILLING	(014)	Administration; Physiology of Exercise
RONALD W. HYATT	(005)	Intramurals; Health Education; Administration
ANGELA LUMPKIN	(004)	History; Sociology; Administration
FREDERICK O. MUELLER	(007)	Administration; Sport Medicine
FRANK PLEASANTS, JR.	(008)	Motor Learning; Sport Medicine

Associate Professors

ROBERT G. MCMURRAY	(013)	Physiology of Exercise
BOYD L. NEWNAM	(011)	Adapted Physical Education
PAMELA S. ROBINSON	(009)	Anatomy; Physiology of Exercise
EDGAR W. SHIELDS, JR.	(010)	Measurement and Evaluation; Intramurals
JOHN M. SILVA	(017)	Sport Psychology

Assistant Professors

CHARLES HARDY	(018)	Research Design; Motor Performance
WILLIAM E. PRENTICE	(015)	Athletic Training; Sport Medicine

Lecturer

A. DREW ZWALD	(020)	Sport Administration
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Professors Emeriti

E. MARVIN ALLEN
CARL S. BLYTH
PATRICK F. EAREY
RUTH W. FINK
BILL W. LOVINGOOD
WILLIAM H. PEACOCK

The Department of Physical Education offers graduate training leading to the Master of Arts degree. It also offers, through the School of Education, the Master of Arts in Teaching degree. Additionally, through cooperative effort with the Division of Curriculum and Instruction in the School of Education, the Department contributes to the training of those doctoral students who wish to prepare themselves for positions in teaching and research in colleges and universities.

Master of Arts

The Master of Arts degree provides advanced course work in the subfields of physical education. Additionally, the program provides training for re-

search and clinical positions in a variety of fitness and rehabilitation programs in government, business, and private industry.

Thirty hours of graduate work are required, including a minimum of 18 hours in physical education. Physical Education 220, 225, and 393 are required of all M.A. students. Additional course requirements depend upon the area the student wishes to emphasize. Areas of emphasis include exercise physiology, motor learning, athletic training, sport psychology, human performance and sport administration. The area of emphasis in athletic training also involves working toward the National Athletic Trainers Association Graduate Certificate (see Athletic Training Certificate). Other formal requirements for the Master of Arts include a written comprehensive examination covering the program, a formal thesis, and a final oral defense of the thesis. If a North Carolina Public School Graduate Teaching Certificate is desired, the student must complete those courses required for a Master of Arts in Teaching, including the practicum.

A limited number of applicants who have not majored in physical education may be accepted into the Master of Arts program. Prior to enrolling in the graduate program, these individuals must have completed a minimum of 24 semester hours (8 courses) of specified undergraduate physical education major courses. These students will not be eligible for the North Carolina Public School Graduate Teaching Certificate.

Master of Arts in Teaching

The Master of Arts in Teaching is offered for those graduate students who are interested in advanced preparation for teaching at the junior and senior high school levels. Students entering the program must have an undergraduate major in physical education and must either have or acquire a public school teaching certificate in physical education. Thirty-three hours of graduate work are required to complete the degree. Eighteen hours must be selected from the graduate courses in the Department of Physical Education. A core of 12 hours (4 courses) and a 3-hour practicum are required by the School of Education.

At the conclusion of the program, students must pass a written comprehensive examination covering all the course work in physical education. Completion of the degree qualifies one for the North Carolina Public School Graduate Teaching Certificate.

Athletic Training Certification

The Department of Physical Education offers graduate courses and clinical experience in athletic training which can lead to certification by the National Athletic Trainers Association. The Department can allow only a limited number of graduate students to work toward certification each year. Those interested in such certification must submit a Graduate Student Trainer Application Form. That application form and specific information

describing the requirements for graduate certification in athletic training can be obtained by writing to the Director of Graduate Admissions in the Department of Physical Education.

Teaching Assistantships

A number of Graduate Teaching Assistantships are awarded annually by the Department of Physical Education. The primary duties of a teaching assistant involve instruction of sport skill classes to non-majors. Those wishing to apply for one of these assistantships should complete and return the appropriate application form. This form can be obtained by writing to the Director of Graduate Admissions in the Department of Physical Education.

Courses for Graduates and Advanced Undergraduates

- 113 THE HEALTH COORDINATOR (3). Prerequisite, PHYE 78 or equivalent. An introduction to leadership skills required of local health coordinators. Emphasis is placed on practical work experience involving supervisory and facilitative responsibilities. *Fall*.
- 147 INTRAMURAL AND EXTRAMURAL ACTIVITIES FOR SCHOOLS AND COLLEGE (3). Designed for physical education majors and students from allied areas. Study of the history, philosophy, principles, status, and problems of intramural programs. Organizational and administrative patterns, program of activities, evaluation, and other administrative areas are also covered. Theoretical and practical experiences are provided. *Spring*. Hyatt, Shields.
- 175 ADAPTED PHYSICAL EDUCATION (3). Prerequisites, anatomy and physiology, or equivalents. This course is concerned with physical education for the handicapped, with emphasis on the problems of specific disabilities. Actual experience of working with the handicapped is provided. *Spring*. Newnam.

Courses for Graduates

- 220 DATA ANALYSIS IN PHYSICAL EDUCATION (3). Prerequisite, graduate standing in physical education or permission of instructor. Descriptive and inferential statistical techniques used in physical education research. An introduction to packaged computer statistical programs is included. *Fall, spring*. Hardy, Silva.
- 225 RESEARCH TECHNIQUES IN PHYSICAL EDUCATION (3). Prerequisite, graduate standing in physical education or permission of instructor. Study of the various techniques and designs used in research. Practical experience in the identification and delimitation of problems for research and the preparation of a research prospectus. *Fall, spring*. Pleasants, Hardy.
- 230 MANAGEMENT OF ATHLETIC INJURIES (3). Prerequisite, permission of instructor for non-majors. Designed to provide basic knowledge and skill that aid in the prevention and treatment of injuries common to athletics. *Fall*. Prentice.
- 232 HUMAN ANATOMY FOR ATHLETIC TRAINERS (4). The study of gross human anatomy with emphasis on the functional and clinical aspects of the neck, back and extremities as related to athletic injuries. *Fall*. Robinson.
- 235 SPORTS MEDICINE ANALYSIS: SPECIAL PROBLEMS RELATED TO SPORTS MEDICINE (3). Prerequisite, permission of instructor for non-majors. Problem and research oriented. *Spring*. Blyth, Prentice.
- 236 CLINICAL METHODS IN ATHLETIC TRAINING (3). Prerequisite, 230. Analysis of theories and techniques used in clinical sports medicine settings. *Spring*. Prentice.

- 239 PRACTICUM IN ATHLETIC TRAINING (3). Prerequisite, graduate standing in physical education or permission of instructor. The implementation of theories and practices in a professional setting under the direction of a competent practitioner. *Spring*. Prentice.
- 240 ADMINISTRATION OF PHYSICAL EDUCATION AND SPORT (3). Prerequisite, permission of instructor for non-majors. Policies and problems of organization and administration of physical education and athletic programs in schools and colleges. Emphasis on the case study approach. *Fall*. Mueller.
- 249 PRACTICUM IN SPORT ADMINISTRATION (3). Prerequisite, 240. The implementation of theories and practices in a professional setting under the direction of a competent practitioner. *Spring*. Graduate Faculty.
- 250 HISTORY OF PHYSICAL EDUCATION (3). Comprehensive study of the historical development of physical education from prehistoric societies to the present time with emphasis in the 1880's and the 1900's and in the United States. *Fall*. Lumpkin.
- 251 SPORT PSYCHOLOGY (3). Prerequisite, undergraduate course in sport psychology or permission of instructor. A study of the personality and psychological variables affecting an individual's performance in sport and exercise. *Fall*. Silva, Hardy.
- 252 APPLIED SPORT PSYCHOLOGY (3). Instruction in the development of intervention and psychological skills designed to enhance physical performance and improve the social climate of sport groups. *Spring*. Silva.
- 255 SOCIAL ISSUES IN PHYSICAL EDUCATION AND SPORT (3). A comprehensive study of race and gender discrimination, adherence, value development, violence and other socialization factors in youth, collegiate and Olympic sport. *Spring or summer*. Lumpkin.
- 270 MOTOR LEARNING (3). Prerequisite, permission of instructor for non-majors. A study of the physiological and psychological factors that affect skill acquisition, including the application of principles of learning to the teaching and learning of motor skills. *Fall*. Pleasants, Hardy.
- 275 INFORMATION PROCESSING AND MOTOR CONTROL (3). Prerequisite, graduate standing in physical education or permission of instructor. Research and study of selected topics pertaining to the learning and performance of physical skills. Emphasis on cybernetic processes, information processing and retention. *Spring or summer*. Pleasants.
- 280 PHYSIOLOGY OF EXERCISE (3). Prerequisites, zoology, anatomy and physiology. The application of physiological principles relevant to the effect of exercise on human functioning. Emphasis is placed on collection and evaluation of experimental data. Laboratory work shall be conducted in facilities provided by the Department of Physical Education and the Medical School. Two hours of lecture and four laboratory hours per week. *Fall and spring*. McMurray.
- 281 ADULT FITNESS/CARDIAC REHABILITATION (3). Prerequisites, undergraduate human anatomy, human physiology & exercise physiology. This course provides the knowledge and skills necessary for conducting adult fitness, industrial fitness and cardiac rehabilitation programs. *Summer*. McMurray.
- 283 ASSESSMENT OF PHYSIOLOGICAL FUNCTIONS IN EXERCISE (3). Prerequisite, undergraduate course in exercise physiology. Theories and laboratory techniques for assessing human physiological responses to exercise and training. *Spring*. McMurray.
- 285 SEMINAR IN EXERCISE PHYSIOLOGY (3). Prerequisite, graduate standing in physical education or permission of instructor. Research and in-depth study of selected topics in exercise physiology. Emphasis on respiratory gas analysis, human calorimetry, exercise electrocardiography, body composition, and physical work capacity. *Spring*. Robinson.
- 289 PRACTICUM IN EXERCISE PHYSIOLOGY (3). Prerequisites, 280, 283, 285, or permission of instructor. The implementation of theories and practices in a professional

setting under the direction of a competent practitioner. *Fall and spring*. Graduate Faculty.

- 300 SPECIAL TOPICS IN PHYSICAL EDUCATION (3). Prerequisite, graduate standing in physical education. The study of special topics directed by an authority in the field. *Fall, spring and summer*. Graduate Faculty.
- 320 RESEARCH IN PHYSICAL EDUCATION (3). Prerequisite, graduate standing in physical education or permission of instructor. *Fall and spring*. Graduate Faculty.
- 393 MASTER'S THESIS (3 or more). *Fall, spring and summer*. Graduate Faculty.
- 400 GENERAL REGISTRATION (0).

DIVISION OF PHYSICAL THERAPY

DARLENE S. SLATON, *Director*

Professor

RUTH U. MITCHELL (6) Geriatrics, Health Care and Health Professions, Research Theory and Design

Associate Professors

BARRY R. HOWES (3) Organization and Administration
CHARLENE M. NELSON (8) Electroneuromyography, Electrotherapy
Clinical Education, Clinical Specialization and Certification
CHARLES P. SCHUCH (12) Organization and Administration, Clinical Education

Assistant Professors

SUSAN M. ATTERMEIER (19) Developmental Disabilities, Theories Underlying Therapeutic Exercise
CAROL A. GIULIANI (28) Neural Basis of Motor Control
PETER MCGRAIN (27) Biomechanics, Computer Software
CAROL PARR (10) Developmental Disabilities, & Rehabilitation, Developmental Biomechanics, Human Development
PHILIP L. WITT (22) Research Design, Orthopaedics, Holistic Approaches

Research Associate Professor

IRMA WILHELM (24) Infant Motor Behavior, Research, and Statistics

Clinical Assistant Professor

DARLENE S. SLATON (25) Pediatrics, Neurodevelopmental Theory, Gait Analysis

Instructor

MICHAEL T. GROSS (29) Sports Medicine, Biomechanics, Orthopedics

Professors Emeritae

MARJORY WILSON JOHNSON
MARGARET L. MOORE
MABEL M. PARKER
MARY CLYDE SINGLETON

The Division of Physical Therapy of the Department of Medical Allied Health Professions offers a graduate program leading to the degree of Master of Science in Medical Allied Health Professions with a major in physical therapy.

Requirements for Admission

1. A bachelor's degree and graduation from a physical therapy curriculum accredited by an agency recognized by either the U.S. Office of Education or the Council on Postsecondary Accreditation.
2. A grade point average of B or better in the professional physical therapy curriculum.
3. Submission of scores of the Graduate Record Examination.
4. Three letters of recommendation.
5. A statement specifying personal objectives for graduate study and career goals.
6. A minimum of one year of clinical experience.
7. A graduate level statistics course.

General Program Description

The M.S. in Medical Allied Health Professions with a major in physical therapy is designed to prepare specialists in physical therapy who can assume positions of leadership in various work environments. The program is organized into two major specialty tracts, musculoskeletal and neuromuscular, with supporting areas in health policy and administration, education, research or clinical practice.

The M.S. degree program requires a minimum of thirty-six semester credit hours. General curriculum requirements include:

PHYT 198 — Scientific Basis of Human Motion (4 cr); PHYT 393 — Master's Thesis (6 cr); a research design/statistics course of choice in addition to the statistics course required for admission (3 cr). Students are also required to take 9–15 credits in a specialty tract and at least 9 credits in a supporting program of choice. A written comprehension examination and an oral defense of the thesis is required.

Musculoskeletal Specialty Tract

The musculoskeletal specialty tract is designed for students who have a special interest in biomechanical and kinesiological aspects of human motion, and the effects of trauma and disease on joint function. Students may choose to concentrate on the developmental aspects of musculoskeletal function in relation to congenital or early childhood disorders, adult orthopedic problems, or the aging process. Upon completion of the curriculum, students are expected to have advanced knowledge of the musculoskeletal system, to be able to apply mechanical principles to the function of the

musculoskeletal system, and to be able to assess and measure normal and abnormal musculoskeletal function.

Neuromuscular Specialty Tract

The neuromuscular tract is designed for students who have a special interest in neurophysiological and kinesiological function of the neuromuscular system. Students may choose to concentrate on the developmental aspects of normal and abnormal development, the problems of trauma and disease affecting the adult's neuromuscular system, or the problems of aging. Upon completion of the curriculum, the students will be able to describe theories of normal and abnormal neuromuscular function, to describe normal and abnormal function, and to utilize methods of assessing and measuring human motion.

Many Physical Therapy courses listed are available to graduate students enrolled in other areas of the University. They may be utilized for a minor in physical therapy by students who are graduates of an accredited physical therapy curriculum.

Courses for Graduates and Advanced Undergraduates

- 102 INTRODUCTION TO MAMMALIAN PHYSIOLOGY (Physiology 102) (5). A general course in vertebrate physiology with emphasis on morphological and function correlations. Suitable for graduate students with a minimal biology background. *Fall*. Faust; staff.
- 139 ADVANCED PEDIATRIC ASSESSMENT AND PROGRAM PLANNING IN PHYSICAL THERAPY (3-6). Prerequisite, permission of instructor. Laboratory for the physical therapist in diagnostic evaluation and program planning for children with developmental and/or learning problems. *Six to twelve laboratory hours a week, fall, spring and summer*. Attermeier.
- 172 ELECTROTHERAPY (3). Prerequisites, college physics and permission of instructor. Physical aspects, physiological effects, indications and contraindications of electrical currents and their therapeutic value. Basic principles and techniques of electro-diagnostic testing, electromyography, and nerve condition are included. *Two lecture and two laboratory hours a week, fall*. Nelson.
- 175 COMMUNICATIONS FOR PHYSICAL THERAPY (1). Prerequisite, permission of instructor. The use of audiovisual aids; writing for professional journals; and basic principles of research design for physical therapy. *One lecture hour each week, fall and spring*. Witt.
- 177 ORGANIZATION AND ADMINISTRATION OF A PHYSICAL THERAPY SERVICE (3). Prerequisite, permission of instructor. Includes material on planning, organizing, and managing a physical therapy service in an institution or agency. Deals with personnel, facility planning, fiscal management, communication, and medical-legal aspects of service. *Three lecture hours a week, spring and summer*. Howes, Schuch.
- 178 HEALTH CARE, SCIENCE AND PHILOSOPHY (3). Prerequisite, permission of instructor. An interdisciplinary course to develop critical thinking capacities through philosophical study of nature of scientific presuppositions, and concepts including events, causality, and determinism with specific application to health care issues. *Three lecture hours a week, fall*. Mitchell, Schlesinger.
- 183 OVERVIEW OF CLINICAL EDUCATION (3). Prerequisite, permission of instructor. An overview of clinical education with information collected through literature search

- and discussions with instructor and guests responsible for areas in clinical education. *Three lecture hours a week, upon request, fall, spring, or summer.* Schuch.
- 191 GROSS ANATOMY FOR PHYSICAL THERAPISTS (Anatomy 191) (6). Prerequisites, Zoology 11 and Zoology 41 or equivalents and permission of instructor. Fundamental principles and concepts of human gross anatomy for physical therapists taught by lectures and cadaver dissection. Emphasis on functional anatomy. *Three lecture and six laboratory hours a week, fall.* Lay.
- 192 ELECTROMYOGRAPHIC KINESIOLOGY (4). Prerequisites, Anatomy 191, Physical Therapy 90 or equivalents and permission of instructor. Essential elements of electromyographic instrumentation, study of anatomical relationships in the human cadaver and laboratory analysis of muscle activity. Anatomical and electromyographic kinesiology publications will be discussed. *Two lecture and two laboratory hours a week, fall.* McGrain.
- 193 FUNCTIONAL NEUROANATOMY (Anatomy 193) (3). Prerequisites, Anatomy 191, Anatomy 107 or equivalent and permission of instructor. Study of basic structure of the brain and spinal cord, including both lecture and laboratory. *Four hours a week, spring and summer.* Giuliani.

Courses for Graduates

- 198 SCIENTIFIC BASIS OF HUMAN MOTION (4). Prerequisites, Basic Kinesiology or equivalent and permission of instructor. Provides the student with knowledge of biomechanics and neurophysiology necessary for understanding the basis of motor skill development and control. *Four lecture hours a week, fall.* Giuliani, Gross.
- 241 OVERVIEW OF NEUROMUSCULAR FUNCTION AND DYSFUNCTION (3). Prerequisite, permission of instructor. Overview of topics essential to the understanding of neuromuscular function and dysfunction and to the critical analysis of current theories of therapeutic exercise. *Fall.* Slaton.
- 243 THERAPEUTIC EXERCISE WITH NEUROMUSCULAR DISORDERS (3). Prerequisites, PHYT 241 and permission of instructor. Exploration of traditional and current theories of therapeutic exercise for neuromuscular disorders with an emphasis on critical analysis. *Spring.* Attermeier.
- 272 ELECTRONEUROMYOGRAPHY (3). Prerequisites, Physical Therapy 172 or equivalent and permission of instructor. Electrophysiology and advanced electromyographic and nerve conduction studies for clinical research applications are the bases of this course. Biomedical instrumentation and methods for analysis and quantitation of electromyographic data are included. *Two lecture and two laboratory hours a week, spring.* Nelson.
- 282 ASSESSMENT OF DEVELOPMENTAL PROCESSES IN INFANCY (2). Prerequisites, Physical Therapy 385 or equivalent and permission of instructor. Theory and use of research/clinical methods for assessing behavior of infants 0-6 months, including Brazelton Scale, movement assessment, and psychophysiological methods. Laboratory develops basic competence in use of Brazelton Scale. *Summer I.* Wilhelm.
- 282L LABORATORY IN INFANT ASSESSMENT (1-2). Prerequisite, Physical Therapy or equivalent, and permission of instructor. Laboratory offers training in administration of the Brazelton Scales and other neonatal & infant assessment tools. *Fall, spring and summer II.* Wilhelm.
- 285 MOVEMENT DYSFUNCTION: ASSESSMENT AND INTERVENTION (3). Prerequisite, permission of instructor. Quantitative and qualitative assessment of movement and early identification of dysfunction. Contemporary philosophies of treatment. Social-legal issues of handicapping conditions. Can be tailored to individual interest. *Two lecture and two laboratory hours a week, spring.* Slaton.

- 290 ADVANCED KINESIOLOGY AND BIOMECHANICS (3). Prerequisites, Physical Therapy 198 or equivalent and permission of instructor. A biomechanical and neurophysiological approach to the study of normal and pathological motion. *Three lecture hours a week, fall.* Gross.
- 291 ANALYSIS OF HUMAN MOTION (3). Prerequisites, Physical Therapy 198 or equivalent and permission of instructor. A lecture laboratory course on the rationale and basic principles of stroboscopy, cinematography, electrogoniometry, dynamometry, and electromyography as means of evaluating the biomechanics of human motion. *Two lecture and two laboratory hours a week, spring.* McGrain.
- 292 DEVELOPMENT BIOMECHANICS (3). Prerequisite, permission of instructor. Applies the basic principles of mechanics and principles of growth to the musculoskeletal system for normal and abnormal development through the various stages of life. *Three lecture hours each week, fall.* Staff.
- 293 ADVANCED ORTHOPEDIC ASSESSMENT (3). Prerequisite, permission of instructor. Analysis of the testing procedures available for orthopedic assessment. Evaluation of the efficacy of these procedures. *Three lecture hours a week, spring.* Gross.
- 301 SEMINAR IN PHYSICAL THERAPY (1-3). Group presentations and discussions by students and staff of selected topics related to physical therapy. *Fall, spring and summer.* Staff.
- 303 PROBLEMS IN PHYSICAL THERAPY (2-3). Prerequisite, permission of instructor. Advanced group study, analysis and discussion of issues related to the practice of physical therapy. *Time to be arranged, fall, spring, and summer.* Staff.
- 307 SEMINAR IN DISORDERS OF DEVELOPMENT AND LEARNING IN CHILDHOOD (2). Prerequisite, permission of instructor. Seminar for students with prior background in child development or related areas on interdisciplinary diagnosis and management of developmental problems in childhood. Focus on staff and student prepared case material. *Fall, spring, and summer.* Knobloch, DDDL staff.
- 347 NEUROPATHOLOGIES (3). Prerequisite, Speech & Hearing 170 and 194, and permission of the instructor. Multidisciplinary approach to diagnosis and treatment of childhood neuropathologic disorders. *Fall.* Attermeier, Porter.
- 376 SEMINAR IN PHYSICAL THERAPY PROFESSIONAL ISSUES (2). Prerequisite, permission of instructor. Discussion of current issues affecting physical therapy and health care. *Fall.* Mitchell.
- 377 READINGS IN SELECTED TOPICS IN PHYSICAL THERAPY (1-3). Prerequisite, permission of instructor. The student explores areas of special interests pertinent to eventual goals in physical therapy. *Time to be arranged, fall, spring and summer.* Staff.
- 379 RESEARCH IN PHYSICAL THERAPY (2-4). Prerequisites, PHYT 198, permission of instructor. Independent investigation under the guidance of an instructor, who must approve the topic of research. *Time to be arranged, fall, spring and summer.* Staff.
- 380 SEMINAR IN HUMAN GROWTH AND DEVELOPMENT (1-3). Prerequisites, PHYT 80 or equivalent and permission of instructor. Selected topics related to human development of the child and the adult. *Time to be arranged, fall, spring and summer.* Staff.
- 381 THE NEURAL BASIS OF MOTOR CONTROL (3). Prerequisite, neuroanatomy, Physical Therapy 198 or equivalent and permission of instructor. Advanced study of the neurophysiological basis of motor control, including physiology of the motoneuron, methods of research, and identification of unsolved problems in sensorimotor physiology. *Fall.* Giuliani.
- 383 EDUCATIONAL ASPECTS OF CLINICAL EDUCATION IN PHYSICAL THERAPY (2). Corequisite, PHYT 383L. Prerequisite, PHYT 183. Overview of teaching-learning and evaluation in the clinical setting; curriculum and program planning and integration of didactic education with clinical instruction; supervision and interpersonal relations; and continuing education for clinical faculty development. *Two seminar hours a week, upon request, fall, spring, or summer.* Schuch.

- 383L LABORATORY IN EDUCATIONAL ASPECTS OF CLINICAL EDUCATION IN PHYSICAL THERAPY (1). Corequisite, PHYT 383. Prerequisite, permission of instructor. Offers experience with practical application of educational elements involved in clinical education as applicable to students and clinical facilities. *Two laboratory hours a week, upon request, fall, spring, or summer.* Staff.
- 384 ADMINISTRATIVE ASPECTS OF CLINICAL EDUCATION IN PHYSICAL THERAPY (2). Corequisite, 384L. Prerequisites, PHYT 183, Overview of Clinical Education; PHYT 177, Organization and Administration of a Physical Therapy Service or equivalent; and permission of instructor. The application of basic principles of administration pertaining to clinical education, such as: professional standards relating to students and clinical practice; medico-legal considerations; site selection; inter-institutional agreements; cost of clinical education; records and reporting; interpersonal and interdepartmental communications; and clinical faculty development. *Two seminar hours a week, upon request, fall, spring, or summer.* Schuch.
- 384L LABORATORY IN ADMINISTRATIVE ASPECTS OF CLINICAL EDUCATION IN PHYSICAL THERAPY (1). Corequisite, PHYT 384. Prerequisite, permission of instructor. Offers experience with practical application of administrative elements involved in clinical education as applicable to the students, the University, and the clinical facilities. *Two laboratory hours a week, upon request, fall, spring, or summer.* Staff.
- 385 TESTS AND MEASUREMENT IN CHILD DEVELOPMENT (3). Prerequisites, PHYT 198 or equivalent and permission of instructor. Introduction to measurement theory, including test reliability, validity and standardization. Laboratory develops basic skills in administering the Bayley Scales, Neonatal Behavioral Examination, Wolanski Motor Evaluations and other tests of sensorimotor function in infancy and childhood. *Two lecture and two laboratory hours a week, spring.* Mitchell, Wilhelm.
- 393 MASTER'S THESIS (6). *Fall, spring and summer.* Staff.

DEPARTMENT OF PHYSICS AND ASTRONOMY

SANG-IL CHOI, *Chairman*

Professors

JOHN M. BANE, JR.	(29)	Physical Oceanography
C. VICTOR BRISCOE	(2)	Low Temperature Physics
SANG-IL CHOI	(3)	Ionic Conductors, Organic Crystals, Condensed Matter Theory
WAYNE A. CHRISTIANSEN	(4)	Theoretical Astrophysics, Radio Astronomy
THOMAS B. CLEGG	(5)	Nuclear Physics, Polarized Ion Source Development
KIAN S. DY	(8)	Condensed Matter Theory, Surface States
PAUL H. FRAMPTON	(33)	Theoretical Particle Physics including Gravity
JOHN P. HERNANDEZ	(10)	Condensed Matter Theory, Electron States
PAUL S. HUBBARD	(11)	Molecular Physics, Spin Relaxation
EDWARD J. LUDWIG	(13)	Experimental Nuclear Physics
J. ROSS MACDONALD	(28)	Condensed Matter Theory, Space Charge Polarization, Data Analysis Methods
EUGEN MERZBACHER	(14)	Quantum Mechanics, Atomic and Nuclear Theory
EARL N. MITCHELL	(15)	Applied Physics
Y. JACK NG	(30)	Theoretical Particle Physics, Gravitation
DIETRICH SCHROEER	(19)	Mossbauer Spectroscopy of Lattice Defects, Science and Policy
STEPHEN M. SHAFROTH	(20)	Accelerator-Based Atomic and Nuclear Physics, Inelastic X-ray Scattering
MARVIN SILVER	(21)	Solid State, Electron Excitons in Disordered Matter, Photoconductivity
LAWRENCE M. SLIFKIN	(22)	Lattice Defects in Solids, Science and the Arts
WILLIAM J. THOMPSON	(25)	Theoretical Nuclear Physics, Nuclear Reactions
HENDRIK VAN DAM	(26)	Theoretical Physics
JAMES W. YORK, JR.	(27)	Gravitation, Relativity, Theoretical Physics

Associate Professors

BRUCE W. CARNEY	(32)	Optical Observational Astronomy
HORST KESSEMEIER	(12)	Nuclear Magnetic Relaxation in Solids
LAWRENCE G. ROWAN	(18)	Electron Paramagnetic Resonance, Physics of Music, Electronics

Assistant Professors

HUGON J. KARWOWSKI	(37)	Experimental Nuclear Physics
LAURIE E. MCNEIL	(36)	Solid State, Optical and Transport Properties of Disordered Solids

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|----------------|------|---|
| JOHN H. MILLER | (40) | Electrical Transport Properties of Solids,
Macroscopic Quantum Phenomena |
| JAMES A. ROSE | (41) | Galactic and Extragalactic Astronomy |

Visiting Assistant Professors

- | | | |
|---------------------|------|---|
| MICHAEL D. GREGG | (45) | Observational Astronomy, Extragalactic
Astronomy |
| ALLEN V. R. SCHIANO | (46) | Theoretical Astrophysics, Computational
Physics |

Research Professors

- | | | |
|----------------|------|---|
| WEI-KAN CHU | (35) | Particle-Solid Interaction, Ion-Beam
Microanalysis, Microelectronics
Processing |
| MAX L. SWANSON | (42) | Defect Solid State Physics |

Adjunct Assistant Professors

- | | | |
|----------------|------|---|
| ROY H. PROPST | (39) | Applications of Hybrid Microelectronics |
| LEE T. SHAPIRO | (43) | Planetariums, Science Education |

Professors Emeriti

WAYNE A. BOWERS
 MORRIS S. DAVIS
 WALDO E. HAISLEY
 EVERETT D. PALMATIER
 LOUIS D. ROBERTS
 PAUL E. SHEARIN
 CHARLES S. SMITH, JR.
 JOSEPH W. STRALEY

The Department of Physics and Astronomy offers graduate work leading to the degrees of Master of Science and Doctor of Philosophy.

The active fields of research are condensed-matter physics, microelectronics, atomic, molecular, and nuclear physics, quantum field theory, theoretical particle physics, general relativity and gravitation, stellar astronomy and astrophysics. The chemical physics program combines courses from chemistry and physics with research in either department. The graduate courses are designed to give a broad foundation and to introduce the student to the special fields in which the research interests of the Department lie.

The general regulations of the Graduate School govern the work for the degrees of Master of Science and Doctor of Philosophy. To begin a graduate program in physics, the student should have completed the requirements for the degree of Bachelor of Science with a major in physics at the University, or their equivalent elsewhere. The minimum prerequisite for graduate study consists of the basic undergraduate courses Physics 26, 27, 28, 28L; 103, 104; 105, 106, 107, 108; together with Mathematics 32, 33, and 124. In the first spring as a graduate student in physics at UNC a student who

has not passed a similar examination elsewhere must take the Qualifying Examination, which covers the content of first year course work and includes a review of undergraduate physics. This examination serves as a comprehensive examination for the M.S. degree and/or a qualifying examination for the Ph.D. degree. A Ph.D. candidate must also take the Ph.D. Written Examination within the first three years of graduate study in physics at UNC. This examination, offered each spring, is based upon the graduate student's course work.

The M.S. degree in Physics may be taken with or without thesis. If one chooses not to do a thesis, then one must complete one semester of Advanced Laboratory (Physics 201 or 202) and do three to six hours of Research (Physics 301) under the supervision of a graduate faculty member and report on this activity. A minor is not required for the M.S. degree, but one may be chosen in accord with the regular graduate requirements for this option. The equivalent of one semester teaching experience is required of all M.S. degree candidates.

The requirements for a Ph.D. in Physics are: (a) A student must pass the following courses in the Department, or have passed their equivalents elsewhere as an undergraduate or graduate student: 161, 169, 191-192, 203, 204-205, 221, and 260-261; (b) in order to acquire some familiarity with experimental physics, a student must pass one semester of the Advanced Laboratory, Physics 201-202; or pass one of the electronics courses Physics 141 or 101-102; or earn an M.S. degree which involves experimental research, whether or not a thesis is written; or perform other experimental research judged adequate by the Director of Graduate Studies; and (c) a student must pass at least three other graduate level courses appropriate to his field of specialization. A minor is not required, but may be elected, in which case requirement (c) above is replaced by the requirement that the student pass at least five graduate level courses selected from no more than two departments, with no fewer than two courses in either department. The minor program must be approved in advanced by the minor department. Teaching experience, as part of professional training, is required of all doctoral candidates through laboratory or lecture instruction as a half-time teaching assistant for two semesters, or until teaching competence is acquired.

Research Interests

Astronomy and Astrophysics. Spectroscopic and photometric observations are made with 38-cm and 60-cm reflector telescopes and at national and international optical and radio astronomy observatories. Research includes radio and x-ray astronomy, study of globular clusters and metallicity of stars.

Atomic, Molecular, and Chemical Physics. Theoretical and experimental areas include magnetic resonance and relaxation, properties of solids and

surfaces, excited states of molecules, charge transport in solids and fluids. The chemical physics program involves collaboration with the Department of Chemistry.

Condensed-Matter Physics. Research activities include experiments on NMR in solids, Mössbauer studies of crystals and alloys, the mechanism of photography, lattice dynamics, defects and radiation damage of crystals, and ion beam analysis, ion implantation, superlattices, and the theory of molecular properties at solid surfaces, and amorphous materials. A basic research program supports the new Microelectronics Center of North Carolina at nearby Research Triangle Park.

Field Theory, Particle Physics, Gravitation and Relativity. Gauge field theories, quantum chromodynamics, electroweak theory, grand unified theories, supersymmetry, supergravity, Cauchy problem of general relativity, gravitational radiation, and the classical and quantal structure of gravitational fields.

Nuclear and Accelerator-Based Atomic Physics. Experimental nuclear and atomic physics is carried out using spin-polarized protons, neutrons and deuterons, heavy ions, x-rays, gamma rays, and a cryogenic polarized target. Experimental and theoretical research emphasizes using polarized beams in nuclear interaction studies, and inner-shell ionization phenomena in ion-atom collisions.

Facilities and Equipment

Research in physics and astronomy is carried out in several laboratory facilities. In Phillips Hall, where the Department's offices are located, are research laboratories with an area of 3,000m², used mainly for atomic, molecular, and condensed-matter physics research. Equipment includes spectrometers covering x-rays to microwaves, an electron microscope, NMR, EPR, and ESR systems, Mössbauer spectrometers, high-pressure apparatus, lasers, cryogenic equipment, an intense gamma-ray source, crystal growth facilities, a 500KeV ion implantation machine, and a 2-MeV Van de Graaff accelerator. Two astronomy observatories, the Morehead Observatory on the UNC campus and the University Observatory south of Chapel Hill, have excellent facilities for photographic and photometric research, while the Morehead Planetarium may be used for special projects. Atomic and nuclear physics research is carried out at UNC and at Triangle Universities Nuclear Laboratory (TUNL) in Durham, a facility with three Van de Graaff accelerators and a cyclotron, operated in collaboration with Duke University and North Carolina State University. (For a more complete description see Research Institutes and Centers.)

Computing facilities include microprocessors and minicomputers within the Department, three minicomputers at TUNL, as well as terminals to the UNC Computation Center in Phillips Hall and to the network of Triangle Universities Computation Center 20 km from Chapel Hill.

Library facilities include the Alfred T. Brauer Library (mathematics, physics, statistics, computer science, and operations research) in Phillips Hall, which has 60,000 volumes and subscribes to 200 physics and astronomy journals, and access to 17 other libraries on the Chapel Hill campus having a total of over three million volumes.

Fellowships and Assistantships

Many teaching assistantships (with stipends beginning at \$7,425 for 9 months) are available to qualified graduate students. The duties of assistants include supervision of laboratory classes in elementary physics or astronomy, assisting in the supervision of advanced laboratories, and grading papers. Graduate School fellowships, including a microelectronics fellowship for first-year students, are available for well-qualified applicants to the Department's graduate program. Teaching assistants can usually be supported in the summer by teaching or research.

Research assistantships are also offered, especially to those who have completed a year or two of graduate work. The stipends range from \$9,333 to \$9,813 for the calendar year, depending on experience. Summer employment usually is available.

Application forms for admission, including graduate appointments, may be obtained from the Graduate Admissions Committee, Department of Physics and Astronomy, Phillips Hall 039A, The University of North Carolina at Chapel Hill, Chapel Hill, NC 27514, U.S.A. Application for fall admission should be made by February 1.

Courses for Graduates and Advanced Undergraduates

For courses with Staff indicated as instructor, the name following in parentheses is that of a professor who can advise on the course.

ASTRONOMY

- 117 COSMIC EVOLUTION¹ (3). Prerequisites, Mathematics 32 and Astronomy 31 or 33 (or permission). A course in stellar and planetary astrophysics with emphasis on astronomical conditions for the development and sustenance of life. *Fall or spring*. Carney; staff.
- 119 MODERN COSMOLOGY¹ (3). Prerequisites, Mathematics 32, Physics 19 and Astronomy 31 or 33 (or permission). A study of the large scale structure of the Universe as determined from modern observational techniques followed by a discussion of modern theories for the evolution of the Universe. *Fall or spring*. Christiansen; staff.
- 131 INTRODUCTION TO CELESTIAL MECHANICS (3). Prerequisites, Physics 26 and Mathematics 31 and 32, or permission of the instructor. The differential equations and their integrals in the two-body problem. Computation of orbits. The three-body problem. Perturbation theory. Satellite theory. *Fall or spring*. Davis.
- 137 OBSERVATIONAL ASTRONOMY (4). Prerequisites, Astronomy 31 or 32, or permission of instructor. A course designed to familiarize the student with observational

1. Astronomy 117 and 119 are not to be taken for graduate credit by graduate students in Physics and Astronomy.

- techniques in optical and radio astronomy, including application of photography, spectroscopy, photometry, and radio methods. Three lecture and three laboratory hours a week. *Fall or spring*. Rose, staff. (Laboratory fee required.)
- 184 RADIATIVE PROCESSES IN ASTROPHYSICS (3). Prerequisites, Physics 28 and Physics 105 (or permission). Radiative transfer, opacities, curve of growth analysis, line profiles, stellar and nebular abundance determinations. *Spring (alternate years)*. Christiansen.
- 185 RADIO ASTROPHYSICS (3). Prerequisites, Physics 107; corequisite Physics 105 (or permission). Physical basis of Radio Astronomy, interstellar and intergalactic media, gas and plasma dynamics, physics of shock waves, synchrotron radiation and relativistic particle acceleration. *Fall (alternate years)*. Christiansen.
- 186 STELLAR STRUCTURE AND EVOLUTION (3). Prerequisites, Physics 28, Physics 105 and Physics 161 (or permission). Stellar interiors, stellar evolution, nucleosynthesis, and the physics of degenerate stars. *Spring (alternate years)*. Carney.
- 187 GALACTIC STRUCTURE (3). Prerequisites, Physics 103 and Astronomy 31 or 33 (or permission). Stellar and gas distributions and dynamics within the Milky Way Galaxy; theories of large-scale galactic structure and evolution. *Fall (alternate years)*. Carney.
- 188 EXTRAGALACTIC ASTRONOMY (3). Prerequisites, Physics 19, Physics 103 and Astronomy 31 or 33 (or permission). Clusters and superclusters of galaxies, voids, expansion of the universe, model cosmologies, microwave background and observational tests. *Fall (alternate years)*. Christiansen.
- 350 SEMINAR IN ASTROPHYSICS (1 or more). Recent observational and theoretical developments in stellar, galactic, and extragalactic astrophysics. *Fall and spring*. Carney and Christiansen.

PHYSICS

- 101 INTRODUCTORY ELECTRONICS I (3). Prerequisites, introductory physics and Mathematics 31, or permission of the instructor. This course is designed to give students a sound working knowledge of basic electronic principles. Physics 101 and 141 may not both be taken for credit. *Three lecture and three laboratory hours a week, fall*. (Laboratory fee required.) Propst.
- 102 INTRODUCTORY ELECTRONICS II (4). Prerequisite, Physics 101 or permission of the instructor. Digital electronics including Boolean algebra, logic gates, flip-flops, counters, storage registers, ADC's, DAC's and applications. An introduction to micro-processors. *Three lecture and three laboratory hours a week, spring*. (Fee required.) Propst.
- 103 MECHANICS I' (3). Prerequisites, Physics 26 (or permission) and Mathematics 33. Particle kinematics. Central forces, planetary motion. Systems of particles and conservation laws. Statics. Motion of rigid bodies. Constrained motion. Wave motion on a string. *Spring*. Staff. Hubbard.
- 104 MECHANICS II' (3). Prerequisite, Physics 103. Deformable bodies and wave motion Lagrange's and Hamilton's equations, Euler's equations, small oscillations, normal coordinates. *Fall*. Hubbard.
- 105 HEAT AND THERMODYNAMICS (3). Prerequisite, Physics 27 (or 25 or 25c by permission) and Mathematics 33. Equilibrium statistical mechanics; the thermodynamics laws, internal energy, enthalpy, entropy, thermodynamic potentials. Maxwell equations. *Fall*. Slifkin, staff.
- 106 OPTICS (3). Prerequisites, Physics 107 and 108 (or 58 by permission). Elements of geometrical optics. Huyghens' principle, interference, diffraction, and polarization.

- Elements of the electromagnetic theory of light; Fresnel's equations, dispersion, absorption and scattering. Photons. Lasers and quantum optics. *Spring*. Merzbacher.
- 107 ELECTRICITY AND MAGNETISM¹ (3 each). Prerequisites, Physics 27 and Mathematics 34 (or permission). Brief treatment of DC and AC circuit theory. Electrostatics; dielectrics; the magnetic field; magnetic materials. Maxwell's equations and their application to electromagnetic waves. *Fall and spring*. Hooke, Schneider.
- 108
- 113 SPACE AND TIME IN PHYSICS AND PHILOSOPHY¹ (Philosophy 121) (3). Contingent and necessary properties of space and time. The direction and flow of time. Fatalism. Effects preceding their causes. *Spring*. Van Dam, staff.
- 115 THE EVOLUTION OF PHYSICAL IDEAS IN THE TWENTIETH CENTURY¹ (3). Prerequisites, Physics 25 and Mathematics 30 (or permission). The most important physical ideas and phenomena, discovered in the twentieth century, are studied by reading original papers or excerpts (in translation). These works are put in historical perspective. *Spring*. Staff. (Shafroth).
- 140 PHYSICS OF SOLID STATE ELECTRONIC DEVICES (3). Prerequisite, Physics 25C or 27. Corequisite or prerequisite, Physics 58 or 107. Properties of crystal lattices, electrons in energy bands, behavior of majority and minority charge carriers, p-n junctions related to the structure and function of semiconductor diodes, transistors, display devices. *Fall*. Silver.
- 141 ELECTRONICS (4). Prerequisites, Physics 27 (or 58), Mathematics 34. Basic electronics with emphasis on circuitry. DC and AC circuits, diodes and application, transistors, amplifiers, wave form generators, operational amplifiers, digital electronics, transmission lines. Physics 101 and 141 may not both be taken for credit. *Three lecture and three laboratory hours a week, spring*. Kessemeyer; staff. (Fee required).
- 142 INTERMEDIATE LABORATORY I AND II (2 each). Prerequisite, Physics 141 or permission. Selected experiments illustrating modern techniques such as the use of laser technology to study the interaction of electromagnetic fields and matter. *Six laboratory hours a week, fall and spring*. Briscoe; staff. (Fee required).
- 143
- 144 CHEMISTRY AND PHYSICS OF ELECTRONIC MATERIALS PROCESSING (Chemistry 192) (3). Prerequisite, Chemistry 182 or Physics 25C or 27 and permission of the instructor. A survey of materials processing and characterization used in fabricating microelectronic devices. Crystal growth, thin film deposition and etching, and microlithography. *Spring*. Chu.
- 148 MATERIALS LABORATORY I (2). Corequisite, Chemistry 190. Structure determination and measurement of the optical, electrical, and magnetic properties of solids. *Fall*. Briscoe, McNeil, Propst, Smith.
- 149 MATERIALS LABORATORY II (2). Prerequisite, Physics 148. Continuation of Physics 148 with emphasis on low- and high-temperature behavior, the physical and chemical behavior of lattice imperfections and amorphous materials, and the nature of radiation damage. *Spring*. Propst.
- 151 FLUID DYNAMICS (Marine Sciences 151) (3). Prerequisite, Physics 103 or permission. The physical properties of fluids, kinematics, governing equations, viscous incompressible flow, vorticity dynamics, boundary layers, irrotational incompressible flow. *Fall*. Bane.
- 160 INTRODUCTION TO QUANTUM MECHANICS (3). Prerequisites, Physics 103 or 108, or permission. Origins of quantum theory. Uncertainty principle. Schroedinger equation for simple systems, including hydrogen atom. Perturbation theory. *Fall*. Miller; staff.
- 161 NUCLEAR PHYSICS (3). Prerequisites, Physics 160 or equivalent. Nuclear structure, nuclear reactions, experimental techniques of producing and studying nuclear particles; models of the nucleus; nuclear forces. *Spring*. Staff. (Ludwig).

1. Physics 103-104 and 107-115 are not to be taken for graduate credit by graduate students in physics.

- 163 APPLICATION OF QUANTUM MECHANICS (3). Prerequisites, Physics 160, Emphasizes atomic physics but includes topics from nuclear, solid state and particle physics, such as energy levels, the periodic system, selection rules, and fundamentals of spectroscopy. *Spring*. Staff. Bowers.
- 169 INTRODUCTORY SOLID STATE PHYSICS (3). Prerequisite, Physics 160 or equivalent. Crystal symmetry, types of crystalline solids; electron and mechanical waves in crystals, electrical and magnetic properties of solids, semiconductors; low temperature phenomena; imperfections in nearly perfect crystals. *Fall*. Macdonald.
- 181 ADVANCED LABORATORY (3 each). Prerequisites, Physics 103, 108, or permission. 182 *Six laboratory hours a week, fall and spring*. Staff. (Kessemeyer). (Fee required).
- 191 MATHEMATICAL METHODS OF THEORETICAL PHYSICS I (3). Prerequisites, Physics 28, or equivalent; Mathematics 34. Vector fields, curvilinear coordinates, functions of complex variables, linear differential equations of second order, Fourier series, integral transforms, delta sequence. *Fall*. Choi; staff.
- 192 MATHEMATICAL METHODS OF THEORETICAL PHYSICS II (3). Prerequisite, Physics 191 or permission. Partial differential equations, special functions, Green functions, variational methods, traveling waves and scattering. *Spring*. Hubbard; staff.
- 193 SCIENTIFIC PROGRAMMING (Computer Science 112) (3). Prerequisites, mathematics 128 or 129, or Physics 191 or 192; elementary FORTRAN, PL/1 or Pascal programming. Structured programming in FORTRAN or Pascal; use of secondary storage and program packages; numerical methods for advanced problems, error propagation and computational efficiency; symbolic mathematics by computer. *Spring*. Thompson.

Courses for Graduates

- 201 ADVANCED LABORATORY (3 each). Prerequisites, Physics 103, 108, or by permission. 202 Experimental projects with research groups, or individual projects in atomic and sub-atomic physics. *Six laboratory hours a week, fall and spring*. Staff. (Kessemeyer).
- 203 CLASSICAL DYNAMICS (3). Prerequisite, advanced undergraduate mechanics. Variational principles, Lagrangian and Hamiltonian mechanics. Symmetries and conservation laws. Two-body problems, perturbations, and small oscillations, rigid-body motion. Relation of classical to quantum mechanics. *Fall*. Van Dam.
- 204 ELECTROMAGNETIC THEORY I (3). Prerequisites, Physics 191-192 or equivalent. Electrostatics, magnetostatics, time-varying fields, Maxwell's equations. *Fall*. Staff. Hubbard.
- 205 ELECTROMAGNETIC THEORY II (3). Prerequisites, Physics 204 or equivalent. Plane electromagnetic waves and wave propagation, wave guides and resonant cavities, simple radiating systems, scattering and diffraction, special theory of relativity, radiation by moving charges. *Spring*. Staff. (York).
- 221 STATISTICAL MECHANICS (3). Prerequisites, Physics 203 and 260. Classical and quantum statistical mechanics, ensembles, partition functions, ideal Fermi and Bose gases. *Spring*. Van Dam.
- 230 NUCLEAR PHYSICS (3 each). Prerequisites, Physics 161 and 260. Nuclear interactions 231 at non-relativistic energies. Charge and spin dependence in nuclear reactions. Decay modes and electromagnetic properties. Collective and single particle states. *Fall and spring, alternate years*. Thompson.
- 260 QUANTUM MECHANICS (3 each). Prerequisite, Physics 160 or equivalent. Nonrelativistic wave mechanics, spin, linear vector spaces in quantum mechanics, angular momentum, perturbation theory, scattering, identical particles. *Fall and spring*. Ng.
- 262 ADVANCED QUANTUM MECHANICS² (3). Prerequisite, Physics 261. Second quantization, applications to many-body problems. Hartree-Fock method, quasiparticles, Dirac theory of electron, elementary radiation theory, scattering. *Fall, alternate years*. Staff. Merzbacher.

- 263 FIELD THEORY² (3). Prerequisite, Physics 261. Dirac equation, free fields, Feynman rules, quantum electrodynamics. *Fall, alternate years.* Frampton.
- 264 THEORY OF PARTICLES AND FIELDS² (3). Prerequisites, Physics 262 or 263. Quantum electrodynamics, renormalization, dispersion relations, gauge theories. *Spring, alternate years.* Staff. (Frampton).
- 267 CURRENT ADVANCES IN PHYSICS (3). Prerequisite, by permission, In recent years, nuclear physics, elementary particle physics and coherence in quantum optics have been among the topics discussed. *Either semester, as announced.* Staff.
- 270 SOLID STATE PHYSICS (3 each). Prerequisite, Physics 160 or equivalent. Topics considered include those of Physics 169, but at a more advanced level, and in addition a detailed discussion of the interaction of waves (electromagnetic, elastic, and electron waves) with periodic structures; e.g., X-ray diffraction, phonons, band theory of metals and semiconductors. *Fall and spring.* Hernandez.
- 272 THEORY OF THE SOLID STATE (3). Prerequisite, Physics 261. Calculation of one-electron energy band structure. Electron-hole correlation effect and excitons. Theory of spin waves. Many-body techniques in solid state problems including theory of superconductivity. *As announced.* Dy.
- 274 SPECIAL THEORY OF RELATIVITY (3). Prerequisites, Physics 203, 204. The elements of special relativity will be applied to a number of problems, both conceptual and practical, including many of the "paradoxes" Tensor analysis, mechanics of continuous media, classical electrodynamics, relativistic thermodynamics. *Either semester, as announced.* York.
- 275 GENERAL THEORY OF RELATIVITY (3). Prerequisite, Physics 274 or permission of the instructor. Differential geometry of space-time. Tensor fields and forms. Curvature, geodesics. Einstein's gravitational field equations. Tests of Einstein's theory. Applications to astrophysics and cosmology. *Either semester, as announced.* York.
- 288 PRINCIPLES OF CHEMICAL PHYSICS (Chemistry 288, 289) (3 each). Prerequisite, 289 Physics 160 or Chemistry 281 or permission of the instructor. The quantum mechanics of molecules and their aggregates. Atomic orbitals, Hartree-Fock methods for atoms and molecules. Special topics of interest to the instructor and research students. *As announced.* (Choi).
- 290 PRINCIPLES OF MAGNETIC RESONANCE (3). Prerequisite, Physics 260, or Chemistry 281, or permission of the instructor. *Either semester, as announced.* Kesemeier.
- 291 GROUP THEORY AND ITS APPLICATIONS (3). Prerequisites, knowledge of matrices, mechanics, and quantum mechanics. Discrete and continuous groups. Representation theory. Application to atomic, molecular, solid state, nuclear and particle physics. *As announced.* Van Dam.

Research Courses

- 301 RESEARCH (3 or more). *Ten or more laboratory or computation hours a week, fall and spring.* Staff.
- 310 SEMINAR IN THEORETICAL PHYSICS (1 or more). Topics from current theoretical research including, but not restricted to, field theory, particle physics, gravitation, and relativity. *Fall and spring.* York.
- 360 SEMINAR IN NUCLEAR PHYSICS (1 or more). Current research topics in low-energy nuclear physics, especially as related to the interests of Triangle Universities Nuclear Laboratory. *Fall and spring.* Staff. (Ludwig).
- 364 SEMINAR IN ATOMIC AND MOLECULAR PHYSICS (1 or more). Experimental and theoretical topics in atomic collision physics, chemical physics, molecular states, and surface properties. *Fall and spring.* Staff. (Shafroth).

2. The Physics 262 and Physics 380 sequence alternates with Physics 263-274.

- 370 SEMINAR IN SOLID STATE PHYSICS (1 or more). Research topics in condensed matter physics, with emphasis on current experimental and theoretical studies. *Fall and spring*. Staff. Hernandez.
- 380 SEMINAR IN PARTICLE PHYSICS² (1 or more). Symmetries, gauge theories, asymptotic freedom, unified theories of weak and electromagnetic interactions, and recent developments in field theory. *Fall and spring*. Staff. Frampton.
- 393 MASTER'S THESIS (3 or more). *Either semester*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Either semester*. Staff.
- 400 GENERAL REGISTRATION (0).

2. The Physics 262 and Physics 380 sequence alternates with Physics 263-274.

DEPARTMENT OF PHYSIOLOGY

EDWARD R. PERL, *Chairman*

Professors

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|------------------------|------|--|
| WILLIAM J. ARENDSHORST | (25) | Renal Physiology and Pathophysiology; Micropuncture Techniques; Neurohumoral Control of Renal Function; Hypertension |
| FREDERIC L. ELDRIDGE | (4) | Respiratory Disease; Respiratory Physiology; Neurophysiology of Respiration |
| PAUL B. FAREL | (5) | Development and Regeneration of Spinal Neurons; Motor System Development |
| ROBERT G. FAUST | (6) | Mechanisms of Membrane Transport |
| ARTHUR L. FINN | (35) | Cellular Electrophysiology and Volume Regulation in Isolated Epithelia; Molecular Mechanisms |
| CARL W. GOTTSCHALK | (8) | Renal Physiology and Pathophysiology; Micropuncture Techniques; Neural Control of Renal Function |
| DAVID L. MCILWAIN | (14) | Chemistry of Spinal Motoneurons |
| GERHARD W. D. MEISSNER | (26) | Sarcoplasmic Reticulum Function |
| EDWARD R. PERL | (18) | Somatosensory Physiology; Neural Mechanisms of Pain; Synaptic Mediators |
| JOSEPH H. PERLMUTT | (19) | Endocrine and Renal Physiology |
| ALDO RUSTIONI | (30) | Somatosensory System; Connections, Neurotransmitters and Interneuronal Integration |
| ANN E. STUART | (41) | Vision; Synaptic Transmission; Cellular Mechanisms of Information Processing |
| BARRY L. WHITSEL | (23) | Somatosensory Neurophysiology, Neuropharmacology and Psychophysics |
| LLOYD R. YONCE | (24) | Cardiovascular Physiology |

Associate Professors

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|----------------------|------|--|
| JOHN A. CIDLOWSKI | (48) | Molecular Endocrinology: Mechanisms of Steroid Hormone Action |
| RICHARD L. GLASSER | (7) | Cerebral Hemispheric Laterality of Function; Neural Control of Respiration |
| ENID R. KAFER | (9) | Respiratory Physiology |
| GEORGE M. LANGFORD | (44) | Structure and Function of Neuronal Microtubules and the Cytoplasmic Matrix |
| LAWRENCE M. MARSHALL | (45) | Neurophysiology and Ultrastructure of Developing Synapses |

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|-------------------|------|---|
| DAVID E. MILLHORN | (46) | Central Neural Control of Respiration; Localization and Release of Neurotransmitters and Peptides in Brainstem; Neuroendocrine Influences on Homeostatic Regulation |
| GERRY S. OXFORD | (36) | Biophysics and Physiology of Excitable Cell Membranes Related to Neural and Endocrine Function |
| ROBERT W. SEALOCK | (32) | Cell Biology of the Cholinergic Postsynaptic Membrane; Cryotechniques in Electron Microscopy |

Assistant Professors

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|-----------------|------|---|
| JAMES E. FABER | (49) | Regulation of Microcirculation and Vascular Smooth Muscle; Autonomic Circulatory Control |
| ALAN R. LIGHT | (52) | Somatosensory Physiology; Immunocytochemistry of Spinal Sensory Neurons |
| PAULINE K. LUND | (50) | Gastrointestinal Peptides: Use of Recombinant DNA Technology to Investigate Their Precursors and Regulation of Biosynthesis |
| ALAN L. WILLARD | (54) | Peptide-containing Neurons; Development in Cell Culture |

Research Associate Professors

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|------------------|------|---|
| MARCO CONTI | (56) | Mechanism of Action of Peptide Hormones; Signal Transduction and Second Messengers |
| C. WILLIAM DAVIS | (51) | Electrophysiological and Optical Studies of the Control of Cell Membrane Permeability |
| NICHOLAS G. MOSS | (55) | Renal Physiology; Neurophysiology; Micropuncture Techniques |

Adjunct Professor

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|-----------------|------|--|
| JAMES N. WEAKLY | (22) | Synaptic Transmission; Trophic Interactions between Nerve and Muscle |
|-----------------|------|--|

Adjunct Associate Professor

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|-------------|-----|--------------------|
| JOHN C. DAW | (3) | Cardiac Metabolism |
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Lecturer

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|--------------------|------|---|
| JOSEPH J. CAPOWSKI | (53) | Computer Analysis of Neuronal Morphology; Computer Design |
|--------------------|------|---|

Professors Emeriti

- JOHN H. FERGUSON
 ESZTER B. KOKAS
 AUGUSTUS T. MILLER, JR.

Physiology is the study of the physical and chemical factors and processes underlying the functions of living cells and organs. Research in physiology involves applying tools from the physical, chemical, and mathematical sciences to the identification of the mechanisms, interactions and means whereby functions are regulated, at subcellular to organismic levels of complexity.

The curriculum. The Department offers a program of graduate study leading to the Ph.D. degree. The primary purpose of the program is to foster and develop the desire and capability for sound scientific research and the capacity for teaching others. This is accomplished through course work; teaching; seminars; interaction with faculty and students, which provides support and learning; and most importantly, through the rigorous thesis research undertaken by the student under the direction of his or her adviser.

In the first year of study, students serve rotations in the laboratories of departmental faculty in addition to taking courses. Students are urged to choose a thesis adviser by the end of the first year and to begin doctoral research soon thereafter. Written and oral comprehensive preliminary examinations are usually taken within the second year after the required courses in physiology, biochemistry, biostatistics, and advanced mathematics or computer science have been taken. Students may be exempted from selected required courses if they have demonstrated to the satisfaction of the Graduate Committee an equivalent background in other courses or by working experience. A specialty examination (written or oral) and a dissertation proposal are usually completed during the third year of study. Four or five years are usually required to complete the program. Special arrangements will be made for M.D./Ph.D., or D.D.S./Ph.D. students.

The Department offers the master's degree only as a terminal degree in unusual circumstances.

Facilities. The Department has several central facilities (computer, electron microscope and histology facilities, and machine and electronics shops), and individual laboratories are fully equipped with modern research equipment, usually including laboratory computers. Researchers in the Department frequently work with members of the Departments of Biochemistry, Anatomy, Microbiology, Pharmacology, and Medicine, and with the Neurobiology Program.

Financial aid. As a rule, the Department offers stipends to all of its students. Competitive University fellowships are available for qualified candidates, and students are encouraged to apply for National Science Foundation and other predoctoral fellowships.

Requirements for admission. Applicants should hold or expect to receive the bachelor's degree in any of the natural sciences. Applications are welcome at any time of the year, but must be received by February 1 to be considered for University fellowships.

Courses for Graduate and Professional Students

- 102 INTRODUCTION TO MAMMALIAN PHYSIOLOGY (Physical Therapy 102) (5). Prerequisite, permission of the instructor. A general course in vertebrate physiology with emphasis on morphological and functional correlations suitable for graduate students with a biology and chemistry background. *Fall*. Staff.
- 111 BIOMEDICAL INSTRUMENTATION I (Biomedical Engineering-Biomedical Mathematics 111) (3). Prerequisites, Physics 101 or equivalent, Physics 102 corequisite, and permission of the instructor. Topics include analysis of medical instrumentation with emphasis on pressure, flow, bioelectric, and ultrasonic transducers. This course includes a laboratory and interfacing microprocessors with transducers. Students are given the opportunity to design and fabricate original devices. *Spring*. Hsiao, Buchanan.
- 140 CELL AND ORGAN SYSTEM PHYSIOLOGY (Neurobiology 140) (5). Prerequisite, permission of the instructor. Principles of cell and organ system physiology suitable for students with a biology and chemistry background. *Fall*. Sealock; staff.
- 190 TEACHING OF PHYSIOLOGY (1). Prerequisite, permission of the instructor. Instruction in techniques of lecturing. Includes delivery of formal, coached lectures on topics in physiology. *Fall and spring*. Millhorn; staff.
- 200 HUMAN PHYSIOLOGY (5). Prerequisite, permission of the course director. A special segment (for physiology graduate students only) of the course for medical students. The course provides a general consideration of cell function and of systemic physiology. *Four lecture and two laboratory hours a week*. *Spring*. Millhorn; staff.
- 201 NEUROBIOLOGY (3). Prerequisite, permission of the course director. A special segment (for physiology graduate students only) of the Neurobiology Course for medical students. Structural and functional organization is analyzed at the level of the cell membrane, the neuron and integrated neuronal systems. *Spring*. Oxford; staff.
- 202 ADVANCED CELLULAR PHYSIOLOGY (4). Prerequisites, Physiology 140 or equivalent and permission of the course director. Selected topics in cellular physiology, which may include membrane transport, cell volume regulation, the cytoplasmic matrix, molecular endocrinology and gene expression, covered in depth through lectures, seminars and demonstrations. *Spring*. Lund; staff.
- 203 INTEGRATED SYSTEMS PHYSIOLOGY (4). Prerequisites, Physiology 140 or equivalent and permission of the course director. Selected topics in organ systems physiology which may include cardiovascular, renal, respiratory, endocrine and gastrointestinal physiology, covered in depth through lectures, seminars and demonstrations. *Spring*. Arendshorst; staff.
- 204 ADVANCED NEUROPHYSIOLOGY (Neurobiology 200) (4). Prerequisites, Physiology 140, working knowledge of mammalian neuroanatomy and permission of the course director. A course designed to provide detailed analysis of selected areas of neurophysiology such as synaptic transmission, sensory and motor systems, and higher integrative mechanism. *Three lecture and two laboratory hours a week*. *Fall*. Marshall; staff.
- 211 SPECIAL TOPICS IN PHYSIOLOGY (Neurobiology 211) (3-5). Prerequisite, permission of the instructor. Individually arranged in-depth programs of study of selected topics such as membrane function, transport physiology, renal physiology, etc. *Fall*. Staff.
- 212 SPECIAL TOPICS IN PHYSIOLOGY (Neurobiology 212) (3-5). Prerequisite, permission of the instructor. Individually arranged in-depth programs of study of selected topics such as membrane function, transport physiology, renal physiology, etc. *Spring*. Staff.
- 217 THE COMPUTER IN THE LABORATORY (3). Prerequisites, ability to program in a high level language and permission of the instructor. Computing hardware, operating systems and languages. Data collection and analysis, A/D conversion tech-

- niques, interfacing to laboratory instruments. Elementary waveform analysis. Computer control of experiments. Short programming exercises and semester project required. *Two lecture and two laboratory hours a week. Fall.* Capowski.
- 220 SEMINAR IN PHYSIOLOGY (1). Prerequisite, permission of the Departmental Director of Graduate Studies. Weekly seminars emphasizing current literature. *Fall.* Staff.
- 221 SEMINAR IN PHYSIOLOGY (1). Prerequisite, permission of the Departmental Director of Graduate Studies. Weekly seminars emphasizing current literature. *Spring.* Staff.
- 225 NEURAL INFORMATION PROCESSING (Biomedical Engineering-Biomedical Mathematics 221) (3). Prerequisites, Biomedical Engineering-Biomedical Mathematics 103 or equivalent, Math 128 or equivalent, and Physiology 140 or equivalent. This approaches the nervous system as a data processing network, the brain as the computer for a homeostat. *On request.* Coulter, Johnson.
- 227 CURRENT TOPICS IN PHYSIOLOGY (Biology 227) (3). Prerequisite, one introductory course in physiology. Lecture and seminar consideration of selected advanced aspects of physiology. Topics will vary from year to year, may be repeated for credit. *Spring.* Staff.
- 290 SEMINAR IN NEUROBIOLOGY (Biochemistry 290) (Neurobiology 290) (Pathology 290) (Pharmacology 290) (Psychology 290) (3). Prerequisite, permission of the Director of Training of the Neurobiology Curriculum. An intensive consideration of selected topics and problems. Participation required of Neurobiology Trainees. *Spring.* Faculty of the Neurobiology Curriculum.
- 301 RESEARCH IN PHYSIOLOGY (3-10) *Fall.* Staff.
- 302 RESEARCH IN PHYSIOLOGY (3-10). *Spring.* Staff.
- 303 RESEARCH IN PHYSIOLOGY (3-10). *Summer.* Staff.
- 310 RESEARCH IN NEUROBIOLOGY (Biochemistry 310) (Neurobiology 310) (Pathology 310) (Pharmacology 310) (Psychology 310) (Biology 302) (3-12). Prerequisite, permission of a staff member. Research in various aspects of neurobiology. *Six to twenty-four hours a week. Fall and spring.* Faculty of the Neurobiology Curriculum.
- 393 MASTER'S THESIS (3 or more). *Fall and spring.* Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring.* Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF POLITICAL SCIENCE

RICHARD J. RICHARDSON, *Chairman*

Professors

THAD BEYLE	(3)	State and Local, Policy Studies
CHI HSI-SHENG	(6)	East Asian Affairs, Comparative Politics, Contemporary China
WILLIAM KEECH	(16)	Theory and Practice of Representative Government
LEWIS LIPSITZ	(19)	Political Philosophy and Empirical Political Theory
DUNCAN MACRAE	(21)	Policy Analysis
GEORGE RABINOWITZ	(25)	Social Statistics and Dimensional Analysis
RICHARD J. RICHARDSON	(26)	Judicial Politics and Policy
ROBERT RUPEN	(27)	Soviet Government, Communism in Asia
LARS SCHOULTZ	(20)	Inter-American Relations, Latin American Politics
JOEL SCHWARTZ	(28)	Soviet Politics and American Social Policy
ANDREW SCOTT	(29)	International Relations and Foreign Policy
DONALD SEARING	(30)	British Politics, Political Psychology
GLENN SNYDER	(33)	International Relations Theory, History of International Relations, National Defense Policy
JURG STEINER	(31)	Comparative Politics
JAMES WHITE	(34)	Comparative Politics, Political Demography, East Asia-Japanese Politics
DEIL S. WRIGHT	(37)	Public Administration, Intergovernmental Relations, Organization Theory

Associate Professors

MERLE BLACK	(4)	Political Behavior in the South, State Government
PAMELA CONOVER	(10)	Political Psychology, Mass Political Behavior, Public Opinion, Voting Behavior
JACK DONNELLY	(44)	International Relations, Political Philosophy
MICHAEL LIENESCH	(38)	History of Political Thought, American Political Theory
DAVID LOWERY	(45)	Public Administration Policy Analysis
CATHARINE NEWBURY	(24)	African Politics; Comparative Politics
JEFFREY OBLER	(23)	Political Theory and Public Policy
ALAN STERN	(32)	Political Psychology, Comparative Politics
GORDON WHITAKER	(36)	Public Administration, Urban Politics, Policy Analysis

Assistant Professors

RUTH DE HOOG	(7)	Public Administration; Organization Theory and Behavior; State and Local Politics
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STEPHEN LEONARD	(15)	History of Political Thought, Recent and and Contemporary Political Theory, Critical Theory
STUART MACDONALD	(39)	Political Behavior, Quantitative Methods, Mathematical Physiology
GARY MARKS	(18)	Comparative Politics; Western Europe
TIMOTHY MCKEOWN	(22)	International Relations; International Political Economy
CHERYL MILLER	(8)	Policy Analysis, Public Administration, Political Feasibility, State and Local

Instructor

PATRICK BRUER	Law and Legal Process
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Professors Emeriti

LEE BOUNDS
 GORDON CLEVELAND
 ROBERT DALAND
 FEDERICO GIL
 DONALD HAYMAN
 S. SHEPARD JONES
 CHARLES B. ROBSON
 EARLE WALLACE

The Department of Political Science offers courses of study leading to the Master of Arts in Political Science, Master of Arts in Political Science with a certificate in Latin American Studies, and the Doctor of Philosophy in Political Science. The Department, with the collaboration of the Institute of Government, also offers a program of professional graduate study leading to the degree of Master of Public Administration.

Admission

The general prerequisite for admission to graduate study is a Bachelor of Arts degree or equivalent. A student is not required to have an undergraduate major in political science but will normally be expected to have had a minimum of nine semester hours of course work in political science.

All applicants for admission to graduate study are expected to have taken the Graduate Record Examinations. Prospective applicants should take these tests early enough to enable them to submit official reports of scores with their application for admission. In some cases decisions on admission of applicants may be withheld until test scores are provided. In considering applications for fellowship awards, these test scores are given heavy emphasis. Applicants are encouraged to have their applications complete by January 15. Applicants are also encouraged to submit a writing sample and a personal statement.

Graduate Study in Political Science

Departmental programs of graduate study are intended to train professional political scientists. Thus graduate work is expected to be qualitatively different from undergraduate work. Its emphasis is upon the acquisition of tools, skills, and knowledge at a level of qualifying the student to carry on research, to teach, to fill active political and administrative duties, and in other roles to carry on the profession of practicing political scientists.

All candidates for graduate degrees will be expected to achieve broad mastery at the professional level of the literature, problems and skills of the academic fields and subfields offered for the degree, and will have gained experience in teaching and research. Much more is required of the candidate than a mere compilation of credits in relevant courses.

At the doctoral level, preliminary examinations are both written and oral, in that order. Written examinations are given twice each year, in September and in the spring semester, that date to be determined prior to that semester. The final part of the examination is an oral defense of the dissertation proposal. Successful completion of these examinations permits a student to become a doctoral candidate. Following completion of the dissertation, a final oral examination will be held, which is primarily a defense of the dissertation but may include such excursions into underlying theory and related fields as are germane to the dissertation.

At the M.A. level (excluding specialized programs described below), the student is required, in addition to passing successfully the course programs, to write a thesis and to be examined orally on both the major field of interest and in defense of the thesis.

Field and Course Requirements

The political science curriculum is designed to insure that graduate students develop both a professional competence in the discipline as a whole and expertise in one major and two minor fields of political science. The courses in the Department are grouped under the following broad categories: International Relations, Comparative Politics, Political Philosophy, American Politics, Public Policy/Public Administration, and Methodology.

Ph.D. students are required to demonstrate competence in *three* fields of study and, by participating in the instructional program, to undergo training as teachers. One field of study may be in a related discipline of political science. A minimum of four courses *and* a comprehensive examination is required in the major field. In each of the two minor fields, a comprehensive examination *or* three courses will be required.

Master of Public Administration Degree Program

Program Overview. The University of North Carolina at Chapel Hill offers a two-year graduate program leading to the MPA degree. The aim of

the program is to provide professional education for careers of leadership in public service. The curriculum is flexible, providing concentrations in *Public Management* and *Public Policy Analysis*. Through elective courses, students may develop further specialization within each concentration. The MPA Program is offered by the Department of Political Science with the support of the Institute of Government and the Department of City and Regional Planning. The MPA Program is accredited by the National Association of Schools of Public Affairs and Administration.

The courses of study for the MPA provide preparation for careers in federal, state, and local government and in not-for-profit agencies. At the federal level, alumni from this program serve as administrators and analysts in many different agencies, including among others the Office of Management and Budget, the Environmental Protection Agency, the Department of Education, the Department of Health and Human Services, the Department of Labor, the Administrative Office of the Courts, and Senate and House Committee Staffs. In state governments, our MPA alumni direct departments and serve in middle management and staff positions in policy planning, finance and management, personnel, water resources, health services, education, and other areas. The Chapel Hill MPA Program has also produced many city and county managers, budget and finance directors, personnel directors, and other local government department heads and professional staff. In the not-for-profit sector, MPA alumni administer programs in the arts, in education, in economic development, and in human services.

The MPA Program has a long-standing commitment to public service education for women and members of historically underrepresented minority groups. Black and female graduates of our program now lead a variety of public agencies. Program faculty continue this commitment and especially encourage female and minority applicants.

Admission Requirements. The MPA Program is open to men and women from many differing backgrounds. A majority of past entrants into the program have had undergraduate majors in the social sciences, especially Political Science and Economics, but applicants have been accepted with undergraduate majors in Architecture, Business Administration, Engineering, English, History, and Industrial Relations, Music, and many other fields. Minorities have comprised substantial portions of each class.

Preference is given to the applicants with demonstrated and clear career interests in the public service. A significant part of each class comes directly from full-time employment. Others enter immediately after receiving undergraduate or graduate degrees. Admission to the program is highly selective because of the large number of applicants and the small size of the program. Undergraduates who are considering application are encouraged to take courses in American government and politics, economics, statistics, psychology, and accounting, although not all those areas are among the formal prerequisites for admission.

The requirements for admission are:

A bachelor's degree;

At least a "b" average in the undergraduate major and a generally strong academic record;

For the public management concentration, a minimum of three hours credit in American government and politics and a minimum of three hours credit in economics;

For the public policy analysis concentration, a minimum of three hours credit in probability and statistics (through multiple regression) and three semester hours credit in intermediate microeconomics;

Submission of verbal and quantitative scores on the Graduate Record Examinations;

An oral interview with the MPA Admissions Committee.

Admission to the program is made only for the fall semester (starting in August) of each year. Applications are normally accepted until April 1, but since nearly all admission decisions are made by late March, applications and all supporting materials should be submitted by January 22. The GRE should be taken in October or December. Application blanks may be requested from the Graduate School, 200 Bynum Hall. After a preliminary screening of applications, notifications are made concerning the oral interview. In most cases, letters of acceptance and financial awards will be sent by April 15.

Financial Aid. Financial aid is available for students with outstanding records. Also, nonresidents who have special skills as research assistants may qualify to pay in-state tuition. Loans are available on the student's own initiative from the Insured Student Loan Program. Information about this program is available from the Student Aid Office, 300 Vance Hall.

Several types of financial aid are available through the MPA Program:

MPA Alumni Association Scholarships;

John Gold Scholarship, granted annually by the North Carolina City and County Management Association;

Bob House Fellowship, granted to a person desiring a career in local government, provided by gifts in memory of Mr. House;

Howard Holly Scholarship, granted annually by the North Carolina Association of County Finance Officers;

Research Assistantships provided by the Institute of Government and the Department of Political Science.

Prospects for financial assistance are improved if applications are received early.

Course Work and Degree Requirements. A minimum of 45 semester hours of credit, an internship, a major paper, and a final oral examination are required for the MPA. All MPA students take a set of required "core" courses. Each student also completes additional requirements for either the public management or public policy analysis concentration.

Core courses are:

- 210 POLITICS AND ADMINISTRATION OF PUBLIC ORGANIZATIONS (3). Internal and external patterns, processes, and relationships of public organizations.
- 211 PUBLIC MANAGEMENT AND LEADERSHIP (3). Development of administrators' skills in working with others to accomplish organization goals.
- 212 STATISTICS FOR PUBLIC POLICY (3). The application of social science research to administrative problems, including practical problems, practical methods of gathering, analyzing, and interpreting data. Use of spreadsheet and database applications on microcomputers.
- 175 METHODS FOR POLICY ANALYSIS AND EVALUATION (3). Design, implementation, and interpretation of research to assess policy options and evaluate programs. Practice in microcomputer applications.
- 214 GOVERNMENT BUDGETING (3). The processes and politics used to allocate limited public resources; special attention given to diverse budgetary theories and techniques and to selected analytical methods of evaluation.
- 234 ADMINISTRATIVE WRITING (1). Development of clarity, brevity, and precision in writing.
- 217 INTERNSHIP SEMINAR (2). Understanding agency mission and culture, administrative procedures and communications, roles of line administrators and staff specialists while applying course work to field experiences.

The Public Management Concentration

In addition to the common core, each student concentrating in *Public Management* must complete:

- 105 PUBLIC PERSONNEL ADMINISTRATION (3). Concepts and skills for personnel administration in public agencies.
- 213 PUBLIC ADMINISTRATION AND POLICY MAKING (3). The role of the public manager in the design and implementation of public policy with attention to processes, techniques, and ethical dimensions of policy development, execution, and evaluation.
- 218 INTERNSHIP SEMINAR II (2). Public managers' internal and external responsibilities for the agency: leadership, supervision, delegation, programming, implementation, representation.
- 233 GOVERNMENTAL ACCOUNTING LAB (1). Principles and uses of fund accounting for public and not-for-profit agencies.
- 395 RESEARCH IN PUBLIC ADMINISTRATION (3). Analysis of a public policy or management problem.

Five elective courses (15 hrs.)

Professional Work Experience. The second year of the public management concentration extends MPA education into a work situation in a public agency for a period of at least nine months. This off-campus work experience with associated seminars is generally pursued after twelve consecutive months of full-time, on-campus study. Five or six seminars of two or three days each are conducted during the two-semester period. Through this series of discussions, lectures, and group experiences, students analyze and interpret their professional work in terms of previous courses and learn additional management concepts and skills. During this experience, degree candidates receive a full salary or stipend and are expected to work as regular profes-

sional members of a public service agency. Each student is responsible for securing his or her own position and performing professionally in it. The assistance of MPA faculty and staff is an important part of this process. The MPA Program provides information and referral for suitable positions and conducts seminars on resumé writing, interviewing, and other job search skills. Faculty remain in close contact with students and their supervisors during this period, conducting at least one visit to the work site.

The Public Policy Analysis Concentration

In addition to the common core (credit for the introductory statistics course will *not* count toward the required 45 hour minimum), each student concentrating in *Public Policy Analysis* must complete:

- 205 PUBLIC POLICY ANALYSIS (3). An introduction to the field.
- 235 VALUES AND ETHICAL PERSPECTIVES IN POLICY ANALYSIS (3). Understanding and clarifying the role of values in administrative and policy choices and officials' personal actions.
- 131 DECISION ANALYSIS (3). Quantitative techniques for analyzing choices.
- 225 PUBLIC SECTOR ECONOMICS (3). Economic theory applied to public policy problems; benefit-cost analysis.
- 110/ MACROECONOMICS AND PUBLIC POLICY (3). Use of economic theory to understand the motivations and rationales for and the effects of federal macropolicies.
- 233/ POLICY WORKSHOP (3). Design and execution of policy research for a public client.

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(Students who have not had intermediate microeconomics must also take an appropriate course in that subject, for no credit toward the 45 hour minimum.)

Four elective courses (12 semester hours)

Professional Work Experience. A three-month internship conducting policy analysis for a public agency is required of all students concentrating in public policy analysis. Typically, this is in the summer following the first nine months of full-time study on campus. A series of seminars helps students prepare for and learn from this work assignment. Whenever possible, the intern receives an appropriate salary or stipend. Each student is responsible for securing his or her own position and for professional performance of the work assignment. Faculty assist with placements and remain in close contact with interns and their supervisors during the internship.

Master of Arts Certificate Program in Latin American Studies

The increased participation of the United States in world politics has opened a variety of new careers in international affairs. Opportunities in national and international government service as well as in business and journalism are open to persons with a basic knowledge of the processes of international politics, and of the public affairs of specific world areas.

Often these careers require special competence in foreign languages, social science and history, public administration, or other subjects in addition to training in political science.

In order to provide training for a variety of careers in this field the Department offers programs leading to a Master of Arts in Political Science with a certificate in Latin American Studies.

Requirements for the Master of Arts in Political Science with the Certificate in Latin American Studies

The requirements are:

1. minimum of two (2) semesters of residence
2. twenty-seven (27) hours of coursework (including a minimum of twelve (12) in courses about Latin America)
3. three (3) hours of thesis in a topic related to Latin America
4. oral defense of the thesis
5. proficiency in Spanish or Portuguese.

The Louis Harris Data Center

National pollster Louis Harris has been surveying Americans' opinions on issues of national importance since the late 1950s. Harris surveys cover many topics, including national morale, the arts, energy policy, women's roles, political candidates, violence, health, housing, and so on. Because of the breadth and scope of the Harris surveys, they are a rich source for secondary analysis by social scientists. In addition, Harris data provide information about attitudes and opinions among many different social groups. Although most Harris surveys are cross-sectional, polls have also been conducted to tap the opinions of college students, political and business elites, Vietnam veterans, community residents, and many others.

In 1965, Louis Harris agreed to make his data available for secondary analysis by researchers. Mr. Harris and The University of North Carolina jointly agreed to establish at Chapel Hill The Louis Harris Data Center as the national archive for all Harris data. Since 1965, over 200 national, state, and community studies conducted by Louis Harris and Associates have been deposited at the Harris Data Center for use by researchers at the University of North Carolina and elsewhere.

The Department of Political Science and the Institute of Government

The Institute of Government is the University's principal agency to provide training, consulting and research services for state and local governments in North Carolina. As one of the oldest university-based governmental research and training organizations in the United States, the Institute has gained distinction for the high quality and diversity of its professional staff and for the comprehensive character of its program.

Recognizing their strong mutual interest in encouraging fuller understanding of and improvement in government and public administration in North Carolina, the Institute and the Department of Political Science work together in pursuing these ends. They collaborate for example in offering the professional training program leading to the Master of Public Administration degree. Several members of the Institute faculty regularly teach courses in this program. Institute staff members also carry major responsibility for placing and supervising MPA students during their internship assignments.

In addition, Institute staff members teach other courses for the Department of Political Science and from time to time serve on thesis and dissertation committees. On occasion, a political science faculty member or advanced graduate student joins the Institute staff on a part-time basis to pursue research important to the Institute program. Finally, political science graduate students regularly make use of the Institute's library collection of state and local government research materials and call upon Institute faculty for informal consultation and guidance in their research. In short, the Department of Political Science finds the professional staff, the program and the facilities provided by the Institute of Government a major resource supporting creative scholarly work in American government and public administration.

Publications

Under the direction of the departments involved, there is published *The James Sprunt Studies in History and Political Science*, established by the late Dr. James Sprunt, of Wilmington, North Carolina.

Courses for Graduates and Advanced Undergraduates

- 102 URBAN POLITICAL SYSTEMS (3). Characteristics, political processes, and actor behavior in urban political systems. *Spring*. Whitaker.
- 104 MUNICIPAL ADMINISTRATION IN THE UNITED STATES (3). An examination of the programs, processes, techniques, and problems of municipal government. Student committees do in-depth studies of departments in a North Carolina city. *Fall*. Jenne.
- 105 PUBLIC PERSONNEL ADMINISTRATION (3). A review of theory and practice of public personnel administration with an emphasis on the major current policy problems. *Fall*. Hayman.
- 110 POLITICS AND LITERATURE (3). Prerequisite: One political science course other than Political Science 41 or any literature course. Models of politics available in literature and literature as political activity. Draws from English and other literature in translation. *Spring*. Lienesch, Lipsitz.
- 117 POLITICAL ECONOMY: THE DOMESTIC SYSTEM (3). Problems of the national government in managing capitalist development and economic growth; political constraints, patterns of conflict among domestic actors. *Fall*.
- 119 POLITICS OF AUTHORITARIAN REGIMES (3). Comparative analysis of basic processes, strategies and structural features of contemporary authoritarian regimes. Student selects preferred region or country for concentrated study. *Fall*.

- 122 POLITICS AND SOCIETY IN THE U.S. AND THE SOVIET UNION (3). Prerequisite, Political Science 55 or equivalent, History 31, Economics 168, or Sociology 152. An examination of selected aspects of politics and society in the USA and USSR, focusing upon differences and similarities and their underlying causes. *Fall*. Schwartz.
- 124 COMMUNISM IN ASIA (3). This course deals primarily with Russian-Chinese relations but also analyzes the USSR in Asia and the borderlands of Sinkiang and Mongolia. *Fall*. Rupen.
- 127 GOVERNMENT AND POLITICS IN LATIN AMERICA (3). Prerequisite, Political Science 56 or permission of the instructor. The forms of organization, the functions, and the operations and dynamics of government in Latin America with emphasis on present conditions and trends. *Fall*.
- 128 EUROPEAN POLITICS (3). Deals with the major and some of the smaller European countries. Discussion of current events; theoretical work; partly in small groups. *Fall and spring*. Steiner.
- 130 SOUTHERN AFRICA IN CONFLICT (3). The problems of race, class and ideology are explored in the countries south of the Zambesi River along with the political and economic ties that bind these countries. *Spring*.
- 132 HEALTH SYSTEMS AND POLITICAL SYSTEMS (3). An examination of the impact of politics and ideology on the organization and delivery of medical care services in the U.S., Great Britain, and the U.S.S.R. *Spring*. Schwartz.
- 133 POLITICS OF MACROECONOMIC POLICY (3). The effects of political considerations on macroeconomic policymaking, and the effects of economic variables on voting and popular support for incumbents. *Fall or spring*. Keech.
- 134 NORTH CAROLINA POLITICS AND PUBLIC POLICY (3). An intensive study of politics, government and public policy in the State of North Carolina. Emphasis is placed on student research projects, with a major paper the main requirement. *Fall*. Beyle.
- 135 STATE POLITICS AND PUBLIC POLICY (3). The comparison of development and implementation of public policy in the states. Special emphasis is placed on the impact of the political process and intergovernment relations. *Spring*. Black.
- 136 SOUTH IN NATIONAL POLITICS (3). This course analyzes the important roles played by the South in national politics. Topics include the South in presidential elections and the roles played by southerners in the U.S. House and U.S. Senate. *Fall*. Black.
- 138 POWER, MORALITY, AND FOREIGN POLICY (3). To what extent can, and should, moral concerns be integrated into national foreign politics? An examination of theoretical alternatives as well as selected substantive issues (e.g., human rights, just war, food policy, development assistance). Donnelly.
- 139 EAST EUROPEAN COMMUNISM (History 189) (3). *Fall*. Anderle.
- 140 INTERNATIONAL POLITICAL ECONOMY (3). Prerequisite: Political Science 86 and Economics 10. Theories of international political economy; major trends in international economic relations; selected contemporary issues. *Fall*. McKeown.
- 141 THEORIES OF WAR AND PEACE (3). Theories of international relations, with emphasis on the role of force, causes of conflict and conditions of cooperation. Snyder.
- 142 QUANTITATIVE INTERNATIONAL RELATIONS (3). The use of quantitative theory, methods and data in analyzing international relations and forecasting conflict and cooperations. *Spring*. Staff.
- 143 CONTEMPORARY PROBLEMS OF SOVIET FOREIGN POLICY (3). General propositions about contemporary foreign relations of the USSR will be examined through analysis of selected case studies. *Spring*. Rupen.
- 144 AMERICAN FOREIGN POLICY: FORMULATION AND CONDUCT (3). This course focuses on the making of American foreign policy. It deals with the role of Congress, the press, public opinion, the President, the Secretary and the Department of

- State, the military, and the intelligence community. Emphasis is placed on the impact of the bureaucratic process on the content of foreign policy. *Fall and spring*. Scott.
- 145 CONTEMPORARY INTERNATIONAL RELATIONS OF THE UNITED STATES (3). A study of selected United States foreign policy problems since World War II; analysis of the process of policy formulation from Truman to Reagan; and of the impact of the external environment and domestic politics on the White House and Department of State. *Spring*. Staff.
- 146 INTERNATIONAL COMMUNICATIONS AND COMPARATIVE JOURNALISM (Journalism 146) (RTVMP 146) (3). *Fall, spring*. Cole.
- 147 CONTEMPORARY INTER-AMERICAN RELATIONS (3). Stresses new patterns of hemispheric international relations and foreign policies of individual Latin American nations; also such topics as transnational corporations, Third World relations, and specific problem areas involving the United States. *Spring*. Schoultz.
- 148 THE MIDDLE EAST IN WORLD POLITICS (3). A study of the contemporary international relations of the Middle East, including an analysis of country, regional, and global factors shaping the foreign relations of Middle East states and non-state actors. Emphasis on problems of war, diplomacy, and peace in the Arab-Israel and Persian Gulf areas since World War II. *Fall*. Staff.
- 149 DEFENSE POLICY AND NATIONAL SECURITY (3). A study of national defense policy as affected by the constitutional and political setting, as well as its relation to foreign policy. Some attention to strategic doctrine. *Fall and spring*. Rupen.
- 150 EUROPEAN FOREIGN POLICIES (3). Foreign policies of European countries towards each other, the superpowers, NATO, the European Community, and the developing countries. Snyder.
- 151 THE ADVERSARY SYSTEM OF CRIMINAL JUSTICE (ADJU 100) (3). Focuses upon the political, legal, and administrative problems encountered in the actual operation of the American System of Criminal Justice as affected by the adversarial nature of its processes. *Fall*. Staff.
- 152 LAW ENFORCEMENT IN A DEMOCRATIC SOCIETY (ADJU 102) (3). Deals with the development and current functioning of law enforcement agencies in the U.S., legal and practical issues involved in the exercise of police discretion, judicial supervision of law enforcement activities, policy community relations, the impact of technological change and research on law enforcement, contemporary practices and future possibilities respecting functional improvements on law enforcement. *Fall*. Staff.
- 153 CONSTITUTIONAL POLITICS AND THE JUDICIAL PROCESS (3). Analysis of the structure and functions of judicial systems emphasizing the organization, administration and politics of judicial bureaucracies and roles of judges, juries, counsel, litigants, and interest groups in adjudication process. *Fall*. Richardson.
- 154 THE JUDICIAL SYSTEM AND NATIONAL SECURITY (Cross-listed with PWAD 154) (3). Analysis of the critical role of the American judicial system in questions of national security with special attention to constraints of the powers of President, Congress, and security agencies. *Fall, alternate years*. Richardson.
- 155 THE CONSTITUTION OF THE UNITED STATES (History 175) (3). A study of the fundamental principles of constitutional interpretation and practice in the United States by means of lectures, textbooks, and cases. Emphasis will be on the political context surrounding and the impact following Supreme Court decisions. *Fall and spring*.
- 156 JUNIOR/SENIOR SEMINAR IN LAW AND JUSTICE (ADJU 104) (3). Advanced topics of varying focus, taught in seminar format for students who have completed appropriate background coursework. Permission of instructor is required. *Spring*. Staff.
- 157 CIVIL LIBERTIES UNDER THE CONSTITUTION (3). An analysis of the complex problems created by the expansion of protections for individual liberties in the United States. Emphasis will be on contemporary problems with some supplement involved in effecting changes in correctional administration. *Spring*.

- 158 THE PROBLEMS OF CHANGE IN CORRECTIONAL ADMINISTRATION (ADJU 103). An analysis of the political, legal, and administrative problems involved in effecting changes in correctional administration. *Spring*.
- 159 CRIMINAL LAW—DEVELOPMENT AND ADMINISTRATION (ADJU 101) (3). Analysis of problems in defining, invoking, and administering criminal law as a governmental process. *Spring*.
- 161 SOCIAL AND POLITICAL PHILOSOPHY (3). A study of selected topics and concepts in contemporary social and political philosophy, such as rights, liberty, obligation, the state, welfare, authority and power. *Fall or spring*. Donnelly, Obler.
- 162 AMERICAN POLITICAL THOUGHT (3). An historical and analytic examination of the ideas underlying the political culture and institutions of the United States. *Spring*. Lienesch.
- 163 MARXISM AND SOCIALISM (3). A consideration of the political thought of major Marxist and socialist schools, including Marxism, Leninism, contemporary Democratic and Revolutionary Socialism—with reference to Utopian socialism, and recent controversies on the left. *Fall*. Lipsitz.
- 164 FEMINISM AND POLITICAL THEORY (WMST 164) (3). Introduction to feminist theory and its implications for the study and practice of political theory. Topics: Women in feminist critiques of the western political tradition, schools of feminist political theory. *Fall*. Leonard.
- 165 PROBLEMS OF MODERN DEMOCRATIC THEORY (3). Major problem areas: definitions, presuppositions, and justifications of democracy, liberty, equality, minority rights, public interest, participation, dissent and civil disobedience. *Fall*. Keech.
- 166 RECENT AND CONTEMPORARY POLITICAL THOUGHT (3). Survey of the historical foundations, central tenets, and political consequences of prominent twentieth century political theories. Topics include: contemporary liberalism and Marxism, fascism, theories of development, populism, feminism. *Fall or spring*. Leonard.
- 168 RECENT DEVELOPMENTS IN POLITICAL PHILOSOPHY (3). A study of selected recent works of Continental or Anglo-American political theory by authors such as Rawls, Nozick, Walzer, Habermas and Gadamer. *Fall or spring*. Donnelly, Leonard.
- 169 THEORY AND PRACTICE OF REPRESENTATIVE GOVERNMENT (3). Theories of representative government with special emphasis on those derived from modern social choice theory. Keech.
- 170 U.S. NATIONAL ELECTIONS (3). Course studies U.S. Presidential and Congressional elections. Emphasis on individual vote, changing party strengths, and the relation of outcomes to policy. *Spring*. Rabinowitz.
- 171 RACE, POVERTY, AND POLITICS (Human Services Administration 171) (3). Definitions of poverty and their policy implications; the composition and causation of poverty; an examination of public policies directed at the alleviation, reduction, and elimination of poverty. *Spring*. Schwartz.
- 172 EXECUTIVE POLITICS (3). An examination of political roles and behavior of chief executives and their advisory networks, with emphasis on the American presidency. *Spring*. Staff.
- 173 GOVERNMENT AND THE ENVIRONMENT (3). Examines political implications of environmental problems; environmental policy making and implementation processes in the U.S., and management problems in selected policy areas such as population, energy, pollution, the ocean, land, hazardous waste, wilderness areas. *Fall*. Daland.
- 174 MASS MEDIA AND AMERICAN POLITICS (3). Prerequisites, junior/senior standing and Political Science 41. Examination of the role, behavior, and influence of the mass media in American politics. Staff.
- 175 METHODS FOR POLICY ANALYSIS AND EVALUATION (PUPA 175) (3). Introduction to selected techniques such as the following: multiple regression, decision theory, research design, social experiments and quasi-experiments, program evaluation, and policy-related models. *Spring*. Lowery, MacRae.

- 176 INTERNATIONAL LAW (3). The place of international law in the international political system; traditional substantive issues (e.g., recognition, laws of war, intervention); selected new issues; hypothetical cases/problems. Donnelly.
- 177 ADMINISTRATIVE LAW DEVELOPMENT AND APPLICATIONS (3). Prerequisite, Political Science 155. Analysis of problems in defining, invoking, and applying administrative law at the federal and state level; rulemaking, administrative adjudication and judicial review. *Spring*. Allred.
- 179 SCIENCE AND POLICY (Sociology 179) (PUPA 179) (3). The problems of using expert knowledge in democratic policy formation. These relate to communication within scientific disciplines; scientists' values; and the use of scientific information and personnel in decision making. *Fall and spring*. MacRae, Schroeer.
- 180 FORMAL MODELS OF POLITICAL SYSTEM (3). An introduction to the use of mathematical models for analyzing political behavior. *Fall and spring*. McKeown.
- 183 STATISTICS (3). Elementary descriptive statistics and basic principles of statistical inference including estimation and tests of hypotheses. *Fall*. Macdonald.
- 184 INTERMEDIATE STATISTICS (3). This course will extend the coverage of Political Science 183. Topics to be covered will include analysis of variance, multiple and partials correlation, and multiple regression. *Spring*. Rabinowitz.
- 185 CAUSAL ANALYSIS OF POLITICAL DATA (3). Prerequisite, Political Science 184 or equivalent. Use of regression and other techniques in political research. Special emphasis on attribution and its role in analysis of political data. *Fall*. Macdonald.
- 186 DIMENSIONAL ANALYSIS (3). Prerequisite, Political Science 184 or equivalent. Deals with methods used to scale political data, and the assumptions underlying their use. Topics include German scaling, difference scaling. *Spring*. Rabinowitz.
- 187 AGGREGATE AND TIME SERIES ANALYSIS (3). Prerequisites, Poli. 196 or permission of instructor. The course will extend the coverage of Poli. 186. Topics to be covered include problems of inference across levels in political research and the analysis of political data over time. *Spring*. (Alternate years.) Staff.
- 191 INTRODUCTION TO PUBLIC FINANCE (Economics 140) (3). Principles and practices of the budgetary activities of American governments—federal, state, and local. Students may not receive credit for both Econ 140 and 141. *Fall or spring*. Akin, Wilde.

Courses for Graduates

- 200 PRINCIPLES AND PROBLEMS OF POLITICAL INQUIRY (3). Prerequisite, permission of instructor. A consideration of the theory and process of political analysis including philosophy of science, research design, the methods of drawing casual inferences, and of generating and analyzing data. *Fall and spring*. White.
- 201 COMPARATIVE POLITICAL RESEARCH AND ANALYSIS (3). The seminar introduces the beginning graduate student to the central issues and major developments in the field of comparative government and politics. *Fall and spring*. Steiner, Searing.
- 202 THEORY AND METHOD IN INTERNATIONAL RELATIONS (3). Introduces beginning graduate students to the central issues and major developments in the field of international relations and foreign policy. *Fall and spring*. Scott, Snyder.
- 203 AMERICAN POLITICAL BEHAVIOR (3). Theoretical study of mass behavior (i.e., participation, voting, protest) in the American context. *Spring*. Staff.
- 204 AMERICAN POLITICAL INSTITUTIONS (3). Theory and practice of political institutions in the American context. *Fall*. Staff.
- 205 PUBLIC POLICY ANALYSIS (Sociology 205) (3). The roles of expertise in policy discourse; the place of values in policy analysis; summarizing preferences; benefits and costs; policy models; policy expertise and democratic political systems. *Fall*. MacRae.
- 206 INTERVIEWING IN SOCIAL SCIENCE RESEARCH (3). This seminar deals with the theoretical underpinnings and practical execution of interview techniques ranging

- from the short survey instrument to the adaptation of prolonged clinical interviews. Most of the work will emphasize different varieties of in-depth interviewing. *Fall*. Stern.
- 207 MEASUREMENT AND DATA COLLECTION (Sociology 207) (3). Provides an introduction to measurement theory and a review of various methods of data gathering. Gaining experience with a variety of techniques of measurement and preparing a pretested research proposal are required for all students. *Wiggins*.
- 209 PLANNING AND GOVERNMENT (City and Regional Planning 209) (3). A survey of nature and scope of government planning, its relation to other governmental activities, and its administrative and organizational problems. *Spring*. Howes, Beyle.
- 210 POLITICS AND ADMINISTRATION OF PUBLIC ORGANIZATIONS (3). Internal and external patterns, processes and relationships of public organizations. Generic and distinctively public-based models of the structure and functions of large-scale organizations. Accountability and responsiveness. *Fall*. DeHoog, Wright.
- 211 PUBLIC MANAGEMENT AND LEADERSHIP (3). Development of administrators' skills in working with others to accomplish organization goals. Conceptual and experimental modes of learning used to examine a variety of administrative behaviors. *Spring*. DeHoog.
- 212 STATISTICS FOR PUBLIC POLICY ANALYSIS (3). The application of social science research to administrative problems, including practical methods of gathering, analyzing and interpreting data. Theory and basic techniques underlying quantitative analysis of public programs. *Fall*. Lowery, Whitaker.
- 213 PUBLIC ADMINISTRATION AND POLICY MAKING (3). Public policy in terms of static and dynamic models of the process and a synthesis which attempts to resolve the two. Policy from the perspective of the policy maker; cases exploring the relation of theory to actual policy processes. *Summer*. Whitaker.
- 214 GOVERNMENT BUDGETING (3). The processes and politics used to allocate limited public resources; special attention given to diverse budgetary theories and techniques and to selected analytical methods of evaluation. Brief introduction to governmental accounting and work on a field problem whenever possible. *Summer*. Vogt.
- 215 ADMINISTRATION IN CLIENT-CENTERED SERVICES (3). Examination of organizational alternatives and administrative practice employed in agencies involved in changing client behavior. *Fall*. Whitaker, Staff.
- 216 LEGAL ISSUES IN STATE/LOCAL GOVERNMENT (3). Prerequisite, graduate standing. Substantive law applied to aspects of governmental and administrative operations in state and local government. Topics include: state-local relations, government structures, liabilities of officials, financial and regulatory activities. *Summer*. Lawrence, Ducker.
- 217 MPA INTERNSHIP SEMINAR I (2). Understanding agency mission and culture, administrative procedures and communications, roles of line administrators and staff specialists. The application of course work and formal learning to field experience. *Fall*. Whitaker.
- 218 MPA INTERNSHIP SEMINAR II (2). Public managers' internal and external responsibilities for the agency: leadership, supervision, delegation, programming, implementation, representation. *Spring*. Whitaker.
- 219 POLITICAL ELITES (3). Analysis of recruitment, socialization, belief systems and behavior of politicians and other elites in the U.S. and Europe. The seminar's specific focus changes from one semester to another. *Fall or spring*. Searing.
- 220 THE POLITICS OF DEVELOPMENT AND CHANGE (3). Prerequisite, permission of instructor. The theories, concepts and mechanisms of political change, with particular attention to processes of development and modernization in new nations of Africa, Asia, and Latin America. *Fall*.
- 221 PUBLIC POLICY AND ADMINISTRATION (3). Alternative explanation of public policies and policy-making processes; introduction to policy analysis as a way to inform

- choices among policy options; policy implementation through administrative practices and procedures. *Fall or spring*. MacRae, Wright.
- 222 PUBLIC FINANCIAL MANAGEMENT (3). Alternative sources of public revenues from the perspective of the government financial manager; public enterprise and pension financing; capital planning and budgeting, debt markets and the use of debt; government purchasing policies, short term investments, and cash flow management. *Spring*. Vogt.
- 224 COMMUNIST POLITICAL SYSTEMS (3). An examination of the political evolution and process in societies governed by communist parties. *Fall*. Rupen, Schwartz.
- 227 MODERN POLITICAL PARTIES AND MOVEMENTS IN LATIN AMERICA (3). Development, structure, functioning, and role of contemporary political parties and movements in Latin America. The role of political parties in modernization and revolutionary change. *Spring*. Schoultz.
- 228 LATIN AMERICAN POLITICS: PROBLEMS OF RESEARCH AND ANALYSIS (3). Examines problems of field research, assesses contemporary political science research on Latin America, and reviews major works in the literature. *Fall*. Schoultz.
- 229 CENTRAL ASIA (3). Contemporary political and social institutions of area including Mongolia, Sinkiang, and Tibet. Rupen.
- 230 ORGANIZATION DESIGN (3). Prerequisite, Political Science 210, or permission of instructor. Field theory, motivation, communication, and systems perspectives as theoretical bases for organization design. *Spring*. Staff.
- 231 COMPARATIVE BUREAUCRACY (3). A cross-national examination of functions, career patterns, role behavior, and relationships of bureaucratic elites within the context of national political systems. Research on particular countries will be emphasized. *Fall*. Staff.
- 232 GOVERNMENT AND POLITICS IN METROPOLITAN AREAS (3). Changing patterns of political cooperation and conflict in metropolitan areas; political behavior in central and suburban areas; the large metropolis as a political system; and national policies toward metropolitan problems. *Spring*. Daland.
- 233 GOVERNMENTAL ACCOUNTING LAB (1). Teaches the principles of accounting in public and non-profit organizations within the context of the general fund. Provides skills necessary for analyzing efficiency and effectiveness of government programs. *Spring*. Staff.
- 234 ADMINISTRATIVE WRITING (1). Improves clarity, brevity and precision in administrative writing. Seminar sessions supplemented by individual tutorials with the instructor. *Fall*. Staff.
- 235 VALUES AND ETHICAL PERSPECTIVES ON PUBLIC POLICY (3). Understanding and clarifying the valuational base of administrative and policy choices. Ethical problems encountered in public official's personal actions. *Spring*. DeHoog.
- 236 RESEARCH TOPICS IN CONTEMPORARY SOUTHERN POLITICS (3). Topics will vary, but will include minority politics in the region, the counter-mobilization of whites during the 1960's, party realignment and the decline of one-party politics, and the impact of the region on national politics. *Fall or spring*. Black.
- 238 INTERGOVERNMENTAL RELATIONS (3). Conflict and cooperation among governmental officials representing national, state and local governments in the U.S.; changing roles of governments, and new mechanisms for intergovernmental collaboration. *Spring*. Wright.
- 239 POLICY WORKSHOP (Planning 239) (3). Application of theories and techniques of policy analysis and planning to current public problems for actual clients. Focus on design and execution of policy research, and interpretation and presentation of results. *Spring*. Staff.
- 242 POWER, MORALITY AND INTERNATIONAL SOCIETY (3). Thucydides, Machiavelli, Hobbes, Kant, 20th century Realists (Niebuhr, Morgenthau), Idealists, Neo-Realists,

- the British School (Wight, Bull) and selected topics (e.g., just war, human rights, food policy).
- 243 INTERNATIONAL ORGANIZATION (3). Theories and approaches to the study of international organizations and regimes, plus selected noneconomic case studies.
- 244 TOPICS IN NATIONAL SECURITY AND FOREIGN POLICY (3). This research seminar examines contemporary substantive issues in national security and foreign policy in light of research organizational and administrative topics.
- 247 INTERNATIONAL CONFLICT AND COOPERATION (3). An examination of international conflict and cooperative processes in the context of the evolution of the international system. *Spring*. Snyder.
- 248 INTRODUCTION TO MATHEMATICAL INTERNATIONAL RELATIONS (3). Surveys research in mathematical models of international decisionmaking, bargaining, systemic change, arms races, coalitions and perception. Philosophic and historical considerations about this field are also discussed. *Spring*.
- 249 SEMINAR IN PROBLEMS OF U.S. MILITARY POLICY AND CIVIL-MILITARY POLITICS (3). Research seminar in problems of U.S. military policy and civil-military problems, focused chiefly on deterrence, arms control and disarmament. Rupen.
- 252 POLITICAL DECISION MAKING (3). Study of decision making in small committees, large organizations and countries. Impact of the decision process on policy outcome. Coalition theories, consociationalism, neocorporatism, Marxism. *Spring*. Steiner.
- 253 JUDICIAL PROCESS (3). Survey of recent literature on the politics of judicial institutions and the behavior of judges, lawyers, litigants, and other actors in the judicial process, emphasizing relationships between judicial and other policy making processes. *Spring*.
- 255 PROBLEMS IN CONSTITUTIONAL LAW (3).
- 260 LOGIC OF POLITICAL INQUIRY (3). A critical examination of models of political inquiry. Empirical (naturalist), interpretive, and critical metatheories are considered in terms of each model's ontological, epistemological, and practical/political consequences and presuppositions. *Fall or spring*. Leonard.
- 261 MAJOR ISSUES IN POLITICAL THEORY (3). An introduction to the major issues of political theory, with emphasis on the major thinkers in the history of Western political thought. *Fall or spring*. Leonard, Lienesch, Lipsitz, Obler.
- 262 AMERICAN POLITICAL THEORY (3). Survey of issues and problems in American political thought, with analysis of major thinkers and selected topics, and emphasis on the role of family, society and economy in political theory. *Spring*. Lienesch.
- 263 CLASSICAL POLITICAL THEORY (3). An introduction to ancient and medieval political thought, its major thinkers and issues. *Spring or fall*. Donnelly, Leonard, Lienesch.
- 264 MODERN POLITICAL THEORY (3). An introduction to modern political thought, its major thinkers and issues. *Fall or spring*. Donnelly, Leonard, Lienesch, Lipsitz.
- 265 RECENT AND CONTEMPORARY POLITICAL THOUGHT (3). An introduction to recent and contemporary political thought, its major thinkers and issues. Emphasis on Continental thought. Topics include: post-Marx Marxism, critical theory, existentialism, structuralism, post-structuralism. *Fall or spring*. Leonard.
- 267 MAJOR FIGURES IN POLITICAL THEORY (3). An in-depth study of the primary and secondary literature on one or two major figures in the history of political thought (e.g., Plato, Machiavelli, Hobbes, Marx).
- 270 PUBLIC OPINION (3). A study of public opinion, its formation, expression, and impact on political systems and public policy. *Spring*.
- 271 DYNAMICS OF ELECTORAL POLITICS (3). Change within mass electorates. Topics will include issue and attitude change, political realignments, and models of electoral competition. *Spring*. Rabinowitz.

- 272 POLITICAL SOCIALIZATION (3). The learning process by which individuals acquire values, attitudes, and norms affecting their behavior in the political community, with emphasis on major agencies of socialization: family, schools, peer groups, and media. *Spring*. Stern.
- 275 POLITICAL PARTIES (3). Selected problems and issues in the study of American and comparative parties and party systems. *Spring*. Keech.
- 280 LEGISLATIVE SYSTEMS (3). Institutions and processes in the U.S. Congress with some cross national comparisons. *Spring*. Keech.
- 285 AMERICAN PRESIDENCY (3). Survey of the substantial literature and research on the American Presidency. *Fall*. Staff.
- 300 POLITICAL SCIENCE RESEARCH (3). Permission of instructor required. Presentation of theory, method, and data analysis in political science research reports. *Spring*. Searing.
- 301 INTERNATIONAL POLITICS (3). *Fall*. Scott.
- 302 SEMINAR IN INTERNATIONAL RELATIONS (3). Special topics in international relations, such as alliances, bargaining, decision-making, economic interdependence, and international human rights. *Fall or spring*. Donnelly, Scott, Snyder.
- 303 THEORIES OF INTERNATIONAL POLITICS (3). Topics relating to the development of theory in the realm of international politics. *Spring*. Scott.
- 305 SEMINAR ON APPLICATION OF POLITICAL BEHAVIOR RESEARCH TO PUBLIC PROBLEMS (3). Exploration and examination of the ways in which political behavior research can be applied to understanding and ameliorating public problems. *Spring*. Beyle, Keech.
- 311 SEMINAR IN POLITICAL SOCIOLOGY (Sociology 311) (3). The relationships between social structure and political decisions. Regimes and social structure; bureaucracies, political associations, and professions; science and politics; closed and open politics; political movements and change. *Spring*. MacRae.
- 321 SEMINAR IN AMERICAN GOVERNMENT AND POLITICS (3). *Fall*. Beyle, Black.
- 341 DIRECTED READINGS IN POLITICAL SCIENCE (Variable). Directed readings in a special field under the direction of a member of the graduate faculty. By permission only. *Fall and spring*. Graduate Faculty.
- 342 SPECIAL TOPICS IN POLITICAL SCIENCE (1-3). Prerequisite, permission of the instructor. Seminar in selected areas of Political Science. Topics will vary from year to year. May be repeated for credit. *Fall, spring, summer*. Graduate Faculty.
- 346 SEMINAR IN INTERNATIONAL COMMUNICATION (Journalism 346) (3). Prerequisite, Journalism 146 or permission of the instructor. *Spring*. Cole.
- 361 SEMINAR IN POLITICAL THEORY (3). Special topics in political theory such as Marxism and Socialism, Democratic theory, contemporary political thought, or related topics. *Fall or spring*. Donnelly, Leonard, Lienesch, Lipsitz.
- 353 JUDICIAL BEHAVIOR RESEARCH (3).
- 393 MASTER'S THESIS (3 or more). *Fall and spring*. Members of the graduate faculty.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Members of the graduate faculty.
- 395 RESEARCH IN PUBLIC ADMINISTRATION (3-6). *Fall, spring, and summer*. Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF PSYCHOLOGY

DAVID GALINSKY, *Chairman*

Professors

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|------------------------|-------|---|
| MARK I. APPELBAUM | (1) | Applied Multivariate Statistics, Experimental Design, Evaluation Methods |
| GEORGE BAROFF | (2) | Mental Retardation |
| ROBERT CAIRNS | (4) | Social and Genetic Determinants of Aggression, the Origins and Plasticity of Interchanges |
| ELLIOT M. CRAMER | (7) | Multivariate Analysis, Experimental Design, Computer Applications |
| W. GRANT DAHLSTROM | (8) | Assessment of Personality, Psychopathology and Behavioral Change |
| LINDA DYKSTRA | (9) | Behavioral Pharmacology, Stimulus Control Processes |
| DAVID ECKERMAN | (10) | Operant Conditioning, Learning Theory, Behavioral Toxicology |
| SAMUEL FILLENBAUM | (13) | Psychology of Language |
| M. DAVID GALINSKY | (14) | Community Psychology, Theories of Psychotherapy, Personality Theory |
| BERNADETTE GRAY-LITTLE | (16) | Sociocultural Influences on Personality, Marital Interaction, Psychopathology |
| CHESTER A. INSKO | (18) | Attitude Change, Balance Theory, Social Interdependence |
| LYLE V. JONES | (20) | Evaluation and Measurement, Data Analysis |
| RICHARD A. KING | (21) | Brain-Behavior Relationships |
| SHARON LANDESMAN | (131) | Child Development, Observational Methods, Family Factors in Development, Mental Retardation |
| BIBB LATANE | (120) | Social Impact, Responsibility, Communication |
| BARCLAY MARTIN | (26) | Family Therapy, Life Stress, Social Support, Personality Variables Related to the Development of Psychological and Somatic Symptoms |
| PETER A. ORNSTEIN | (28) | Cognitive Development, Development of Learning and Memory |
| AMMON RAPOPORT | (29) | Decision Making, Multistage Betting Games, Coalition Formation and Bargaining in Small Groups |
| ERIC SCHOPLER | (49) | Autism and Developmental Disorders |
| JOHN SCHOPLER | (32) | Small Group Processes, Social Power, Person Perception |
| PAUL G. SHINKMAN | (33) | Effects of Early Experience on Vision and Visual Neurophysiology |
| VAIDA D. THOMPSON | (36) | Attitude Change, Attribution, Population Issues |
| MARCUS B. WALLER | (37) | Analysis of Verbal Behavior, Operant Conditioning |

- THOMAS WALLSTEN (38) Inference and Categorization Processes, Individual Decision Behavior, Measurement and Communication of Uncertainty
- JOHN WEISZ (96) Personality Development, Mental Retardation, Child Psychopathology, Outcomes of Child and Adolescent Psychotherapy
- MEREDITH J. WEST (45) Development of Communication, Learning and Evolution
- FORREST W. YOUNG (41) Methods of Quantifying Qualitative Data

Associate Professors

- DONALD H. BAUCOM (104) Sex Roles, Marital Therapy, Depression Assessment
- PAUL B. FIDDLEMAN (12) Psychopharmacology, Drug Dependence, Community Psychopathology, Sexual Assault
- MICHELA GALLAGHER (107) Biological Basis of Memory and Learning
- MARK HOLLINS (17) Visual and Haptic Perception, Blindness
- EDWARD S. JOHNSON (18) Human Problem Solving, Concept Learning, Intellectual Ability
- JOSEPH LOWMAN (24) Community Mental Health Consultation, Computer-Assisted Instruction, Training College Instructors, Measurement of Family Affective Structure
- OWEN MCCONNELL (27) Child Development and Diagnostics Psychotherapy, Consultation in Child Clinical Psychology
- GARY B. MESIBOV (94) Normalization and Community Programs for Handicapped People, Normal Social and Personality Development
- CARYL RUSBULT (129) Social Interdependence

Assistant Professors

- DENISE BARNES (110) Adult Development and Aging, Cross-Cultural Issues in Psychology
- DEIRDRE BARRETT (112) Psychodynamic Theory, Psychotherapy, Hypnosis, Imagery, Dreams, and Fantasy Processes
- LINDA CRAIGHEAD (126) Cognitive Behavioral Intervention, Treatment of Obesity, Depression
- BETTY GORDON (127) Developmental Disabilities, Child Sexual Abuse, Pediatric Psychology
- MARCY LANSMAN (115) Attentional Processes, Individual Differences in Cognition, Particularly in Memory, Attention, and Spatial Ability
- JAAN VALSINER (114) Social and Cognitive Development, Comparative-Cultural Developmental Psychology

Research Professors

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| B. J. CAMPBELL | (54) | Human and Vehicle Factors in Driver Injuries |
| CHARLES COFER | (128) | Motivation, Verbal Behavior and Learning. |

Research Associate Professor

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| VERNON BENIGNUS | (65) | Olfactory Electrophysiology, Effects of Environmental Factors on Behavior |
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Clinical Professor

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| SHERMAN JAMES | (87) | Applied Social Psychology, Psychosocial Factors in Chronic Disease Epidemiology |
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Clinical Associate Professors

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| WILLIAM BURLINGAME | (66) | Psychotherapy, Residential Treatment of Adolescents |
| STEPHEN FLANAGAN | (130) | Chronic Mental Illness, Behavior Therapy |
| ROBERT JOHNSON | (72) | Relaxation Therapy, Behavioral Programs for Institutionalized Patients |
| JOHN L. LUBKER | (25) | Behavioral Modification, Hospital Programming |
| DAPHNE MCKEE | (98) | Psychological Aspects of Medical Disorders, Neuropsychology |
| LEE MARCUS | (11) | Diagnostic and Treatment Factors in Autism |

Clinical Assistant Professors

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| DANIEL DARNELL | (117) | Ego Development and Relationship Between Development and Cardiovascular Difficulties |
| JONATHAN FARBER | (127) | Neuropsychology, Health Psychology, Group and Individual Psychotherapy |
| PAUL MERMIN | (118) | Assessment and Therapy of Children and Families, Family Development |

Adjunct Associate Professor

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| ROBERT C. MACPHAIL | (125) | Behavioral Toxicology |
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Professors Emeriti

E. EARL BAUGHMAN
 JOHN B. CARROLL
 J. WILBERT EDGERTON
 WILLIAM J. EICHMAN
 HAROLD G. MCCURDY
 EUGENE R. LONG
 HARRIET RHEINGOLD
 GEORGE S. WELSH

The Department offers training for the Master of Arts and Doctor of Philosophy degrees in the recognized areas of psychology: developmental, experimental and biological, clinical, quantitative/cognitive, and social. Each program is designed to acquaint the student thoroughly with the theoretical and research content of his specialty and to train him in the research skills needed to become a competent and creative investigator in his specialty area. In addition, certain programs, e.g., the clinical program focus on the development of competence in appropriate professional skills.

While many of the requirements for a Ph.D. degree vary with the specialty program, certain requirements apply to all psychology graduate students. Each student must: (1) pass a Ph.D. written examination, (2) pass a Ph.D. oral examination, (3) complete a special competency requirement (research competency, foreign language competency, teaching competency or professional competency), (4) submit an acceptable dissertation and pass an oral examination, (5) engage in research during each year of enrollment, and (6) serve as a teaching assistant or teach a course for at least one academic year.

Brochures describing graduate training in these areas may be obtained by writing the Department of Psychology. New students are accepted for admission in the Fall Semester only. Individuals seeking the M.A. degree only *are not accepted*.

Courses for Graduates and Advanced Undergraduates

The prerequisites for each course are provided for the general guidance of the student in consultation with an adviser. Any deviation from the required prerequisite sequence must be approved by the instructor teaching the course. Such clearance must be obtained before registering for the course.

Note: General Psychology 10 or the equivalent is prerequisite to all courses numbered above 100.

- 100 THINKING AND COGNITION (3). Prerequisite, Psychology 10. Considers problems in intelligence, concept formation, problem-solving and thinking. Emphasis will be on an examination of the experimental literature with attention to recent developments in information processing models and computer simulation. *Fall and spring, as announced.* Johnson.
- 101 CONDITIONING AND LEARNING (Neurobiology 101C) (3). Prerequisites, Psychology 10 and 22. A comprehensive survey of the methods, findings, and theories of classical and operant conditioning. Skills necessary to evaluate, integrate and summarize significant original literature will be developed. *Fall.* Dykstra, Eckerman, Waller.
- 101L RESEARCH METHODS IN CONDITIONING AND LEARNING (3). Prerequisites, Psychology 10, 22 and corequisite or prerequisite of Psychology 101. A series of research projects of limited scope in animal conditioning and learning that teach programming switching circuits, use of recording instruments, data reduction, experimental design, and report writing. Individual research projects are developed and completed. *Six laboratory hours a week, fall.* Dykstra, Eckerman, Waller.

- 102 BIOLOGICAL FOUNDATIONS OF BEHAVIOR (Neurobiology 102) (4). Prerequisite, Psychology 22 or Zoology 11. Ethological, genetic, and physiological variables will be studied in relation to their behavioral effects. *Two lecture and three laboratory hours a week, as announced.* Staff.
- 103 INTRODUCTION TO MATHEMATICAL PSYCHOLOGY (3). Prerequisites, Psychology 10 and 30, Mathematics 32, or permission of the instructor. The use of mathematical models in psychology, with topics selected from measurement, scaling, psychophysics, learning, decision, and choice theory. *As announced.* Wallsten.
- 104 CURRENT TOPICS IN PSYCHOLOGY (3). Prerequisites, Psychology 10 and permission of the instructor. Various special areas of psychological study as needed. Course may be taken more than once. *Fall and spring.* Staff.
NOTE: Psychology 104 will not fulfill a 100-level course requirement for a B.A. degree in Psychology.
- 106 PHYSIOLOGICAL PSYCHOLOGY (Neurobiology 106) (3). Prerequisite, Psychology 10, or a course in Biology. Elements of neurophysiology neuroanatomy, and neurochemistry as they apply to the understanding of behavior and conscious experience. *Fall and spring.* King, M. Gallagher.
- 109 APPLIED BEHAVIORAL ANALYSIS (3). Prerequisites, Psychology 10, 22, and 80 or permission of instructor. A survey of applications of learning theory in solving clinical, educational, and societal problems. Practicum experience included. *Spring.* Eckerman.
- 110 MOTIVATION (3). Prerequisites, Psychology 10. Major theories and supporting research on motivational processes in the control of behavior. *Spring.* Staff.
- 112 HISTORICAL TRENDS IN PSYCHOLOGY (3). Prerequisites, Psychology 10. Limited to senior majors or to graduate students in psychology; others by permission of the instructor. Overview of the origins of psychological concepts, movements, and fields of study. *Fall and spring as announced.* Fillenbaum.
- 119 LEARNING THEORY AND PRACTICE (3). Prerequisites, Psychology 10 and 22. A consideration of paradigms and theories of learning and memory and their application in applied contexts such as education and workplace. *As announced.* Long.
- 120 SENSORY PROCESSES (3). Prerequisite, Psychology 10, 21 or 23. Each year the course will deal with a specific sensory topic, such as "color vision" or "the chemical senses." *Fall.* Hollins.
- 121 ADVANCED PERCEPTUAL PROCESSES (3). Prerequisite, Psychology 21. The perception of shape, space, and motion; also, the role of past experience, set and motivation in perception. *Fall and spring.* Hollins.
- 122 HUMAN LEARNING (3). Prerequisite, Psychology 22. Interference theory, long and short-term memory, organizational processes in memory, and human discrimination learning and concept formation. *Fall and spring.* Long.
- 123 BEHAVIORAL PHARMACOLOGY (Pharmacology 123) (3). Prerequisites, Pharmacology 216 or Psychology 101 and 106. Basic principles of pharmacology and of the experimental analysis of animal behavior will be considered in relation to drugs that affect the central nervous system. *Spring.* Staff.
- 124 PSYCHOLOGICAL APPLICATIONS OF DRUGS (3). Prerequisite, Psychology 10, 22 and 80. This course will investigate the pharmacological effects and the clinical efficacy of drugs used to treat behavior disorders. *Fall.* Dykstra.
- 125 PSYCHOLOGY OF LANGUAGE (3). Prerequisites, Psychology 10. After an examination of the possible relations between psychology and linguistics, this course will consider problems in the acquisition of language and particularly recent work in experimental psycholinguistics. *Fall.* Fillenbaum.
- 127 COGNITIVE DEVELOPMENT (3). Prerequisite, Psychology 10 and 24. An examination of the development of attention, perception, learning, memory, and thinking in normal children. *Fall and spring.* Ornstein.

- 128 DEVELOPMENT OF LANGUAGE (3). Prerequisite, Psychology 10 and 24. A study of the development of language in normal children. *Spring*. Staff.
- 129 DEVELOPMENT OF SOCIAL BEHAVIOR AND PERSONALITY (3). Prerequisites, Psychology 24, 28, and 30. Developmental processes during early childhood as these relate to social behavior and personality. *Fall and spring*. Cairns, West.
- 130 DESIGN AND INTERPRETATION OF PSYCHOLOGICAL RESEARCH (3). Prerequisite, Psychology 30. Emphasis on methodological principles underlying experimental and correlational research. Interaction of theory and practice in the design and interpretation of psychological studies. *Spring*. Cramer, Appelbaum, Wallsten.
- 131 INTERMEDIATE PSYCHOLOGICAL STATISTICS (3). Prerequisites, Psychology 10 and 30. Elements of probability theory, principles of statistical inference, including applications of binomial, normal, t, X^2 and F distributions. *Two lecture and two laboratory hours a week, fall*. Appelbaum.
- 132 ADVANCED PSYCHOLOGICAL STATISTICS (3). Prerequisite, Psychology 131. Statistical estimation, hypothesis testing, use of quantitative models in design and analysis of experiments. *Two lecture and two laboratory hours a week, spring*. Cramer, Appelbaum.
- 134 STATISTICAL IDEAS AND LEGAL EVIDENCE OF DISCRIMINATION (3). Prerequisite, Psychology 30 or 131. Statistical and legal problems involved in discrimination law in the areas of sex and race discrimination in hiring, promotion, salary equity, capital punishment, etc. are to be examined. *Fall*. Cramer.
- 135 INDIVIDUAL CHOICE BEHAVIOR (3). Permission of instructor. Descriptive and normative algebraic and stochastic models for individual decision making with applications to behavioral science. *Fall*. (1981 and alternate years.) Wallsten.
- 136 INTRODUCTION TO MULTIVARIATE TECHNIQUES FOR THE BEHAVIORAL SCIENCES (3). Prerequisite, Psychology 132. An introduction to linear regression and multivariate statistical techniques as employed in the behavioral sciences with particular emphasis on analytic techniques and interpretation of results. *Fall*. Appelbaum, Cramer.
- 138 APPLIED MATRIX ALGEBRA FOR BEHAVIORAL STATISTICS (3). Prerequisite, Psychology 132 and Math 147 or permission. Geometric interpretation of vectors and matrices. Applications to linear statistical models, multivariate analysis and factor analysis. Relation of eigenproblems to maximization of statistical functions. *Spring*. Cramer.
- 140 ADVANCED PERSONALITY (3). Prerequisite, Psychology 28 or graduate standing. An in-depth analysis of major theoretical issues in personality study. *Fall and spring*. Gray-Little, Dahlstrom, Lowman.
- 141 PSYCHOLOGY OF ADULTHOOD AND AGING (3). Prerequisite, Psychology 10 and 24. A developmental approach to the study of adulthood, from young adulthood through death. Topic includes adult issues in personality, family dynamics, work, leisure and retirement, biological and intellectual aspects of aging, dying and bereavement. *Fall and spring*. Barnes.
- 142 PSYCHOLOGY OF BLACK AMERICANS (3). Prerequisites, Psychology 10 and 28. This course will focus upon the personal characteristics of black Americans as these have been identified and studied by psychologists and other behavioral scientists. Various methodological approaches will be considered. *Fall or spring, as announced*. Gray-Little.
- 144 PSYCHOLOGICAL DISORDERS OF CHILDHOOD AND ADOLESCENCE (3). Prerequisites, Psychology 10, 24 and 80, or graduate standing. A survey of theories bearing on atypical development and disordered behavior, and an examination of major child and adolescent behavior problems and clinical syndromes. *Fall and spring*. Darnell, Weisz.

- 145 BEHAVIORAL MEDICINE (3). Prerequisites, Psychology 10. An in-depth coverage of theoretical issues and clinical manifestations of psychological responses characteristic of individuals with chronic physical disorders. *Fall*. Barrett.
- 148 TESTS AND MEASUREMENT (3). Prerequisites, Psychology 10 and 30. Basic psychometric theory underlying test construction and utilization. *Spring*. Cramer.
- 152 ATYPICAL PERSONALITIES AND GROUPS I (3). Prerequisite, Psychology 80. This course studies persons and groups labelled as different, outsiders, deviant, stigmatized, or occupying disvalued roles. Focus is placed on how these individuals present themselves in person and in writing. *Fall*. Rogers, R. Johnson.
- 153 ATYPICAL PERSONALITIES AND GROUPS II (3). Prerequisite, Psychology 152. This course studies persons and groups labelled as different, outsiders, deviant, stigmatized, or occupying disvalued roles. Focus is placed on how these individuals present themselves in person and writing. *Spring*. Rogers, R. Johnson.
- 170 RESEARCH IN DEVELOPMENTAL PSYCHOLOGY (3). Prerequisites, Psychology 10, 24, and 30. Introduction to the issue, methods and outcomes of research in developmental psychology. Demonstrational projects designed and completed. *One lecture and four laboratory hours*. *Fall*. Cairns, Ornstein, West.
- 180 INTRODUCTION TO THE STUDY OF EXCEPTIONAL CHILDREN (3). Prerequisites, Psychology 10 and 28 or equivalent. Overview of mental retardation, autism, and learning disabilities; students devote some time each week in work with a handicapped child in addition to the regular class meetings. *Fall and spring*. Baroff.
- 183 CONTEMPORARY SEX ROLES (Women's Studies 183) (3). Prerequisites, Psychology 10. Covers theories and research in the areas of constitutional and social learning influences on sex differences; sex-role identification and the assessment of masculinity and femininity; sex differences in such areas as intellectual accomplishment, achievement, dependency and aggression; and sex differences in relation to behavior disorders. *As announced*. Staff.
- 187 SOCIAL PSYCHOLOGY: THEORY IN PRACTICE (3). Prerequisites, Psychology 10 and 33. Application of social psychological theory and research to practical social problems, e.g., situational impact on performance, discrimination, negotiation, and small group processes. *Spring, alternate years*. Staff.
- 188 SMALL GROUPS (3). Prerequisite, Psychology 10, 30, and 33 or permission of the professor. Intensive survey of research and theory on behavior in small groups combined with appropriate experience in studying various structured groups. *Fall or spring*. Thompson.
- 189 INTERPERSONAL PROCESSES (3). Prerequisites, Psychology 30 and 33, or permission. Intensive coverage of normal interpersonal processes, focusing on the dyad. *Fall or spring*. Staff.
- 191 ATTITUDE CHANGE (3). Prerequisites, Psychology 30 and 33, or permission. A detailed consideration of the theoretical issues in attitude and belief change. *Fall or spring, as announced*. Thompson or Staff.

Courses for Graduates

- 200 EXPERIMENTAL METHODS: COGNITIVE PROCESSES (3). Principal topics include: psychophysics, information processing, memory, cognition. *Spring*. Staff.
- 201 BEHAVIOR AND ITS BIOLOGICAL BASES I (Neurobiology 201a) (3). A survey of psychological and biological approaches to the study of basic learning and higher integrative processing. *Fall*. Staff.
- 202 BEHAVIOR AND ITS BIOLOGICAL BASES II (Neurobiology 202) (3). A survey of psychological and biological approaches to the study of sensory and perceptual information processing and of attention and arousal; comparative, ethological, and developmental perspectives on behavior; behavioral medicine. *Spring*. Staff.

- 203 PERSONALITY RESEARCH METHODS (3). Prerequisites, Psychology 220, 221 and 248 are advisable. Covers empirical research on personality structure and processes, person-situation interactions, and other current issues in the area. *Spring*. Dahlstrom.
- 204 ADVANCED BIOLOGICAL PSYCHOLOGY: CENTRAL NERVOUS SYSTEM (Neurobiology 204) (3). Prerequisite, Psychology 106 or equivalent. Each fall one special topic will be covered in depth; e.g., neural basis of memory storage, homeostasis, and perception. Format will include lectures and seminar meetings with student presentations. *Fall*. Shinkman.
- 205 ADVANCED BIOLOGICAL PSYCHOLOGY: AUTOMATIC NERVOUS SYSTEM (Neurobiology 205) (3). Prerequisites, Psychology 106 and/or 202, or permission of the instructor. Automatic nervous system bases of emotion, motivation, and learning. *Two lecture and two laboratory hours a week, on demand*. Obrist.
- 206 ADVANCED DEVELOPMENTAL PSYCHOLOGY (3). A survey of the main facts and principles of developmental psychology. *Either semester, as announced*. Staff.
- 208 PROSEMINAR IN QUANTITATIVE PSYCHOLOGY I (1). An introduction to concepts in: (A) Measurement, scaling, and test theory; (B) Methods of descriptive data analysis; (C) Classical inferential statistics and basic concepts of experimental design. *Fall*. Staff.
- 209 PROSEMINAR IN QUANTITATIVE PSYCHOLOGY II (1). An introduction to concepts in: (A) Psychophysical and decision processes; (B) Mathematical models of learning and memory; (C) simulation models of complex mental processes. *Fall*. Staff.
- A,B,C
- 210 PROSEMINAR IN DEVELOPMENTAL PSYCHOLOGY I (3). An introduction to comparative developmental and psychobiological research and to social development and interactional processes. *Fall*. Staff.
- 211 PROSEMINAR IN DEVELOPMENTAL PSYCHOLOGY II (3). An introduction to the development of perception, language, learning, memory, and thinking. *Spring*. Staff.
- 212 CONTEMPORARY PSYCHOLOGICAL TRENDS (3). Prerequisite, graduate standing. Different perspectives on the task of psychology with a discussion of selected contemporary problems. *Fall*. Fillenbaum.
- 216 DEVELOPMENTAL PSYCHOLOGY: EXPERIMENTAL METHODS (3). Techniques and research designs appropriate for the study of the development of behavior. Supervised experience in the planning of experiments and data analysis. *Ten laboratory hours a week. Fall and spring. As announced*. Staff.
- 217
- 220 THEORIES OF PERSONALITY I (3). Permission of instructor required. Discussion and analysis of psychodynamic theories of personality (Freud, Jung, Adler, Sullivan, Erikson, and others). *Fall*. Staff.
- 221 THEORIES OF PERSONALITY II (3). Prerequisites, Psychology 220 or permission of instructor. Discussion and analysis of social learning, behavioristic, humanistic, and other theories of personality. Builds upon knowledge of psychodynamic theories. *Spring*. Staff.
- 222 EXPERIMENTAL ANALYSIS OF BEHAVIOR (3). Prerequisite, Psychology 201 or permission of the instructor. Applications of operant conditioning procedures to the analysis of complex behavior in man and animals. Original experiments will be performed. *One lecture and six laboratory hour a week, fall*. Waller.
- 223 DIRECTED RESEARCH SEMINAR IN SOCIAL PSYCHOLOGY (3). Prerequisite, 224 first year Social Psychology graduate student or permission of instructor. Directed research problems and seminar discussion of related issues. *Fall and spring*. Staff.
- 225 DEVELOPMENT PSYCHOLOGY: LABORATORY TRAINING (3). Prerequisite, 226 second year graduate standing and permission of the instructor. Supervised experience in developmental research. *Ten laboratory hours a week, fall and spring*. Staff.
- 227 INTRODUCTION TO CLINICAL PSYCHOLOGY (3). Graduate standing. Survey of methods and findings in psychodiagnostics, psychotherapy, and mental health practices. *Spring*. Dahlstrom.

- 228 ADVANCED SOCIAL PSYCHOLOGY (3). Prerequisite, Psychology 238 or permission of the instructor. *Spring*. Staff.
- 230 MEASUREMENT AND SCALING (3). Prerequisite, Psychology 132. Theory, method, and application of multidimensional scaling as developed by Torgerson, Shepard, Kruskal, Carroll, deLeeuw, Young, Takane, and Ramsay. *Alternate years*. Young.
- 232 TEST THEORY AND ANALYSIS (3). Prerequisite, Psychology 132. Survey of classical test theory and more recent developments in item analysis and test construction. *As announced*.
- 233 METHODS OF SOCIAL PSYCHOLOGY (3). Prerequisite, Psychology 238 or permission of the instructor. Methods of investigation in social psychology with primary emphasis upon experimental design and the nature of the experimental situation. *Fall*. Insko.
- 234 MATHEMATICAL PSYCHOLOGY (3). Permission of instructor required. Development and applications of mathematical models in theoretical and experimental psychology. Topics selected from learning, memory, perception, thinking, attention, decision making. *As announced*. Wallsten.
- 235 TOPICS IN ATTITUDE RESEARCH (3). Prerequisite, Psychology 238 or permission of instructor. A critical examination of selected topics in attitude theory and change. *As announced*. Insko.
- 236 FACTOR ANALYSIS (3). Prerequisites, Psychology 132 and 138. Advanced topics in factor analytic models, multivariate correlational models, and analysis of covariance structures as applied in behavioral research. *As announced*. Appelbaum, Cramer, Young.
- 237 APPLIED MULTIVARIATE ANALYSIS (3). Prerequisites, Psychology 132 and 138. Sampling from the multivariate normal distribution, testing of multivariate hypothesis, the multivariate general linear model, and the multivariate analysis of variance as applied in behavioral speech. *As announced*. Appelbaum, Cramer.
- 238 ADVANCED SURVEY OF SOCIAL PSYCHOLOGY (3). Prerequisite, Psychology graduate student or permission of instructor. Survey of research on and theories of attitude change, interpersonal behavioral, and small groups. *Fall*. Staff.
- 239 MULTIVARIATE EXPLORATORY DATA ANALYSIS (3). Survey of mathematical basis and application of such exploratory data analysis methods as correspondence analysis, conjoint analysis, nonlinear principal components analysis, nonlinear regression analysis, nonlinear redundancy analysis, etc. *Alternate years*. Young.
- 240 INTRODUCTION TO CLINICAL ASSESSMENT (3). Prerequisite, first year graduate status in Clinical Psychology, Lecture and discussion on the nature and theory of psychological assessment. Training in administration, scoring and interpretation of such basic techniques as: WAIS-WISC, Rorschach, TAT, and MMPI. *Two lecture and two laboratory hour a week, fall and spring*. Eichman.
- 242 INTRODUCTION TO PSYCHOTHERAPY (3). Prerequisite, first year graduate status in Clinical Psychology. Survey of basic concepts and processes relevant to individual psychotherapy with adults. The three representative approaches to psychotherapy that will be considered are: psychoanalytic, client-centered, and behavioral. Tapes, films, and other materials will be used as adjuncts to instruction. *Three lecture hours a week, fall*. Galinsky, Gray-Little.
- 244 ADVANCED PSYCHOPATHOLOGY (3). Prerequisite, first year graduate status in Clinical Psychology. The major forms of psychopathology are examined within a development framework. *Fall and spring*. Baucom, Burlingame, Weisz.
- 248 OBJECTIVE PERSONALITY MEASUREMENT (3). Intensive study of theory and research on objective techniques useful for personality assessment, standard and special inventories, checklists, and other devices will be investigated at item, scale and profile levels. *Fall*. Staff.
- 250 ADVANCED ADULT ASSESSMENT (3). Prerequisite, Psychology 241. Consideration of how various forms of assessment data can be utilized in understanding the structure

- and dynamics of adult personalities; problems of differential diagnosis, brain damage, etc., are considered. *Two lecture and two laboratory hours a week, fall.* Baucom.
- 251 ADVANCED CHILD ASSESSMENT (3). Prerequisite, Psychology 241. Consideration of how various forms of assessment data can be utilized in understanding the structure and dynamics of child personalities; problems of differential diagnosis, appraisal of brain damage, etc. are considered. *Two lecture and two laboratory hours a week, spring.* Mermin.
- 252 CHILD PSYCHOTHERAPY (3). Prerequisite, Psychology 243. Basic principles and techniques of therapy of common childhood disorders. *Three lecture hours a week, spring.* McConnell.
- 253 INTRODUCTION TO COMMUNITY PSYCHOLOGICAL APPROACHES (3). Survey of such topics as social contributions to psychopathology, comprehensive and integrated service delivery systems, consultation, primary prevention, manpower innovations, program evaluation, and epidemiological approaches. *Fall.* Lowman.
- 254 CLINICAL PRACTICUM (3). Prerequisite, second year graduate status in Clinical
255 Psychology. Supervised experience in psychological assessment and psychotherapy. *Six to eight laboratory hours a week, fall and spring.* Staff.
- 256 CLINICAL RESEARCH METHODS (3). Prerequisite, graduate status in Clinical
257 Psychology. Analysis of clinical and personality research as to their contribution to knowledge, their limitations, possibilities for their improvement, further research they suggest, etc. Preparation of individual research proposals for class presentation and critical evaluation. *Three hours a week, fall.* Martin.
- 258 METHODS OF APPLIED SOCIAL PSYCHOLOGY (3). Prerequisite, Graduate standing. Detailed examination and practical experience in conceptual and other nonquantitative aspects of advanced methodology of applied social psychology, including evaluation of quasi-experimental and nonexperimental designs. *As announced.*
- 260 HUMAN COGNITIVE ABILITIES (3). Prerequisite, Psychology 239 recommended. Applications of Psychometric and experimental methods to study of human intellectual abilities and processes, with special attention to factor-analytic studies. *As announced.* Lansman.
- 264 ADVANCED CLINICAL PRACTICUM (3). Prerequisite, Psychology 255. Supervised
265 clinical work in an area of particular interest to the student. Clinical activity is coordinated with exploration of psychological literature relevant to the topic. *Six to eight laboratory hours a week, fall and spring.* Staff.
- 270 MEASUREMENTS OF LANGUAGE BEHAVIOR (3). Prerequisite, permission of the instructor. Procedures for the quantitative treatment of language elements (words, text content, etc.) and performance (e.g. speech rate, language acquisition, vocabulary, comprehension, verbal aptitudes). *As announced.* Carroll.
- 271 CHOICE BEHAVIOR IN THE DYAD (3). Psychological and mathematical models of two-person interaction with applications to the social and behavioral sciences. *Fall.* Rapoport.
- 272 GROUP CHOICE BEHAVIOR (3). Psychological and mathematical models of n-person interaction in cooperative and noncooperative decision situations with applications. *Spring.* Rapoport.
- 299 APPRENTICESHIP IN DEVELOPMENTAL PSYCHOLOGY (1-3). Supervised research and practicum experience in developmental psychology. *Fall and spring, as announced.* Staff.
- 300 SPECIAL READINGS IN PSYCHOLOGY (3). Prerequisite, permission of the professor. Intended for advanced graduate students. *Fall and spring.* Staff.
- 301 SEMINAR IN THE EXPERIMENTAL ANALYSIS OF BEHAVIOR (3). Limited to graduate students in psychology. Selected advanced topics depending on the interests of the instructor and the students. *Three to six hours a week, fall and spring.* Eckerman, Long, Waller.

- 302 SEMINAR IN THE BIOLOGICAL FOUNDATIONS OF PSYCHOLOGY (Neurobiology 302) (3). Prerequisite, permission of instructor. Limited to graduate students in psychology and neurobiology. Lectures and seminar presentations on a wide range of topics in the area of physiological psychology. *Fall and spring*. King, Gallagher.
- 303 ADVANCED EXPERIMENTAL DESIGN (3). Prerequisite, Psychology 132. Advanced topics in the design and analysis of psychological experiments. Emphasis is placed on the general linear hypothesis. *As announced, fall*. Cramer, Appelbaum.
- 304 SEMINAR IN GENERAL PSYCHOLOGY (3). Limited to graduate students in psychology. Selected advanced topics depending on the interests of the instructor and students. *Three to six hours a week, fall and spring*. Staff.
- 305 SEMINAR IN THEORIES AND METHODS IN DEVELOPMENTAL PSYCHOLOGY (3). Prerequisite, permission of instructor. Selected topics in developmental theory and methodology. *Either semester, as announced*. Staff.
- 306 SEMINAR IN DEVELOPMENTAL PSYCHOLOGY (3). Prerequisite, permission of instructor. Intensive study of selected topics in developmental psychology. *Either semester, as announced*. Staff.
- 307 SEMINAR IN APPLIED DEVELOPMENTAL PSYCHOLOGY (3). Prerequisite, permission of instructor. Intensive study of the application of developmental principles. *Either semester, as announced*. Staff.
- 316 SEMINAR IN EXPERIMENTAL CHILD PSYCHOLOGY (3). Prerequisite, permission of instructor. Intensive study of selected topics in experimental child psychology. *Either semester, as announced*. Staff.
- 320 SEMINAR IN PERSONALITY (3). Prerequisite, permission of instructor. Selected advanced topics depending on the interests of the instructor and students. *As announced*, Staff.
- 325 SEMINAR IN THEORETICAL-EXPERIMENTAL PSYCHOLOGY (1, 2, or 3). *Time to be arranged*. Staff.
- 326 SEMINAR IN CLINICAL PSYCHOLOGY (1, 2, or 3). *Time to be arranged*. Staff.
- 327 SEMINAR IN ABNORMAL PSYCHOLOGY (1, 2, or 3). *Time to be arranged*. Staff.
- 328 SEMINAR IN SOCIAL PSYCHOLOGY (3). Prerequisite, Psychology 238 or permission of the instructor. *Time to be arranged*. Staff.
- 330 SEMINAR IN QUANTITATIVE PSYCHOLOGY (1, 2, or 3). *Time to be arranged*. Staff.
- 331 PROFESSIONAL PROBLEMS IN PSYCHOLOGY (1). Prerequisite, permission of instructor. Consideration of problems facing academic psychologists. *Fall*. Appelbaum.
- 332 LABORATORY IN COLLEGE TEACHING (3). Specific training in presentational and interpersonal skills needed by college teachers, such as planning, lecturing, discussing, motivating, and evaluating. *Fall*. Lowman.
- 333 RESEARCH SEMINAR IN EXPERIMENTAL PSYCHOLOGY (3). Prerequisite, graduate standing in Psychology. Students will design and conduct a supervised research project and will engage in critical discussion of research performed by other students and faculty. *Fall and spring*. Staff.
- 334 SEMINAR IN COGNITIVE PSYCHOLOGY (3). Prerequisite, permission of instructor. Discussion and critical evaluation of various theories of thinking; theories of concept formation, problem solving, and reasoning. *Either semester, as announced*. Staff.
- 337 QUANTITATIVE METHODS IN EVALUATION RESEARCH (3). Prerequisite, Psychology 132. Methods of bias reduction in non-randomized experiments, elements of survey sampling, assessment of change. *Fall*. Appelbaum.
- 338 CRITICAL APPRAISALS OF EVALUATION STUDIES (3). Prerequisite, Psychology 337. A seminar concerned with detailed examination of methods appropriate to evaluation research. *Spring*. Jones.
- 341 ADVANCED RESEARCH (3). *Six laboratory hours a week, fall and spring*. Staff.

- 361 SMALL COMPUTERS IN THE PSYCHOLOGY LABORATORY (3). Principal topics include a survey of small computers, their application to computational problems and their use as controllers and data acquisitions systems. *Fall*. Staff.
- 362 SURVEY OF STATISTICAL COMPUTING PACKAGES FOR THE BEHAVIORAL SCIENCES (3). Emphasis is on the use of computers for inferential statistical methods in psychology. Principal topics treated are the critical use of statistical packages in psychology with particular emphasis on SAS, SPSS, BMD programs, Manova, etc.; essentials of JCL sufficient for communication between statistical packages and their efficient use; data preparation, reduction, and storage. *Spring*. Staff.
- 393 MASTER'S THESIS (3 or more). *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

SCHOOL OF PUBLIC HEALTH

MICHEL A. IBRAHIM, *Dean*

DONALD T. LAURIA, *Associate Dean for Academic Programs*

The School of Public Health at The University of North Carolina at Chapel Hill was the fourth school of public health established in the United States and the first in a state university. It is one of twenty-four such schools in the nation accredited by the Council on Education for Public Health.

The mission of the school is to advance and apply knowledge drawn from all sciences to the understanding and promotion of the health of human populations and to assist people in translating this knowledge into reality in their own lives, whatever their culture or living conditions. The mission is realized through the education of students to assume professional careers in public health, through continuing education opportunities for professionals and the public, through applied and basic research, through consultation and technical assistance to health and human service agencies and to communities, and through innovative demonstration programs.

The School of Public Health has a curriculum in Public Health Nursing and eight departments: Biostatistics, Environmental Sciences and Engineering, Epidemiology, Health Education, Health Policy and Administration, Maternal and Child Health, Nutrition, and Parasitology and Laboratory Practice. All provide courses open to undergraduates and have graduate degree programs. Five of them have an undergraduate degree program: Biostatistics, Environmental Sciences and Engineering, Health Education, Health Policy and Administration, and Nutrition. The Division of Community Health Service extends the School's commitment to community service as its public responsibility. The curriculum and departments participate in research and field service to the state, region and the nation.

Interdisciplinary programs which provide opportunities for students in education, service, and research include: UNC Center for Health Promotion and Disease Prevention, Institute for Environmental Studies, North Carolina Occupational Safety and Health Education Resource Center, Occupational Health Studies Program, Office of International Public Health Programs, and Program on Aging.

Graduate academic degrees offered by the School of Public Health are the Master of Science (M.S.) and the Doctor of Philosophy (Ph.D.), and the graduate professional degrees are the Master of Science in Public Health (M.S.P.H.), the Master of Science in Environmental Engineering (M.S.E.E.), the Master of Public Health (M.P.H.), and the Doctor of Public Health (Dr.P.H.). All requirements concerning these degrees are administered by the faculty of the School of Public Health with the approval of the Administrative Board of the Graduate School.

Close affiliations are maintained with other graduate schools and departments of the University of North Carolina campuses as well as with other

schools and universities and health and human services and research organizations. These affiliations are local, statewide, national, and international in scope. They include joint sponsorship and effort in teaching and research programs, joint faculty appointments, and establishment of field training centers for students in a number of official and voluntary federal, state, and local health and human services organizations.

For information concerning preparation and admission requirements and proposed curricula leading to degrees see the catalogue of the School of Public Health.

Department of Biostatistics (BIOS)

BARRY H. MARGOLIN, *Chairman*

Professors

JAMES R. ABERNATHY	(9)	Public Health Statistics, Demography
ELIZABETH J. COULTER	(11)	Health Statistics, Health Economics, Demography
CLARENCE E. DAVIS	(27)	Clinical Trials, Nonparametric Statistics, Cardiovascular Epidemiology
DENNIS B. GILLINGS*	(25)	Evaluation, Models, Clinical Trials
JAMES E. GRIZZLE*	(2)	Multivariate Analysis, Design of Experiments
DAVID G. KLEINBAUM	(20)	Epidemiological Applications, Multivariate Methods, Multi-media Instructional Materials
GARY G. KOCH	(14)	Categorical Data Analysis, Nonparametric Methods
LAWRENCE L. KUPPER	(19)	Regression Analysis, Biometry, Statistical Applications in Epidemiology and in Environmental Health
BARRY H. MARGOLIN		Statistical Methods for Genetic Toxicology and Environmental Health, Design and Analysis of Biometrical Experiments, Categorical Data Analysis
DANA QUADE	(6)	Nonparametric Methods
PRANAB K. SEN	(10)	Nonparametric Multivariate Analysis, Large Sample Theory, Sequential Methods
RICHARD H. SHACHTMAN	(18)	Stochastic Models, Decision Analysis and their Health Applications, Health Services Research, Health Promotion/ Disease Prevention
CHIRAYATH M. SUCHINDRAN	(29)	Mathematical Demography
MICHAEL J. SYMONS	(17)	Bayesian Inference, Survival Analysis Applications
O. DALE WILLIAMS	(23)	Collaborative Studies Research, Health Promotion and Disease Prevention, Cardiovascular Disease

*On leave 1987-88.

Associate Professors

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|---------------------|------|--|
| RONALD W. HELMS | (15) | Statistical Computation, Linear Statistical Models, Incomplete Longitudinal Data |
| WILLIAM D. KALSBECK | (55) | Sample Design, Survey Analysis |
| CRAIG D. TURNBULL | (26) | Public Health Statistics, Applied Research on Perinatal Outcomes and Behavioral Sciences |

Assistant Professors

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|--------------------|------|--|
| STEPHEN A. BERNARD | | Hematology/Oncology |
| TIMOTHY M. MORGAN | | Clinical Trials, Survival Analysis, Cancer Statistical Methods |
| KEITH E. MULLER | (76) | Linear and Nonlinear Models, Studies Design for Environmental Research |
| MARJOLEIN V. SMITH | | Stochastic Processes and Biological Applications of Modelling |
| KINH N. TRUONG | | Time Series Analysis, Nonparametric Regression, Bootstrap Methods |

Research Associate Professors

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|-----------------------|------|---|
| RICHARD E. BILSBORROW | (30) | Economic Demography, Demography Economic Development |
| LOYD E. CHAMBLESS | (82) | Logistic Regression Analysis, Epidemiological Applications, Analysis of Survey Data |
| JAMES D. HOSKING | (79) | Data Management, Multivariate Techniques |

Research Assistant Professors

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|------------------------|------|--|
| SHRIKANT I. BANGDIWALA | (80) | Nonparametric Methods, Clinical Trials Methodology, International Health |
| DAVID H. CHRISTIANSEN | (21) | Data Management and Statistical Computing |
| MUHAMMAD K. HABIB | (22) | Time Series, Information Theory Inference for Stochastic Processes |
| PAUL W. STEWART | (84) | Linear Models, Distribution Theory, Statistical Inference, Longitudinal Data |

Adjunct Professors

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|-------------------|------|--|
| ROBERT C. ELSTON | | Human Genetics Analysis |
| DAVID G. HOEL | | Sequential Procedures, Biomathematics, Biological Applications |
| DANIEL G. HORVITZ | | Sample Survey Design, Measurement of Non-Sampling Errors in Surveys, Demographic Simulation Models |
| ANDERS LUNDE | | Demography, Vital Statistics, Health Statistics, Social Statistics |
| IBRAHIM A. SALAMA | (38) | Nonparametric Statistics, Order Statistics, Ergodic Theory |
| BABUBHAI V. SHAH | (49) | Simulation Models, Multivariate Data Analysis and Design of Experiments |

Adjunct Associate Professors

ARJUN L. ADLAKHA		Population Change, Mortality, Fertility
JOHN P. CREASON		Statistical Application in Environmental
		Health, Dose-response Methodology
LESTER R. CURTIN		Statistical Modeling, Sample Survey
		Methodology
DAVID M. DELONG		Statistical Computing, Time Series
		Analysis, Survival Methods
EDWARD L. FROME		Statistical Computing and Biomedical Data
		Analysis
SANDRA B. GREENE		Health Services Applications
FRANK E. HARRELL, JR.	(69)	Nonparametric Statistics, Survival Analysis,
		Clinical Studies
KERRY L. LEE	(52)	Multivariate Analysis, Classification and
		Cluster Analysis
JUDITH T. LESSLER		Sampling
WILLIAM C. NELSON		Multivariate Techniques, Categorical Data
		Methods, Environmental
		Applications
DONALD W. REINFURT		Categorical Data Analysis, Experimental
		Design (Highway Safety)
WILSON B. RIGGAN		Regression Analysis, Time Series Analysis,
		Multivariate Analysis
JEREMIAH M. SULLIVAN		Estimation of Demographic Rates and
		Family Planning Evaluation
WILLIAM E. WILKINSON		Stochastic Processes, Epidemiology
DAVID L. ZALKIND		Operations Research, Health
		Administration

Adjunct Assistant Professors

NGUYEN VAN DAT		Biopharmaceutics
CHRISTOPHER PORTIER		Design and Analysis of Animal Cancer
		Bioassay Studies
CHARLES J. ROTHWELL		Data Management
JOHN R. SCHOENFELDER		Clinical Trials, Nonparametric Methods,
		Applied Markov Modeling
THOMAS B. STARR		Risk Assessment and Reproductive
		Surveillance

Adjunct Instructor

PRISCILLA A. GUILD		Health Services, Planning and
		Evaluation Research

Professors Emeriti

REGINA C. ELANDT-JOHNSON
ROY R. KUEBLER, JR.
FORREST E. LINDER
H. BRADLEY WELLS

- 101 PUBLIC HEALTH STATISTICS (3). Introduction to procedures in collection, summarization, analysis, and presentation of data. Topics include sampling, experimentation, measurement, descriptive statistics, probability, confidence intervals, and tests of hypotheses. *Fall*. Quade.
- 105 PRINCIPLES OF STATISTICAL INFERENCE (3). Prerequisite, permission of instructor. An introduction to the methods of modern statistical analysis and their use in drawing conclusions from data collected in surveys and in the laboratory. Topics include probability distributions, confidence interval estimation of population parameters, tests of significance, chi-squared methods, analysis of variance, correlation, and regression. *Fall and summer*. Turnbull.
- 106 MATHEMATICAL METHODS IN BIostatISTICS (1 each). Prerequisites: Mathematics 32 (for 106 and 107), Mathematics 147 (for 108), or equivalents. Special mathematical techniques necessary for biostatistics. BIOS 106: topics in calculus; BIOS 107: topics in elementary matrix theory; BIOS 108: topics in advanced matrix theory. *Summer*. Staff.
- 111 INTRODUCTION TO STATISTICAL COMPUTING AND DATA MANAGEMENT (3). Prerequisite, Biostatistics 101 or equivalent and permission of instructor. Introduction to use of computers to process and analyze data, components of digital computers, characteristics of magnetic storage devices, use of JCL and utility programs, concepts and techniques of research data management use of statistical program packages and interpretation. *Fall and spring*. Helms and Hosking.
- 115 PRINCIPLES OF STATISTICAL INFERENCE WITH COMPUTING (4). Prerequisite, permission of instructor. Covers the same major topics as Biostatistics 105, but also provides an introduction to a statistical computing system. No previous computing or programming experience is required. *Fall and spring*. Symons.
- 120 SPECIAL TECHNIQUES IN BIOMETRY (1-3). Special topics of current interest in biometry. *Fall, spring and summer*. Staff.
- 124 SOME QUANTITATIVE METHODS IN PLANNING AND EVALUATION (Health Administration 224) (3). Prerequisite, Biostatistics 101 or equivalent or permission of instructor. Planning cycle, methods overview, data sources, PERT, budgeting, health indices, measurement of goal fulfillment, achievement, effectiveness, efficiency, research designs, benefit cost analysis, decision analysis, probability, utility, and decision trees. *Spring*. Coulter.
- 130 RESEARCH ISSUES IN MENTAL HEALTH STATISTICS (3). Prerequisites, Biostatistics 105 and Epidemiology 160, or permission of instructor. Concepts of measurement, history and current status of classification schemata for mental disorders, methods of data analysis, and research designs. *Spring*. Turnbull.
- 135 PROBABILITY AND STATISTICS (4). Prerequisite, Math 32 or equivalent. Basics of probability; random variables and their probability distributions; special distributions, including the binomial, Poisson, normal, gamma; expectation and moments; linear combinations of random variables. Elements of estimation and hypothesis testing; analysis of variance; multiple regression; analysis of categorical data; some nonparametric methods. Particular attention is given to the statistical treatment of environmental science and engineering problems. *Fall*. Symons.
- 140 PROBLEMS IN BIostatISTICS (1 or more). Prerequisites to be arranged with the faculty in each case. A course for students of public health who wish to make a study of some special problem in the statistics of the life sciences and public health. *Fall, spring and summer*. Staff.
- 145 PRINCIPLES OF EXPERIMENTAL ANALYSIS (3). Prerequisite, Biostatistics 115 or 135 or equivalent and permission of instructor. Continuation of Biostatistics 115; the analysis of experimental and observational data, including multiple regression, and analysis of variance and covariance. *Fall and spring*. Staff.
- 150 ELEMENTS OF PROBABILITY AND STATISTICAL INFERENCE (Statistics 101) (3). Prerequisite, Math 32 or equivalent. Fundamentals of probability theory; descriptive

- statistics; fundamentals of statistical inference, including estimation and hypothesis testing. *Fall*. Shachtman.
- 160 PROBABILITY AND STATISTICAL INFERENCE I (3). Prerequisite, Mathematics 32 or equivalent. Introduction to probability; discrete and continuous random variables; expectation theory; bivariate and multivariate distribution theory; regression and correlation; linear functions of random variables; theory of sampling; introduction to estimation and hypothesis testing. *Fall*. Kupper.
- 161 PROBABILITY AND STATISTICAL INFERENCE II (3). Prerequisite, Biostatistics 160. Distribution of functions of random variables; central limit theorem; estimation theory; maximum likelihood methods; hypothesis testing; power, Neyman-Pearson Theorem, likelihood ratio tests, non-central distributions. *Spring*. Kupper.
- 162 INTRODUCTORY APPLIED STATISTICS (3). Prerequisites, Biostatistics 111, 150 or equivalents. Approaches to problems of description, goodness of fit, univariate location and scale, bivariate independence and correlation, and comparison of independent or matched samples, involving categorical, discrete, normal, or ranked data. *Spring*. Quade.
- 163 INTRODUCTION TO LINEAR MODELS (3). Prerequisites, Biostatistics 107, 111, 145, 150, or equivalents. Regression analysis in matrix terms, general linear hypothesis, diagnostics, model building. One- and two-way ANOVA with fixed or random effects. Power; algorithms; analysis of covariance. *Fall*. Muller.
- 164 SAMPLE SURVEY METHODOLOGY (Statistics 104) (3). Prerequisite, Biostatistics 150 or equivalent or permission of instructor. Fundamental principles and methods associated with survey sampling, giving primary attention to as nonmathematical as possible a treatment of simple random sampling, stratified sampling, and cluster sampling. Also, techniques of questionnaire design, the problems of nonresponse, and sources of nonsampling errors. Practical experience in the applied aspects of sampling is provided by student participation in the design, execution, and analysis of an actual survey. *Spring*. Kalsbeek.
- 165 ANALYSIS OF CATEGORICAL DATA (3). Prerequisites, Biostatistics 145, 150, and Epidemiology 160 or equivalents. Introduction to the analysis of categorized data: rates, ratios, and proportions; relative risk and odds ratio; Cochran-Mantel-Haenszel procedure; survivorship and life table methods; linear models for categorical data. Applications in demography, epidemiology, and medicine. *Fall*. Koch.
- 166 APPLIED MULTIVARIATE ANALYSIS (Statistics 160) (3). Prerequisite, Biostatistics 163 or equivalent. Application of multivariate techniques, with emphasis on the use of computer programs. Multivariate analysis of variance, multivariate multiple regression, weighted least squares, principal component analysis, canonical correlation and related techniques. *Spring*. Muller.
- 167 APPLIED STOCHASTIC PROCESSES (Operations Research and Systems Analysis 167) (3). Prerequisite, Biostatistics 160 or equivalent. Markov chains, Poisson processes and extensions, epidemic models, branching processes and other stochastic models of empirical processes. Disease, population, and other biostatistical applications. *Fall and spring*. Sen.
- 168 DESIGN OF PUBLIC HEALTH STUDIES (3). Prerequisites, Biostatistics 145, 150 or equivalents. Statistical concepts in basic Public health study designs: cross-sectional, case-control, prospective and experimental (including clinical trials). Validity, measurement of response, sample size determination, matching and random allocation methods. *Summer*. Davis.
- 170 DEMOGRAPHIC TECHNIQUES I (3). Prerequisite, Biostatistics 101 or equivalent. Source and interpretation of demographic data; rates and ratios, standardization, complete and abridged life tables; estimation and projection of fertility, mortality, migration, and population composition. *Fall*. Suchindran.

- 191 FIELD OBSERVATIONS IN BIOSTATISTICS (1). Field visits to, and evaluation of, major nonacademic biostatistical programs in the Research Triangle area. *Field Fee \$25. Fall.* Turnbull.
- 213 DATA MANAGEMENT IN BIOSTATISTICS (3). Prerequisite, Biostatistics 111 or equivalent. Techniques for designing, implementing and operating computerized data management systems for large studies with particular emphasis on collaborative medical studies. Experience in programming in a procedural language (PL-1, FORTRAN, C, BASIC, etc.) is assumed. *Spring and summer.* Hosking.
- 215 HEALTH DATA PROCESSING LABORATORY (1-3). Prerequisite, Biostatistics 213. A laboratory course for students who wish to gain experience in the data processing aspects of current projects and collaborative medical studies of the Department. *Fall, spring and summer.* Hosking.
- 240 SPECIALIZED METHODS IN HEALTH STATISTICS (1 or more). Prerequisite, permission of the instructor. Statistical theory applied to special problem areas of timely importance in the life sciences and public health. Lectures, seminars and/or laboratory work, according to the nature of the special area under study. *Fall, spring and summer.* Staff.
- 250 ADVANCED TECHNIQUES IN BIOMETRY (3). Prerequisites, Biostatistics 161, 163; or equivalents, permission of instructor. Three separate modules presenting advanced techniques in biometry (not the same selection at each offering). A knowledge of elementary computer programming is assumed. *Summer.* Staff.
- 256 INTRODUCTION TO NONPARAMETRIC STATISTICS (Statistics 171) (3). Prerequisite, Biostatistics 161 or equivalent. Theory and application of nonparametric methods for various problems in statistical analysis. Includes procedures based on randomization, ranks, and U-statistics. A knowledge of elementary computer programming is assumed. *Fall.* Bangdiwala.
- 257 NONPARAMETRIC PROCEDURES IN BIOMETRIC RESEARCH (3). Prerequisite, Biostatistics 256 or equivalent. Nonparametric point and interval estimation in linear models useful in biometric research. Robust procedures, including those based on ranks, for analyzing designed experiments, bioassays, and clinical trials. *Spring.* Sen.
- 260 LARGE SAMPLE THEORY (3). Prerequisite, Biostatistics 161; corequisite, Mathematics 121. Stochastic convergence, probability inequalities, empirical distributions, other statistics, central limit theorems, large sample theory of statistical tests and estimates, categorical data models. *Fall.* Sen.
- 264 ADVANCED SURVEY SAMPLING METHODS (3). Prerequisite, Biostatistics 164 or equivalent. Continuation of Biostatistics 164 for advanced students: stratification, special designs, multistage sampling, cost studies, nonsampling errors, complex survey designs, employing auxiliary information, and other miscellaneous topics. (1988 and alternate years.) *Fall.* Kalsbeek.
- 265 LINEAR MODELS IN CATEGORICAL DATA ANALYSIS (3). Prerequisite, Biostatistics 266. Theory of statistical methods for analyzing categorical data by means of linear models; multifactor and multiresponse situations; interpretation of interactions. *Spring.* Koch.
- 266 LINEAR MODELS I (4). Prerequisites, Mathematics 137 (or Math 116), Mathematics 147, Biostatistics 111, 160, 161, 162, 163; or equivalents. Multivariate normal and related distributions; basic univariate and multivariate linear models; computational aspects. *Fall.* Helms.
- 267 LINEAR MODELS II (4). Prerequisite, Biostatistics 266. Principal components, discriminant functions, canonical variates, repeated measurements experiments, analysis of longitudinal data, components of variance. *Spring.* Truong.
- 271 DEMOGRAPHIC TECHNIQUES II (3). Prerequisites, Biostatistics 170 and integral calculus. Methods of analysis when data are deficient; populations projection methods; stable and quasistable methods; interrelations among demographic variables; migration analysis; uses of population models. *Spring.* Suchindran.

- 277 MATHEMATICAL MODELS IN DEMOGRAPHY (3). Prerequisite, permission of the instructor. A detailed presentation of natality models, including necessary mathematical methods, and applications; deterministic and stochastic models for population growth, migration (1989 and alternate years.) *Spring*. Suchindran.
- 280 SURVIVORSHIP ANALYSIS (3). Prerequisite, permission of instructor. Survival functions, hazard rates, life tables, estimation of survival functions from complete and censored data, fitting parametric models, applications to clinical trials. (1989 and alternate years.) *Spring*. Morgan.
- 281 STATISTICAL METHODS IN HUMAN GENETICS (Genetics 281) (3). Prerequisite, permission of instructor. An introduction to statistical procedures for genetic counseling, testing genetic hypotheses, and estimating genetic parameters from human data. Topics covered include models for monogenic autosomal and X-linkage, mutation and selection, ploygenic inheritance. Special emphasis will be given to segregation and linkage analysis. (1989 and alternate years.) *Spring*. Staff.
- 282 THEORY AND METHODS FOR SURVIVAL AND RISK ANALYSIS (3). Prerequisites, Biostatistics 160 and 280, or equivalents. Applied theory and methods for the analysis of survival data with covariables, including rank methods, parametric methods, conditional likelihoods, proportional hazards, grouped data, iterative calculations, and examples. *Spring*. Morgan.
- 302 FIELD TRAINING IN PUBLIC HEALTH STATISTICS (1-6). This course is designed to offer student majoring in biostatistics an opportunity for supervised experience in all phases of the statistical programs in selected health agencies. Open only to students majoring in biostatistics. *Field fee* \$450. *Summer*. Staff; field counselors.
- 341 PRINCIPLES OF STATISTICAL CONSULTING (1). Biostatistics students only. An introduction to the statistical consulting process, emphasizing its nontechnical aspects. *Fall and spring*. Staff.
- 342 PRACTICE IN STATISTICAL CONSULTING (1-3). Prerequisites, BIOS 111, 145, 150, 341, or equivalents, and permission of the instructor. Under supervision of a faculty member, the student interacts with research workers in the health sciences, learning to abstract the statistical aspects of substantive problems, to provide appropriate technical assistance, and to communicate statistical results. *Fall, spring, and summer*. Staff.
- 350 TRAINING IN STATISTICAL TEACHING IN THE HEALTH SCIENCES (2 or more). Prerequisite, a minimum of one year of graduate work in Statistics. Principles of statistical pedagogy. Students will be responsible for assistance in teaching elementary statistics to students in the health sciences. Students work under the supervision of the faculty with whom they have regular discussions of methods, content, and evaluation of performance. *Fall, spring and summer*. Staff.
- 389 RESEARCH SEMINAR IN BIOSTATISTICS (1-3). Prerequisite, permission of the instructor. Seminar on new research developments in selected biostatistical topics. *Fall and spring*. Staff.
- 390 RESEARCH IN BIOSTATISTICS (2 or more). Individual arrangements may be made by the advanced student to spend part or all of his or her time in supervised investigation of selected problems in statistics. *Fall, spring and summer*. Staff.
- 392 MASTER'S PAPER (1-3). *Fall, spring and summer*. Staff.
- 393 MASTER'S THESIS (0-6). *Fall, spring and summer*. Staff.
- 394 DOCTORAL DISSERTATION (0-9). *Fall, spring and summer*. Staff.
- 400 GENERAL REGISTRATION (0).

Department of Environmental Sciences and Engineering (ENVR)

RUSSELL F. CHRISTMAN, *Chairman*

Professors

RUSSELL FABRIQUE CHRISTMAN	(5)	Organic Water Chemistry, Pollutant Identification, Environmental Management Strategies
RICHARD N.L. ANDREWS	(50)	Environmental Policy
EDWARD CHANEY		Radiation Therapy
FRANCIS A. DIGIANO	(51)	Water and Wastewater Treatment Processes, Mathematical Modeling of Mass Transport
DONALD L. FOX	(8)	Smog Chamber Chemistry, Aerosols
DAVID ALLISON FRASER	(10)	Industrial Hygiene, Occupational Health
AVRAM GOLD	(43)	Environmental Toxicology
ROBERT L. HARRIS	(12)	Industrial Hygiene Engineering, Air Pollution Control
MILTON SYDNEY HEATH, JR.	(39)	Natural Resource Law
HARVEY EDWARD JEFFRIES	(14)	Atmospheric Chemistry, Modeling and Computerized Data Acquisition
J. DONALD JOHNSON, JR.	(15)	Environmental, Analytical and Chemistry of Water
EDWARD J. KUENZLER	(16)	Aquatic and Wetland Ecology, Nutrient Cycling
DONALD T. LAURIA	(18)	Water and Wastewater Systems Analysis, Mathematical Modeling
DAVID LEITH	(56)	Air Pollution Control Engineering, Aerosol Technology
DAVID H. MOREAU	(48)	Water Resources Planning
HANS W. PAERL	(65)	Environmental Microbial Ecology
FREDERIC K. PFAENDER	(25)	Environmental Microbiology
PARKER CRAMER REIST	(26)	Aerosol Technology, Industrial Hygiene Engineering
MORRIS A. SHIFFMAN	(29)	Environmental Management
MARK S. SHUMAN	(30)	Environmental Chemistry, Analytical Chemistry, Electrochemistry
CARL M. SHY	(49)	Environmental, Occupational Epidemiology
PHILIP C. SINGER	(31)	Water and Wastewater Treatment Processes, Water Chemistry
MARK D. SOBSEY	(38)	Environmental Microbiology, Virology, Toxicology
ALVIS GREELY TURNER, JR.	(33)	Environmental Toxicology, Environmental Risk Assessment, Hazardous Wastes Management
JAMES E. WATSON, JR.	(37)	Radiological Hygiene
CHARLES MANUEL WEISS	(35)	Water Quality of Natural Waters, Limnology of Impoundments

Associate Professors

JOHN BRISCOE	(53)	Water-Supply and Sanitation, Health Problems in Developing Countries, Mathematical Modeling
R. EUGENE JOHNSTON	(28)	Radiological Imaging
DONALD G. WILLHOIT	(36)	Radiological Hygiene and Occupational Health
DALE WHITTINGTON		Water Resources Economics; International Development

Assistant Professors

DEBORAH A.L. AMARAL	(68)	Environmental Risk Management
LOUISE M. BALL	(62)	Metabolism; Toxicology and Genotoxicity of Xenobiotics
DOUGLAS J. CRAWFORD-BROWN	(54)	Health Physics, Medical Physics, Theoretical Radiobiology
MICHAEL FLYNN	(61)	Relationship Between Exposure and the Capture Efficiency of Local Exhaust Hoods; Computer Aided Optimization of Ventilation Systems
CASS T. MILLER	(59)	Mathematical Modeling of Ground Water Hydraulics, Contaminant Transport and Transformation Processes, Applied Mathematics in Water Resources Engineering, Computer Methods in Engineering
STEVEN L. SIMON	(63)	Environmental Dose Assessment, Modeling of Contamination Pathways and Statistical Analysis of Radioecological Data, Medical Radiation Dosimetry

Instructor

MICHAEL D. AITKEN	(66)	Wastewater and Hazardous Waste Treatment; Applied Biotechnology
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Lecturer

DONALD E. FRANCISCO	(9)	Limnology and Aquatic Microbial Ecology
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Research Associate Professor

RICHARD M. KAMENS	(55)	Mutagenic and Chemical Changes of Combustion Particles in the Atmosphere
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Research Assistant Professors

M. JUDITH CHARLES	(69)	Gas Chromatography/Mass Spectrometry
FRANCES LYNN	(67)	Environmental Risk Assessment, Communication of Scientific and Technological Information, Sociology of Science

Adjunct Professors

WARREN A. COOK		Industrial Health
MERRIL EISENBUD		Environmental Radioactivity
LEONARD J. GOLDWATER		Occupational Medicine
JOHN LUMSDEN		Occupational Health
TED B. MARTONEN		Aerosol Sedimentation
FOREST O. MIXON	(21)	Environmental Engineering, Process Engineering
P. AARNE VESILIND		Resource Recovery, Sludge Handling and Disposal
WILLIAM E. WILSON, JR.		Aerosols, Photochemistry, Smog Chambers

Adjunct Associate Professors

PHILIP W. ALBRO	(58)	Environmental Chemistry
MICHAEL A. BERRY		Program and Research Management; Environmental Legislation; Health Assessments; Indoor Air Pollution
LINDA S. BIRNBAUM		Xenotoxic Metabolism, Biochemical Toxicology
JOHN M. DEMENT	(60)	Industrial Hygiene
PHILIP HAMRICK		Radiological Hygiene
J. RONALD HASS	(64)	Environmental Chemistry
LINDA W. LITTLE		Bioassay Procedures
DAVID S. MILLINGTON	(52)	Gas Chromatography/Mass Spectrometry, Applications for Pollutant Identification
WARREN T. PIVER		Environmental Management
MADHAV B. RANADE		Air and Industrial Hygiene
HERSCHEL H. SLATER		Air Pollution Meteorology

Adjunct Assistant Professors

LARRY D. CLAXTON		Mutagenes in Testing, Biochemical Chemistry
DANIEL L. NORWOOD		Environmental Analytical Chemistry; Mass Spectrometry
WOODHALL STOPFORD		Occupational Medicine Physics
DAVID B. WASHBURN		Diagnostic Radiation

Professors Emeriti

EMIL THEODORE CHANLETT
 JOHN L.S. HICKEY
 DAVID H. HOWELLS
 JAMES CHRISTIAN LAMB, III
 DANIEL ALEXANDER OKUN
 ARTHUR J. STERN
 STANLEY J. WEIDENKOPF

- 100 READING IN ENVIRONMENTAL SCIENCES AND ENGINEERING (1-6). Prerequisite, permission required for students outside the Department. Extensive library study of a specific subject in environmental sciences and engineering. The subject and

- requirements of the project are arranged with the faculty in each instance. *Fall, spring and summer.* Staff.
- 101 SURVEY OF ENVIRONMENTAL PROBLEMS (3). A survey of basic environmental issues for the non-technologist, including physical dynamics of the natural environment, specific environmental problems and quality control techniques. *Spring.* Shiffman.
- 110 PRINCIPLES OF CHEMICAL CARCINOGENESIS (2). Review of DNA structure, replication, repair and the control of these processes. Bioactivation of carcinogens and the interaction of activated metabolites with DNA will also be covered. *Spring.* Gold.
- 111 INTRODUCTION TO ENVIRONMENTAL POLICY (3). Current issues in environmental protection. Analysis of environmental problems and decisions from the viewpoints of the various disciplines concerned with the assessment of risk, policy development and environmental management. *Fall.* Shiffman.
- 117 ENGINEERED WATER SYSTEMS AND HEALTH (3). Prerequisite, Biostatistics 105, Mathematics 34 or equivalents. Permission of instructor required. The quantitative assessment of the effects of water supply and wastewater disposal practices on infectious and environmentally derived diseases. Examples drawn from developed and underdeveloped countries. Attention given to implications for engineering design. *Fall.* Briscoe.
- 118 QUANTITATIVE STUDIES FOR ENVIRONMENTAL SCIENCES (3). Applied mathematics from the viewpoint of those studying environmental sciences. Specific aspects of differential and integral calculus are developed as needed in environmental hygiene. *Second summer session.* Reist.
- 122 WATER CHEMISTRY (4). Prerequisites, Chemistry 11 and Chemistry 21 or equivalents. Principles and applications of water chemistry. Thermodynamic background for equilibrium calculations is presented. Proton transfer, solubility, complex formation and redox reactions in natural waters are discussed. *Three lecture and two laboratory hours a week, fall.* Johnson, Singer.
- 123 ORGANIC MATERIALS IN NATURAL WATERS (3). Prerequisites, organic chemistry, instrumental analysis or permission of the instructor. Origins of natural product organic materials in rivers and lakes. Survey of synthetic organic waste sources, microbial transformations and metal transport properties. Organic water quality monitoring and rationale for water quality criteria and standards. *Spring, alternate years.* Christman.
- 124 ENVIRONMENTAL KINETICS OF CHEMISTRY AND BIOLOGY (2). Prerequisite, Environmental Sciences 122. Rates of chemical and biological processes of environmental systems. Theory and models of gas and solution kinetics. Applications are primarily to the chemical kinetics of complex reactions in aqueous solutions. *Spring.* Johnson.
- 127 OCEANOGRAPHY (3). (Biology 126, Marine Sciences 101). Prerequisites, Biology 11, Chemistry 21, Physics 25 or permission. An interdisciplinary study of the sea and the interrelationships of marine processes. *Three lecture hours a week, fall and spring.* Neumann, Frankenberg.
- 128 CHEMICAL OCEANOGRAPHY (Marine Sciences 105) (4). Prerequisite, one semester or physical chemistry or Environmental Sciences 122, or Chemistry 180 or equivalent. Variation and abundance of sea water constituents and the chemical, physical and biological processes contributing to their distribution, as well as problems of dispersion of conservative and nonconservative substances are considered. *Spring.* Martens.
- 129 SPECTROSCOPIC PRINCIPLES FOR ENVIRONMENTAL ANALYSIS (3). Prerequisites, organic and analytical chemistry. Fundamentals of several spectroscopic methods including mass spectroscopy are introduced. Emphasis on interpretation and problem solving applied to environmental analytical evaluations. *Fall.* Staff.
- 131 BIOLOGY IN ENVIRONMENTAL SCIENCE (3). Prerequisite, general chemistry. An introduction to biology, including principles of biochemistry, cell structure, classification, and ecology. Laboratory emphasizes techniques utilized in measurement and control of environmental pollution. *Two lecture and two laboratory hours a week, spring.* Francisco.

- 132 LIMNOLOGY AND WATER POLLUTION (3). Prerequisite, two semesters of chemistry or Environmental Sciences 122. The basic determinants of water quality and limnological principles are used to define the ecology of clean and polluted aquatic environments, including lakes, reservoirs and rivers. *Two lecture and two laboratory hours a week, fall and spring.* Weiss.
- 133 ENVIRONMENTAL HEALTH AND THE AQUATIC ENVIRONMENT (3). Prerequisite, Environmental Sciences 135 or equivalent. Environmental biology as it relates to the health of man and the environment. Includes risk assessment process for aquatic pollution, wastewater treatment, aquatic toxicology, infectious agents, indicator organisms and bioassays. *Two lecture and three laboratory hours a week, fall.* Pfaender, Sobsey, staff.
- 134 ENVIRONMENTAL MICROBIOLOGY (3). Prerequisites, organic chemistry, Environmental Sciences 131 or Environmental Sciences 133, general biology, or permission of instructor. Principles of general microbiology; an examination of the microbial world with emphasis on nonpathogenic bacteria: their cytology, growth, physiology, and significance in the environment with special attention given to treatment processes. *Two lecture and three laboratory hours a week, spring.* Pfaender.
- 136 BIOLOGICAL OCEANOGRAPHY (Biology 140, Marine Sciences 104) (4). Prerequisites, Biology 54 or Biology 105. Physical, chemical and biological factors characterizing estuarine and marine environments emphasizing factors controlling animal and plant populations including methods of analysis, sampling and identification. *Five lectures and two laboratory hours a week, summer.* Staff.
- 137 ECOLOGY OF WETLANDS (Marine Science 137) (4). Prerequisites, 1 year of biology, 1 year of chemistry, 1 semester of ecology, and permission of instructor. An introduction to the functioning of freshwater and estuarine marsh and swamp ecosystems, with emphasis on systems of the southeastern U.S. *Fall.* Kuenzler.
- 138 ENVIRONMENTAL VIROLOGY (4). Prerequisite, introductory course in microbiology, or Environmental Sciences 131 or 133; or permission. Ecological, environmental health and fundamental aspects of virology, with special emphasis on viruses in water, food, and air. *Three lecture and three laboratory hours a week, spring.* Sobsey.
- 141 AIR AND INDUSTRIAL HYGIENE (3). Not open to students who have received credit for Environmental Sciences 142. Problem definition, sources of information, health effects, legislative framework and control methods. Hazard recognition, evaluation and remediation approaches for community and industrial environments. *Fall.* Fox, Fraser.
- 142 SURVEY OF AIR AND INDUSTRIAL HYGIENE (3). A survey of current problems in air pollution, air pollution control and industrial hygiene including potential for exposure to disease-causing agents, standards and standards setting and methods of control. *Summer I.* Staff.
- 143 APPLIED PHYSIOLOGY AND TOXICOLOGY (3). Prerequisite, admission to graduate standing or permission of instructor. Physiologic responses of the various organs and organ systems of the body to the physical and chemical stresses of the environment are considered. The methods of industrial toxicology and the toxicological basis for the Threshold Limit Values will be discussed. Concentration-Time equivalence, routes of entry and synergism will be investigated. *Three lecture hours a week, fall.* Gold.
- 144 INDUSTRIAL TOXICOLOGY (2). Toxicological assessment of and a case presentation of related exposure is given. A conceptual approach is utilized to design appropriate programs to prevent worker ill health due to industrial toxicant exposure. *Two lecture hours per week, spring.* Staff.
- 145 INTRODUCTION TO AEROSOL SCIENCE (4). Prerequisite, admission to the Department of Environmental Sciences and Engineering or permission of the instructor. Physical and chemical principles underlying behavior of particles suspended in air. Topics include rectilinear and curvilinear motion of the particles in a force field, diffu-

- sion, evaporation, and condensation, electrical and optical properties and particle coagulation, as well as the behavior of the cloud *in toto*. *Three lecture hours and 2 lab hours a week, fall*. Reist.
- 145L AEROSOL SCIENCE LABORATORY (2). Pre- or corequisite, Environmental Sciences 145. Basic laboratory exercises in aerosol sciences. *Fall*. Reist.
- 147 OCCUPATIONAL SAFETY (2). Fundamentals of occupational safety with emphasis on legislation and organization of industrial safety programs including hazard recognition, analysis, control and motivational factors pertaining to industrial accident prevention. *Fall*. Staff.
- 148 AIR POLLUTION METEOROLOGY (3). Prerequisites, Geography 110, Mathematics 32, Physics 25 or equivalents. Principles of boundary layer meteorology; theory and modeling of transport and diffusion of air pollutants; plume rise; air pollution climatology; data selection for site design; role of meteorology in air quality management. *Spring*. Slater.
- 149 HEALTH HAZARDS OF INDUSTRIAL OPERATION (3). Prerequisite, ENVR 141. An introduction of the health hazards associated with the various unit operations of industry. Field trips to local industries planned. *Spring*. Flynn.
- 153 AMERICAN ENVIRONMENTAL POLICY (3). A survey of the development of American environmental policies using history to illuminate present and emerging issues. Includes policies for environmental hazards, resource opportunities and others affecting environmental conditions. *Spring*. Andrews.
- 161 ELEMENTS OF RADIOLOGICAL HYGIENE (2). Prerequisite, calculus. The physics of ionizing radiations, their interactions with matter, biological effects, and principles of radiation protection are presented. *Spring, second summer session*. Watson, Willhoit.
- 162 MODERN PHYSICS FOR ENVIRONMENTAL SCIENCE (3). Prerequisite, Environmental Sciences 118. Modern physics with the emphasis on radioactivity and ionizing radiations. *Fall*. Watson.
- 163 RADIATION INSTRUMENTATION (3). Corequisite, Environmental Sciences 162. A laboratory study of measurements of radioactivity with emphasis on the principles of operation of the instruments. *One lecture and four laboratory hours a week, fall*. Crawford-Brown.
- 164 FIELD OBSERVATIONS IN RADIOLOGICAL HYGIENE (2). Prerequisite, permission of instructor. Field observation of health physics practices at nuclear fuel cycle facilities and government nuclear facilities. Field fee \$175.00. *Spring*. Watson.
- 165 ADVANCED RADIOLOGICAL LABORATORY (2). Intensive radiological laboratory training at Oak Ridge Associated Universities. Tour of research facilities at Oak Ridge National Laboratory. Field fee \$200.00. *Spring, alternate years beginning 1983*. Crawford-Brown.
- 167 INTRODUCTION TO MEDICAL PHYSICS (2). Permission of the instructor required. The physics of radiation therapy, diagnostic radiology, and nuclear medicine are introduced by practicing clinical physicists. *Fall*. Crawford-Brown, Chaney, Johnston, Washburn.
- 171 WATER QUALITY EVALUATION AND CONTROL (3). Characteristics of water as a resource. Water uses, trends, water quality concepts, measurements, criteria, problems, pollutants. Regulation of water quality. *Fall*. Staff.
- 174 WATER AND WASTES TREATMENTS PROCESSES (4). Prerequisite, ENVR 122. Permission of instructor required, or corequisite, ENVR 131. A study of unit processes for water and waste water treatment. Processes discussed include gas transfer, coagulation, disinfection, absorption, demineralization, sedimentation, filtration, aerobic and anaerobic biological treatment. *Three lecture and two lab hours a week, spring*. Singer.
- 176 GROUND WATER ENGINEERING (3). Prerequisites, MATH 31 and MATH 32. Use of analytical solutions to define ground water movement and contaminant transport in subsurface environments. *Three lecture hours a week, fall*. Miller.

- 183 SPECIAL TOPICS IN WATER RESOURCES (2). Prerequisite, permission of instructor. interdisciplinary exploration of the principal issues involved in water resource planning, conservation, development and management. Includes the nature of water resources, principal water uses and conflicts, public objectives and policy issues, institutional arrangements, legal framework planning and governmental agency programs. *Spring*. Staff.
- 200 PROBLEMS IN ENVIRONMENTAL SCIENCES AND ENGINEERING (1 or more). Departmental permission required. For students outside the Department who desire to undertake individual study of a specific problem in environmental sciences and engineering. The subject and requirements of the project are arranged with the faculty in each individual instance. *Two or more hours a week, fall, spring, summer*. Staff.
- 210 ISSUES IN ENVIRONMENTAL MANAGEMENT (1). The practice of environmental management will be presented by persons engaged in professional practice in government, industry, research and consulting. *Fall*. Shiffman, Andrews.
- 211 METHODS IN ENVIRONMENTAL MANAGEMENT (3). The strategies and techniques used in the management of environmental protection programs. Safety evaluations, regulatory processes, institutional arrangements and organization responses. *Fall*. Shiffman.
- 212 ADMINISTRATION OF ENVIRONMENTAL PROTECTION PROGRAMS (3). Organization and operation of environmental protection programs to include administrative processes, program analysis, performance evaluation and project management methods. *Spring*. Shiffman.
- 217 SYSTEMS ANALYSIS IN ENVIRONMENTAL PLANNING (3). Prerequisite, calculus. Applications of systems techniques to the management of environmental quality. *Fall*. Staff.
- 219 ENVIRONMENTAL SYSTEMS ANALYSIS (City and Regional Planning 219) (3). Multiobjective programming and planning techniques applied to environmental and resource management. Review of selected models on water quantity and quality, air quality, land use, and public facilities location. *Fall*. Whittington.
- 221 INSTRUMENTAL METHODS OF ANALYSIS (3). Prerequisites, inorganic and analytical chemistry. Principles and techniques of instrumental chemical analysis, including optical, electrical and separation methods. Laboratory sessions include absorption spectrophotometry, potentiometry, amperometry, gas chromatography, GC-mass spectrometry. *Two lecture and four laboratory hours, spring*. Shuman.
- 222 SPECIAL TOPICS IN AQUATIC CHEMISTRY (2). Prerequisite, Environmental Sciences 122. Modern topics in aquatic chemistry, application of chemical concepts to understanding and controlling man's aquatic environment. May be taken for credit more than once, as special topics change. *Fall, spring*. Staff.
- 223 TRACE ELEMENTS IN THE ENVIRONMENT (3). Prerequisite, Environmental Sciences 122 or equivalent. Transport and transformations of selected trace elements in the environment including global cycles, societal flow, models and experimental approaches to chemical speciation. Health effects, societal targets, drinking water standards. *Fall*. Shuman.
- 225 ANALYSIS OF TRACE ORGANICS (3). Prerequisites, Chemistry 61-62, Chemistry 181-182, and Physics 24-25; permission of instructor required if prerequisites not met. Basic principles of isolation, separation and identification of trace organic chemicals in environmental and/or biological samples including solvent extraction, liquid and gas chromatography and mass spectrometry. *Three lecture hours per week, spring*. Hass, Albro.
- 229 TOPICS IN PRACTICE OF ENVIRONMENTAL ANALYSIS (3). Prerequisite, Environmental Sciences and Engineering 129. Spectroscopic principles from the first semester are applied through demonstration and hands-on experimentation to a variety of environmental analytical problems. Concepts of sampling and sample treatment complete the analysis protocol. *Spring*. Staff.

- 231A LIMNOLOGICAL METHODS (2). Prerequisites, basic limnology and statistics; must register for 231B in the second session. Professional preparation for field study of freshwater aquatic systems. *Two lecture and ten laboratory hours a week, first summer session.* Francisco.
- 231B LIMNOLOGICAL METHODS (2). Prerequisite, Environmental Sciences 231A. *Second summer session.* Francisco.
- 232 SPECIAL TOPICS IN AQUATIC BIOLOGY (2). Prerequisite, Environmental Sciences 132 or permission of instructor. Topics of contemporary concern to the management of the aquatic environment will be discussed in depth. Course may be taken more than once as new topics are offered. *Spring.* Weiss, Kuenzler.
- 233 MICROBIAL ECOLOGY (4). Prerequisite, Environmental Sciences 134 or permission of instructor. A consideration of the factors which influence the distribution and interrelationships of microorganisms and their natural habitats. *Two lecture and four laboratory hours per week, fall.* Pfaender.
- 235 ECOLOGY OF PHYTOPLANKTON (Biology 254) (4). Prerequisites, Environmental Sciences 127 or 132; Environmental Sciences and Engineering 135; permission of instructor. Relationships of planktonic algae to the aquatic environment, emphasizing nutrition, productivity, distributions, and impacts on water quality. *Three lecture and one seminar hours per week, spring.* Kuenzler.
- 236 LIMNOLOGICAL STUDIES (2). Prerequisites, Environmental Sciences 132 or equivalent, permission of instructor. Limnological studies carried out by members of the faculty will be examined in terms of design, implementation, results and conclusions as well as lessons for future projects. *Spring.* Weiss, Staff.
- 241 INDUSTRIAL VENTILATION DESIGN (3). Corequisite, Environmental Sciences 241L. Engineering design of industrial exhaust systems and control of heat exposures in occupied spaces. *Fall.* Harris.
- 241L INDUSTRIAL VENTILATION LABORATORY (1). Corequisite, Environmental Sciences 241. Basic laboratory exercises in aerosol sciences. *Fall.* Harris.
- 242 INDUSTRIAL HYGIENE PRACTICE (3). Prerequisites, Environmental Sciences 143 and 145. Methodology and philosophy of evaluating the industrial environment for stresses and toxic substances which affect the health of the worker. *Spring.* Fraser.
- 243 INSTRUMENTATION AND DATA ACQUISITION (3). Permission of instructor required. Concepts and principles employed in electronic-aided measurements of air quality including acquisition of measurements, principles of input transaction and online minicomputers. *Fall.* Jeffries.
- 244 INDUSTRIAL HYGIENE LABORATORY (3). Prerequisite, Environmental Sciences 145. Corequisite, Environmental Sciences 242. Physical and chemical techniques for measuring industrial exposures. Practical experiments illustrate techniques applicable to the industrial hygiene survey. *Spring.* Reist.
- 245 AIR POLLUTION CONTROL (3). Prerequisite, Environmental Sciences 141. Engineering control of air pollution control systems and discussion of air pollution regulation and standards. *Spring.* Harris.
- 246 AIR POLLUTION, MEASURING, MONITORING AND SURVEY (3). Permission of instructor required. Theory and application of the analysis of samples; manual methods; sensor calibration; site selection, monitoring; gas and aerosol samples. *Two lecture and four laboratory hours per week, spring.* Jeffries, Fox.
- 247 CHEMISTRY OF THE TROPOSPHERE (3). Prerequisites, physical chemistry and permission of instructor. Sources, variability, transformation, and sinks of atmospheric trace constituents in the troposphere, photochemistry and other chemical aspects of the atmosphere. *Spring.* Fox.
- 248 INDUSTRIAL MEDICINE—PRACTICE AND MANAGEMENT (3). Prerequisite, Environmental Sciences 143 or equivalent. The roles and responsibilities of the industrial physician nurse and industrial hygienists and the etiology, diagnosis, treatment and prevention of diseases and stresses found in modern industry. *Spring.* Fraser.

- 252 ENVIRONMENTAL RISK ASSESSMENT (3). Prerequisite, permission of instructor. The characterization of population exposures and the evidence used to identify environmental substances that may pose a human health risk. The theory and methods for quantitatively estimating risk. *Spring*. Turner.
- 253 ENVIRONMENTAL POLICY ANALYSIS (City and Regional Planning 253) (3). Structure and dynamics of U.S. environmental policy-making as they affect environmental management. Legislation, regulation, administration and the roles of science and analysis in political decisions are presented. *Three lecture hours a week, fall*. Andrews.
- 254 FOOD SAFETY POLICY (3). Food safety will be discussed in respect to the development and implementation of policy, food legislation, regulation and other components of food safety programs. *Three lecture hours a week, spring*. Shiffman.
- 255 MANAGEMENT OF HAZARDOUS WASTE (3). Prerequisite, Chemistry 61 or equivalent. The classification, chemistry and toxicology of hazardous wastes will be presented. Control technologies, regulatory policies and management strategies are examined. *Fall*. Turner.
- 259 ANALYTIC THOUGHT AND ENVIRONMENTAL RISK (3). Prerequisite, permission of instructor. The principles of logical analysis are developed and applied to environmental problems. Concepts such as evidence, inference, and proof are formalized for calculations of environmental risk. *Three lecture hours per week, spring*. Crawford-Brown.
- 261 RADIATION BIOPHYSICS (3). Prerequisite, Environmental Sciences 162 or equivalent. Biophysical factors of radiation quality and the response of cell populations, models of the mechanisms of radiation action on biological systems, microdosimetry and dosimetry at interfaces. *Spring*. Crawford-Brown.
- 263 RADIATION HAZARDS EVALUATION I (3). Prerequisite, Environmental Sciences 162. The principles and techniques of external and internal radiation hazard evaluation are studied. The interaction of radiation with matter and fundamentals of radiation dosimetry are presented. *Spring*. Watson.
- 264 RADIATION HAZARDS EVALUATION II (3). Prerequisites, Environmental Sciences 261 and 263. Internal and external hazards of ionizing radiation are evaluated. Problems in hazards evaluation and radiation protection of the types included in certification exams of the American Board of Health Physics are studied. *Fall*. Watson.
- 267 MEDICAL PHYSICS ROTATION (3). Students will spend 9 hours per week in detailed discussion and application of specialized topics of Medical Physics within the Radiology Dept. Time will be spent in therapy, diagnosis and imaging. *Spring*. Crawford-Brown, Chaney, Johnston and Washburn.
- 271 ENGINEERING MODELING OF AQUATIC SYSTEMS (3). Prerequisite, permission of the instructor. Examination of selected physical, chemical and biological phenomena in natural aquatic systems. Use of mathematical models for water quality prediction and control. *Spring, alternate years with ENVR 272*. Lauria.
- 272 DESIGN OF WATER SYSTEMS (3). Prerequisite, permission of instructor required. Use of mathematical models and computer programs for designing water systems, including pumping stations, reservoirs, water distribution, and wastewater collection networks. *Spring, alternate years with ENVR 271*. Lauria.
- 273 WATER AND WASTEWATER TREATMENT PLANT DESIGN (3). Prerequisite, Environmental Sciences 174. The application of the theory of water and wastewater treatment to the design of municipal treatment facilities. The course includes the principles of design and modern design practices. The seminar is devoted to the design and analysis of design of specific works for water and wastewater treatment. *Summer*. Staff.
- 274 ADVANCED WATER AND WASTES TREATMENT PROCESSES I (3). Prerequisite, Environmental Sciences 122 or permission of instructor. Applications of chemical and physical principles to water and wastewater treatment processes. *Fall*. Singer, DiGiano.

- 275 ADVANCED WATER AND WASTES TREATMENT PROCESSES II (3). Prerequisites, Environmental Sciences 274 and 131 or permission of the instructor. Application of biological principles to wastewater treatment processes and consideration of advanced treatment processes. Singer, DiGiano.
- 276 INDUSTRIAL WATER QUALITY MANAGEMENT (3). Prerequisites, Environmental Sciences 171 and 174 or equivalents. Water supply and wastes disposal problems of industries. *Fall*. Staff.
- 277 DIFFUSIVE TRANSPORT IN ENVIRONMENTAL SYSTEMS (3). Prerequisites, Environmental Sciences 274 and permission of instructor. Diffusive transport at phase boundaries and within phases and porous media. Applications to process design of adsorption, gas-transfer and bio-oxidation systems and to analyze transport in natural environments. *Fall, alternate years*. DiGiano.
- 278 DEVELOPMENT OF A WATER PROJECT (3). Prerequisite, permission of instructor. Analysis of a real water project, including data collection, preliminary design, evaluation of engineering alternatives and assessment of feasibility, culminating in the preparation of an engineering report. *Two lecture and two seminar hours a week, spring*. Briscoe.
- 281 MODELING GROUND WATER SYSTEMS (3). Prerequisite, ENVR 176 or permission of instructor. Numerical modeling methods for solving the partial differential equations governing mass, momentum, and energy in ground water. *Spring*. Miller.
- 282 PUBLIC INVESTMENT THEORY AND TECHNIQUES (City and Regional Planning 232) (3). Theory and techniques of public investment planning and benefit cost analysis involving syntheses of economic, political, and technologic aspects. Special focus on project and program evaluation in the Third World. *Spring*. Whittington.
- 283 NATURAL RESOURCE LAW AND POLICY (Planning 233) (3). Prerequisite, permission of instructor. An examination of the law of resource use and development, its administration and underlying policies. Particular attention to water resources law, regulatory law and natural resource administration. Regulatory aspects of pollution control programs will be covered. *Three lecture hours a week, fall*. Heath.
- 284 WATER RESOURCES PLANNING AND POLICY ANALYSIS (Planning 234) (3). Prerequisite, permission of the instructor. Introduction to water resources planning and management. Emphasis on federal and state water resources policies and the development of analytical skills for identification of environmental problems associated with urban water resources development. *Spring*. Moreau.
- 300 RESEARCH IN ENVIRONMENTAL SCIENCES AND ENGINEERING (2 or more). Prerequisites, consultation with the faculty and approval of subject and proposed program. For students outside the Department. *Four or more hours a week, fall, spring and summer*. Staff.
- 301 SEMINAR IN ENVIRONMENTAL SCIENCES AND ENGINEERING (1 or more). No prerequisites. Readings and discussions to provide opportunity to develop new concepts and topics in various aspects of environmental sciences and engineering. *Fall, spring and summer*. Staff.
- 311 SEMINAR IN ENVIRONMENTAL HEALTH (1). Open by special arrangement to students doing advanced graduate work. *Two seminar hours a week, fall and spring*. Staff.
- 314 SEMINAR ON CURRENT INDUSTRIAL HYGIENE ISSUES (1). Environmental Sciences 242, corequisite; permission of instructor required. Discussion on current topics affecting the field of industrial hygiene. *Two seminar hours per week, Spring*. Reist.
- 320 RESEARCH IN ENVIRONMENTAL CHEMISTRY (1-9). Prerequisite, consultation with the faculty and approval of subject and proposed program. *Fall, spring, summer*. Charles, Christman, Johnson, Millington, Shuman, Singer.
- 330 RESEARCH IN ENVIRONMENTAL BIOLOGY (1-9). Prerequisite, consultation with the faculty and approval of subject and proposed program. *Fall, spring, summer*. Ball, Francisco, Kuenzler, Weiss, Pfaender, Sobsey.

- 340 RESEARCH IN AIR AND INDUSTRIAL HYGIENE (1-9). Prerequisite, consultation with the faculty and approval of subject and proposed program. *Fall, spring, summer.* Flynn, Gold, Fox, Fraser, Harris, Hickey, Jeffries, Leith, Reist.
- 341 ENGINEERING RESEARCH IN AIR AND INDUSTRIAL HYGIENE (1-9). Prerequisite, consultation with the faculty and approval of the subject and proposed program. Engineering research problems relating to air and industrial hygiene topics such as control equipment design, industrial ventilation parameters. *Fall, spring, summer.* Flynn, Fox, Fraser, Harris, Hickey, Jeffries, Leith, Reist.
- 350 RESEARCH IN ENVIRONMENTAL MANAGEMENT AND PROTECTION (1-9). Prerequisite, consultation with the faculty and approval of subject and proposed program. *Fall, spring, summer.* Amaral, Andrews, Christman, Gold, Lynn, Shiffman, Turner.
- 360 RESEARCH IN RADIOLOGICAL HYGIENE (1-9). Prerequisite, consultation with the faculty and approval of subject and proposed program. *Fall, spring, summer.* Crawford-Brown, Simon, Watson, Willhoit.
- 370 INVESTIGATIONS IN WATER RESOURCES ENGINEERING (1-9). Prerequisite, consultation with the faculty and approval of subject and proposed program. *Fall, spring, summer.* Briscoe, DiGiano, Lauria, Miller, Singer.
- 392 MASTER'S TECHNICAL REPORT (0-9). The technical report requirement for MSPH, MPH, and MSEE candidates is satisfied by the extensive study of a problem in environmental sciences and engineering. *Fall, spring and summer.* Staff.
- 393 MASTER'S THESIS (0-9). *Fall, spring and summer.* Staff.
- 394 DOCTORAL DISSERTATION (0-9). *Fall, spring and summer.* Staff.
- 400 GENERAL REGISTRATION (0).

Department of Epidemiology (EPID)

BARBARA S. HULKA, *Chairperson*

Professors

GERARDO HEISS	(41)	Cardiovascular Epidemiology
BARBARA S. HULKA	(05)	Cancer Epidemiology, Biochemical Epidemiology, Health Services Research
MICHEL A. IBRAHIM	(06)	Health Services Research and Health Policy, Cardiovascular Epidemiology, Cancer Epidemiology, Case Control Studies
SHERMAN A. JAMES	(07)	Psychosocial Epidemiology, Cardiovascular Epidemiology
BERTON H. KAPLAN	(08)	Social Epidemiology
CARL M. SHY	(14)	Environmental Epidemiology, Occupational Epidemiology, Cancer Epidemiology
HERMAN A. TYROLER	(13)	Environmental Epidemiology, Cardiovascular Epidemiology

Associate Professors

CAROLINE BECKER	(03)	Infectious Disease Epidemiology, Trauma Cardiovascular Epidemiology
VICTOR J. SCHOENBACH	(64)	Health Services Research, Psychosocial Epidemiology, Cancer Epidemiology

Assistant Professors

DEXTER L. MORRIS	(113)	Cancer Epidemiology
DAVID A. SAVITZ	(101)	Reproductive Epidemiology
DAVID J. WEBER	(96)	Infectious Disease Epidemiology
KRISTEN ANN WEIGLE	(112)	Infectious Diseases

Research Associate Professors

RICHARD C. GRAVES	(81)	Dental Epidemiology
GORY (BUD) J. LOVE	(23)	Environmental Epidemiology

Research Assistant Professors

SUZANNE LANDIS	(106)	Infectious Disease
MARGARET F. MCCANN	(100)	Reproductive Epidemiology
DAVID STROGATZ	(97)	Psychosocial Epidemiology, Cardiovascular Epidemiology
TIMOTHY WILCOSKY	(98)	Cancer, Arthritis, Cardiovascular Epidemiology
STEVEN B. WING	(99)	Cardiovascular Epidemiology

Clinical Professors

GORDON H. DEFRIESE	(54)	Health Services Research
ROBERT H. FLETCHER	(45)	Clinical Epidemiology
SUZANNE W. FLETCHER	(46)	Clinical Epidemiology
CURTIS G. HAMES	(44)	Clinical Epidemiology

MICHAEL R. SWIFT	(60)	Clinical Epidemiology, Genetics
EDWARD H. WAGNER	(15)	Clinical Epidemiology, Health Services Research

Clinical Associate Professors

BRIAN A. BOEHLECKE	(84)	Occupational Medicine
LAWRENCE M. CUTCHIN	(53)	Clinical Epidemiology

Clinical Assistant Professors

BONNIE M.E. ROGERS	(111)	Clinical Epidemiology, Occupational Epidemiology
DESMOND K. RUNYAN	(88)	Clinical Epidemiology, Pediatrics
ROBERT S. SANDLER	(73)	Cancer Epidemiology
MARK E. WILLIAMS	(105)	Health Services Research

Adjunct Professors

DAN GERMAN BLAZER	(108)	Psychosocial and Aging Epidemiology
JOAN CORNONI-HUNTLEY	(04)	Aging, Physical, Cognitive and Social Functioning
H. HUGH FUDENBERG	(40)	Immunogenetics
JACK D. GRIFFITH	(114)	Biomedical Epidemiology
CARL G. HAYES	(22)	Environmental Epidemiology
DONALD M. HAYES	(89)	Cancer, Occupational Epidemiology
SIEGFRIED H. HEYDEN	(56)	Cancer Epidemiology, Cardiovascular Epidemiology
CLARENCE C. LUSHBAUGH	(63)	Occupational Epidemiology
EUGENE S. MAYER	(37)	Health Services Research
JOHN W. STAMM	(92)	Dental Epidemiology
HUGH H. TILSON	(87)	Pharmacoepidemiology
JAMES F. TOOLE	(102)	Cerebrovascular Disease

Adjunct Associate Professors

DRAGANA ANDJELKOVICH	(66)	Occupational Epidemiology
JOHN R. CROUSE	(103)	Cardiovascular Epidemiology
RAYMOND S. GREENBERG	(86)	Cancer
SEYMOUR GRUFFERMAN	(34)	Cancer Epidemiology
SUZANNE G. HAYNES	(62)	Cardiovascular Disease Epidemiology
RICHARD J. LEVINE	(85)	Occupational Epidemiology
J. NEWTON MACCORMACK	(57)	Infectious Disease Epidemiology
MELINDA S. MEADE	(58)	Medical Geography
GEORGE R. PARKERSON, JR.	(49)	Clinical Epidemiology
ALLEN J. WILCOX	(61)	Reproductive Epidemiology

Adjunct Assistant Professors

DONNA D. BAIRD	(104)	Reproductive Epidemiology
GWEN W. COLLMAN	(109)	Environmental Epidemiology
KATHRYN MAGRUDER-HABIB	(55)	Health Services Research
JAMES E. HIGGINS	(71)	Population Epidemiology
WALTER J. ROGAN	(39)	Environmental Epidemiology
MICHAEL J. ROSENBERG	(94)	Reproductive Epidemiology

DALE P. SANDLER	(90)	Environmental Epidemiology
C. GREGORY SMITH	(83)	Occupational/Environmental Epidemiology
BONNIE C. YANKASKAS	(82)	Diagnostic Radiology/Cancer Epidemiology

Adjunct Instructor

FRANK J. HIELEMA	(79)	Health Services Research
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Visiting Instructor

PATRICIA TENNIS	(107)	Pharmacoepidemiology, Cardiovascular Epidemiology
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Professor Emeritus

CECIL G. SHEPS

- 140 PROBLEMS IN EPIDEMIOLOGY (1 or more). A course for students who wish to make an intensive study of some special problems in epidemiology. *Two or more hours a week, fall, spring, summer.* Staff.
- 141
- 160 PRINCIPLES OF EPIDEMIOLOGY (2). Pre- or corequisite, Biostatistics 101 or Biostatistics 105 or permission of instructor. An introductory course that considers the meaning and scope of epidemiology and the uses of morbidity, mortality and other vital statistics data in the scientific appraisal of community health. *Two lecture hours a week, fall.* Shy, Kaplan, McCann.
- 160L PRINCIPLES OF EPIDEMIOLOGY LAB (1). Corequisite for EPID 160. Laboratory for EPID 160. Exercises and group discussions. *Fall and spring.* McCann, Wilcosky, Wing.
- 168 FUNDAMENTALS OF EPIDEMIOLOGY (4). Permission required for non-majors. An intensive introduction to epidemiological concepts and methods for students intending to engage in, collaborate in, or interpret the results of epidemiologic studies. Some familiarity with biomedical concepts may be needed. An alternate to EPID 160 for satisfying the SPH core requirements. *Three lecture and two seminar hours a week, fall.* Schoenbach, Wilcosky, Hulka.
- 175 HEALTH POLICY AND AGING (HPAA 175) (3). Critical examination of aging policy in light of empirical findings on the elderly's economic power. Utilization patterns, prevalence of dependency, and the cost-effectiveness of policy options, including long-term care. *Fall.* Weissert.
- 195 FUNDAMENTALS OF CANCER BIOLOGY (PATH 195) (3). Fundamentals of the biology of cancer. *Fall.* Siegal, Askin, Kaufman.
- 197 FUNDAMENTALS OF CLINICAL ONCOLOGY (PATH 197) (3). Overview of clinical management, diagnosis, and treatment of cancer. *Spring.* Siegal, Askin, Kaufman.
- 201 EPIDEMIOLOGIC RESEARCH METHODS (3). Prerequisites, Epidemiology 168; Introductory Biostatistics; or permission of instructor. A second-level course on conduct of epidemiologic research. Focuses on dealing with both conceptual problems of applying the scientific method and practical issues encountered in carrying out the work. *Three lecture hours a week, spring.* R. Fletcher, Savitz.
- 211 DETERMINANTS OF COMMUNICABLE DISEASE (3). Pre- or co-requisite, Epidemiology 160 or equivalent. Biological determinants, changing patterns of communicable diseases, definition of high-risk subpopulations, methods of control. *Three lecture hours a week, fall.* Becker.
- 218 INTRODUCTION TO INFECTIOUS DISEASE EPIDEMIOLOGY (3). Pre- or co-requisites, Introductory-level Epidemiology and Biostatistics, or permission of instructor.

- Introduction to infectious disease epidemiology. Course will focus on methodology, public health concerns, patterns of transmission, and "newly" discovered infections. *Three lecture hours a week, fall.* Weber.
- 219 REPRODUCTIVE EPIDEMIOLOGY (3). Permission of instructor required. Prerequisites, EPID 160 and BIOS 115, or alternatives. Epidemiology of major reproductive health outcomes, including infertility, fetal loss, birth weight, congenital malformations, infant mortality. Current knowledge regarding epidemiology of these outcomes; discussions of methodologic issues specific to reproduction. *Fall.* Savitz.
- 220 HEALTH PROMOTION/DISEASE PREVENTION: A BEHAVIORAL EPIDEMIOLOGIC PERSPECTIVE (3). EPID 168 or permission. Role of behavior in modern illness; theoretical, methodologic, substantive, policy issues in health promotion/disease prevention (HP/DP) programs to promote changes in lifestyle behaviors. *Spring* Schoenbach, Kaplan.
- 221 ASSESSMENT OF HEALTH AND QUALITY OF LIFE (3). Prerequisites, EPID 160 and BIOS 105 or their equivalents. Permission of instructor required. Selection/construction of health status and quality of life measures for epidemiologic investigation, evaluation, resource allocation, population monitoring, clinical decision-making. Theories, operational definitions, weighting strategies, reliability/validity, practical considerations. *Three lecture hours a week, spring.* Patrick.
- 232 METHODS AND ISSUES IN PHARMACOEPIDEMIOLOGY (2). Permission of instructor required. Prerequisites, introductory level epidemiology and biostatistics. Application of the epidemiologic knowledge, methodology, and reasoning to the study of the effects (beneficial and adverse) and uses of drugs in human populations. *Summer.* Faculty.
- 233 CANCER EPIDEMIOLOGY AND PATHOGENESIS (3). Prerequisites, Epidemiology 168 or equivalent, Biostatistics 105, undergraduate major or strong preparation in the biological sciences. Permission of instructor required for non-majors. Emphasis on integration of epidemiologic data with laboratory and clinical research findings. Issues in epidemiologic research design, analysis and interpretation are presented within the context of substantive epidemiology. *Three lecture hours a week, spring.* Hulka, Morris.
- 240 EPIDEMIOLOGY OF ALCOHOL USE AND ABUSE (Health Policy and Administration 240) (3). Prerequisite, Epidemiology 160 or equivalent. Course will examine patterns of alcohol use and abuse nationally, internationally, and ethnically. Problems of definition, measurement and methodology will also be considered; as will implications for health. *Two lecture and two seminar hours a week, spring.* Magruder-Habib.
- 249 GENETICS OF COMMON DISEASES (GNET 249) (3). Prerequisites, BIOS 150, GNET 122, or EPID 160, or permission of instructor. Critical analysis of genetic issues in human diseases. The genetics of cancer, heart disease, diabetes, mental illness, mental retardation, hypertension and arthritis will be covered. The application of genetic and epidemiological techniques will be examined. *Spring, alternate years.* Swift.
- 256 CARDIOVASCULAR DISEASE EPIDEMIOLOGY (3). Pre- or co-requisite, Epidemiology 160, and Biostatistics 105, or their equivalents. Review of major issues in cardiovascular disease epidemiology, summarization of relevant pathology and analogies of population determinants and strategies for prevention. *Three lecture hours a week, fall.* Tyroler, Heiss, Davis, Wing.
- 257 TEACHING INTERNSHIP IN EPIDEMIOLOGY (4). Permission of the Chairman required. Required of students enrolled in the doctoral program in epidemiology. Outstanding students from other departments eligible if space permits. Provides supervised experience in teaching and course preparation. *Fall, spring and summer.* Faculty.
- 264 CULTURE AND HEALTH (3). Prerequisites, EPID 160 or equivalent, basic social science background. Permission of instructor required. Role of social and cultural factors in various disorders. Development of useful frameworks and methods to investigate social environment and health. Emphasis on psychiatric related disorders and on actual projects. *Three lecture hours a week, spring.* Kaplan.

- 265 HISTORY OF EPIDEMIOLOGY (3). Prerequisite, Epidemiology 160 or permission of instructor. This course considers the historical development of epidemiological knowledge and method in relation to changing patterns of health and the existing scientific "climate." *Four lecture hours a week, first session, summer.* Faculty.
- 266 EPIDEMIOLOGIC INVESTIGATION (3). Prerequisites, Epidemiology 160 and Epidemiology 256, Biostatistics 105, or their equivalents. Permission required. Designed for the acquisition of skills in epidemiologic research, through the investigation of problems in cardiovascular disease. Available data sets are used for tutored research. *Three lecture hours a week, spring.* Heiss, Davis, Tyroler.
- 268 ADVANCED METHODS IN EPIDEMIOLOGY (4). Prerequisites, Epidemiology 160 or one of its alternatives, Biostatistics 145, Biostatistics 111, or their equivalents. Permission of instructor required. This course develops a systematic overview of the methodologic techniques available for observational and experimental epidemiologic investigation at the stages of planning, information and analysis. *Three lecture hours and two laboratory hours a week, fall.* Kleinbaum.
- 269 SPECIAL TOPICS IN EPIDEMIOLOGIC METHODS (3). Prerequisite, permission of instructor required. A continuation of Epid 268 covering additional methodologic issues. Topics include survival analysis, collinearity, control of error rates, extensions of logistic regression, plus review of selected methodologic literature. *Two lecture hours and two seminar hours a week, spring.* Kleinbaum.
- 270 PSYCHOSOCIAL EPIDEMIOLOGY (3). Prerequisites, EPID 160, BIOS 105, or equivalent. A critical examination of theory and research on social, economic, and psychological determinants of chronic diseases, with emphasis on cardiovascular diseases and mental health. *Three lecture hours a week, fall.* James, Strogatz.
- 276 ADVANCED ENVIRONMENTAL AND OCCUPATIONAL EPIDEMIOLOGY (3). Prerequisite, Epidemiology 160 or equivalent; permission of instructor. Designed for epidemiology majors, this course investigates various applications of the principles of epidemiologic research to the evaluation and identification of environmental and occupational health hazards. *Spring.* Shy, Checkoway.
- 280 HOSPITAL EPIDEMIOLOGY (2-4). Permission of instructor required. Prerequisites, EPID 168 and EPID 211 or 218. Comprehensive tutorial on hospital infection control. Topics include: employee health, surveillance, outbreak investigation, environmental sampling and policy formation. Course consists of formal instruction, directed readings, and/or independent research. *Fall, spring and summer.* Weber.
- 315 FIELD TRAINING IN EPIDEMIOLOGY (3-6). Prerequisite, advanced standing. Designed to give epidemiology majors a supervised field experience in population health research. Field fee \$500. *Fall, spring, summer.* Faculty.
- 360 RESEARCH IN EPIDEMIOLOGY (2-9). Prerequisite, permission of instructor. Independent investigation in consultation with an instructor who must assign or approve the subject of research. Credits will vary according to the effort and rigor of the research. *Fall, spring, summer.* Faculty.
- 362 ENVIRONMENTAL EPIDEMIOLOGY SEMINAR (1-3). Pre- or co-requisites: basic course in Epidemiology. Permission of instructors required. Detailed critical reviews of selected topics in environmental epidemiology. Students work collaboratively with faculty members conducting research in environmental and occupational determinants of disease. *Two to six seminar hours a week, spring and fall.* Shy, Checkoway.
- 368 EPIDEMIOLOGY AND HEALTH POLICY (2). Prerequisites, basic course in epidemiology and biostatistics. Epidemiology applied to workings of health services and setting of policies. Topics include indices; classifications; data sources; research designs and analyses for planning and evaluation; health screening; health promotion; health care procedures and professionals; coronary heart disease; high blood pressure and cholesterol; mothers, children and the aged. *Two lecture hours a week, spring, odd-numbered years.* Ibrahim.

- 392 MASTER'S PAPER (1-6). *Fall, spring and summer.* Graduate Faculty.
394 DOCTORAL DISSERTATION. *Fall, spring and summer.* Graduate Faculty.
400 GENERAL REGISTRATION (0).

Department of Health Education (HEED)

JAMES R. SORENSON, *Chairman*

Professors

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|-----------------------|------|---|
| KARL BAUMAN | (33) | Health Program and Policy Evaluation, Research Methodology, Determinants of Adolescent Behavior |
| RALPH H. BOATMAN, JR. | (5) | Organization of Higher Education, Community Organization, Health Education |
| JOHN W. HATCH | (6) | Community Organization and Development |
| GODFREY M. HOCHBAUM | (2) | Communications, Health Behavior, Health Education |
| JAMES R. SORENSON | (30) | Medical Sociology and Evaluation Research |
| GUY W. STEUART | (3) | Health-related Social and Behavioral Change Strategies |

Associate Professors

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|--------------------|------|---|
| BRENDA M. DEVELLIS | (13) | Health Education Research, Health Behavior, Patient Education |
| JO ANNE L. EARP | (10) | Medical Sociology, Health Education Research |
| ELIZABETH MUTRAN | (32) | Aging, Family, Medical Sociology |
| ALLAN STECKLER | (12) | Citizen Participation, Health Promotion, Program Evaluation |

Assistant Professors

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| EUGENIA ENG | (17) | Cross-Cultural Health Education, Program Strategies and Design |
| VICTOR STRECHER | (29) | Health Promotion Research, Program Evaluation, Patient Education |

Clinical Associate Professors

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|-------------------|------|---|
| HARRIET H. BARR | (4) | Community Organization and Development, Health Education Practice |
| LEONARD H. DAWSON | (1) | Community Organization Training, Field Practice |
| RICHARD HOUSE | (20) | Adult Education, Personnel Management |

Clinical Assistant Professor

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|-----------------|------|---|
| ROSALIND THOMAS | (16) | Consultation, Training, Health Education Practice and Mental Health |
|-----------------|------|---|

Research Assistant Professor

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|--------------|------|---|
| CAROL RUNYAN | (31) | Injury Control, Policy Research and Adolescent Health |
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Adjunct Associate Professor

HAROLD COOK	(34)	Rural Health, Community Organization and Development, Social Networks
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Adjunct Assistant Professors

ROBERT DEVELLIS	(23)	Health Psychology, Measurement
KENNETH McLEROY	(25)	Behavioral Medicine, Program Evaluation, Health Behavior
KAREN GENTEMANN	(26)	Women and Family Interactions, Program Evaluation, Bicultural Higher Education
JOHN KEY	(28)	Health Administration, Health Promotion and Wellness
MIRIAM SETTLE	(27)	Women's and Children's Health, Organizational Analysis and Development Rural Primary Health Care

Professors Emeriti

HOWARD C. BARNHILL
LUCY S. MORGAN
EUNICE N. TYLER

- 101 AGING AND HUMAN DEVELOPMENT (Public Health Nursing, Nutrition, Health Policy and Administration 101) (3). Biological, medical, demographic, and social aspects of aging. New methods and concepts of aging processes and their implications. *Three lecture hours per week, fall.* Staff.
- 102 COMMUNITY ORGANIZATION FOR HEALTH EDUCATION (3). Introduction of community organization in community health education and implications for the function of the community health educator. (Permission required for non-majors.) *Two lecture and two laboratory hours per week, fall.* Staff.
- 103 THEORY AND PRACTICE IN COMMUNITY HEALTH EDUCATION (3). Detailed diagnosis of a county. Required for all undergraduate Health Education majors. *Two lecture and two laboratory hours per week. Fall.* Jackson
- 104 SCHOOL ORGANIZATION FOR HEALTH EDUCATION (3). Introduction to school health education and administration including components and organization of a comprehensive school health program curriculum design and evaluation. (Permission required for non-majors.) *Two lecture and two laboratory hours a week, spring.* Barr, staff.
- 108 MINORITY HEALTH AND HEALTH SERVICES DELIVERY (2). The life experiences of ethnic minorities in the United States with special reference to the implications for their participation in health programs. *Two lecture hours a week, spring.* Hatch.
- 109 RURAL HEALTH AND COMMUNITY ACTION (3). Permission of instructor. Community education and action as modes of intervention in rural communities. Cross-cultural perspectives of rural development. *Three seminar hours per week, fall.* Hatch.
- 120 PROMOTING HEALTH IN A COLLEGE SETTING (3). Permission of instructor. Lectures and seminars on planning, implementing and evaluating health education programs in a college setting with an emphasis on health promotion and wellness. *Two lecture and two seminar hours per week, fall.* Staff.
- 121 HEALTH PROMOTION PRACTICUM (3). Prerequisites, Health Education 120 and permission of instructor. This field placement in the Student Health Service will provide

- the student with an opportunity to implement skills learned in Health Education 120. *Nine laboratory hours a week. Spring.* Staff.
- 125 INJURY AS A PUBLIC HEALTH PROBLEM (Maternal and Child Health 125) (3). This course considers the causes and consequences of traumatic injury within developmental, social and economic contexts, and dilemmas in injury prevention. Injuries associated with transportation, violence, and the home and occupational environments are included.
- 130 PRINCIPLES OF HEALTH EDUCATION (3). For majors only. The relationship between human behavior and health; natural and planned change in health-related behavior in the individual, small group and community; principles of program design and evaluation; the role of the client. *One lecture and two seminar hours per week, fall.* Dawson.
- 133 INTERPERSONAL AND GROUP RELATIONS (3). Permission of instructor. An experimental study of human relations with emphasis on analysis of interpersonal and group interaction, the effective use of intervention in group problem solving, leadership styles and team building, intergroup cooperation and conflict. *Two lecture and two laboratory hours, fall and spring.* Staff.
- 140 PROBLEMS IN HEALTH EDUCATION (1 or more). Prerequisites to be arranged with the faculty in each individual case, depending upon the problem that is to be studied. A course for students of public health who wish to make an intensive study of some special problem in public health education. *Fall, spring, and summer.* Staff.
- 142
- 150 GROUP DYNAMICS AND DISCUSSION GROUP LEADERSHIP: HUMAN SEXUALITY (4). Prerequisites, Health Education 85 or graduate status; permission of instructor. Interpersonal and group interaction, theory and practice. Design and application of training exercises. Focus on leadership in groups dealing with human sexuality. Students lead discussions of small groups of students in Health Education 85. *Two lecture hours, four seminar hours per week, fall and spring.* Staff.
- 160 INTRODUCTION TO WOMEN'S HEALTH AND HEALTH EDUCATION (Women's Studies 160) (3). Using a lecture-discussion format, this course provides an overview of women's health-specific interests as family and community members, as patients and as health professionals. Implications for health education practice as well as opportunities for future research will be emphasized. *Two lecture and two seminar hours per week, offered every other fall.* Earp.
- 171 SOCIAL PSYCHOLOGICAL THEORIES OF INDIVIDUAL HEALTH BEHAVIOR (3). Selected social psychological theories and their relation to health promotion, disease prevention and patient education. *Three lecture hours per week. Fall.* DeVellis.
- 172 PRINCIPLES AND PRACTICE OF PATIENT EDUCATION (2-3). Principles and practice of implementing, coordinating and evaluating patient education programs. *Two lecture hours per week (three hours credit will be granted on the basis of a relevant research activity approved by instructor), spring.* Hochbaum and DeVellis.
- 180 MENTAL HEALTH PROMOTION: SOCIAL AND BEHAVIORAL CHANGE APPROACHES (3). Critical review and evaluation of programs targeted at individuals, families, interpersonal networks, communities and larger social units which have the promotion of mental health as a goal. *Three lecture hours a week, spring.* Thomas.
- 185 TOPICS IN WORKSITE HEALTH PROMOTION (Public Health Nursing 185) (3). An overview of critical scientific, political, economic, behavioral and other issues as they affect planning, conduct and evaluation of health promotion/risk reduction programs at the worksite. *Three lecture hours a week, spring.* Hochbaum.
- 190 PSYCHOSOCIAL ASPECTS OF AGING (3). Psychosocial aspects of the aging process and of old age. Needs of the elderly and their reactions to agencies and programs for the aged. *Two lecture and two seminar hours per week, spring.* Mutran.
- 200 SPECIAL STUDIES IN BEHAVIOR CHANGE (1 or more). Permission of instructor.
- 201 Health Education 200—natural change process in health-related behavior; Health Education 201—planned change; personal and non-personal methods; Health Education

- 203 202—program design and evaluation; Health Education 203—personal development
204 and community action; Health Education 204—social class and culture variations in
planned change. *Fall, spring and summer.* Staff.
- 208 UNITS OF PRACTICE I: FAMILY AND KINSHIP SYSTEMS (3). Permission of
instructor. The relationship of family and kinship patterns to health behavior; implica-
tions for planned change. *One to three lecture hours per week, fall and spring.* Staff.
- 209 UNITS OF PRACTICE II: INDIVIDUAL, SMALL GROUP AND NETWORK (1-3).
Corequisite, enrollment in Health Education 241, or permission of instructor. Behavior
systems in the individual and small group with reference to planned change in personal
health-related behavior. *Three lecture hours a week, fall and spring.* Staff.
- 210 UNITS OF PRACTICE III: THE COMMUNITY (1-3). Corequisite, enrollment in
Health Education 241, or permission of instructor. The nature and delineation of com-
munities as social systems; theories, principles and practices relevant to health-related
community development processes; the identification of formal and informal leadership
and power structures, etc. *Two lecture and seminar hours per week, fall.* Eng.
- 211 UNITS OF PRACTICE IV: SOCIAL POLICY AND LARGE POPULATIONS (1-3).
Health education social policy roles and strategies. The nature and delineation of policy
and large populations as units of health education practice; includes field practicum.
One-three seminar, one-three laboratory hours per week. Offered every other spring.
Steckler, Dawson.
- 212 CITIZEN PARTICIPATION IN COMMUNITY HEALTH DECISION MAKING
(1-4). Permission of instructor. Theories and concepts of citizen participation in commu-
nity health settings; an historical review of mandated citizen participation; and strategies
for enhancing citizens' ability to influence the social policy process. *One to three lecture
hours; zero to two seminar hours per week, fall.* Steckler.
- 215 NATURAL CHANGE DETERMINANTS IN HEALTH RELATED BEHAVIOR (3).
Permission of instructor. An integrated behavioral science approach to unplanned deter-
minants to change in the health-related behavior systems of the individual, small group
and community. *Fall.* Staff.
- 216 CULTURE, HEALTH AND PLANNED CHANGE (3). The relationship between
effective planned health related behavioral and social change and cultural systems.
Fall. Staff.
- 222 PROFESSIONAL PRACTICE (1 or 2). Corequisite, enrollment in Health Education
223 242 or permission of instructor. Studies in the professional role of the change agent
and consultant with special reference to cross-cultural settings; the development of
the professional and sources of innovation in practice. *One or two hours a week, fall.*
Dawson.
- 230 PLANNING CONSUMER HEALTH-ORIENTED PROGRAMS (Health Policy and
Administration 230) (3). Policy/program options and implementation strategies in the
light of contemporary patterns of illness and the efficacy of modern health improvement
interventions. *Spring.* Milio, Steckler.
- 231 CROSS CULTURAL CONSULTATION (3). Permission of instructor. The process
and content of cross-cultural and international consultation in technical assistance
to developing country health programs with special reference to planned social and
behavioral change. *Fall.* Stuart.
- 232 HEALTH, DEVELOPMENT AND TECHNOLOGY (3). Critical analysis of the
theories in and approaches to adult learning, economic development, technology
transfer, and primary health care. Non-formal education and community organization
techniques tools for integrating health and development in the rural U.S. and in develop-
ing countries. *Spring.* Eng.
- 234 TEAM PROBLEM SOLVING (1 or more). Prerequisite, Health Education 133 or per-
mission of instructor. An experimental study of interpersonal relations in professional
team settings; intra- and inter-team relationship processes to large social systems with
emphasis on intervention techniques. *Two or more hours a week, spring.* Staff.

- 235 INSTRUCTIONAL MATERIALS AND DEVELOPMENT (1-3). Permission of in-
236 structor. Independent projects in the design production, validation and utilization of
self-instructional training materials for use in college courses, in-service training pro-
grams, patient education, etc. Students may arrange for credit proportionate to the
complexity of the individual projects. *Two or more lecture hours per week, fall and
spring.* Staff.
- 240 FIELD WORK: INTRODUCTION TO COMMUNITY ACTION (2 or more). Co-
requisite, Health Education 130, Health Education 133 or permission of instructor.
Establishing client-professional relations; community group development and participa-
tion in planning; preliminary analysis of selected demographic, social, cultural and
epidemiological features of the community needs. Field fee, \$450.00. *Fall.* Dawson; staff.
- 241 FIELD WORK: PROGRAM PLANNING AND DESIGN (2 or more). Prerequisite,
Health Education 240 or permission of instructor. Data-collection and analysis relevant
to program objectives, methods and evaluative research with associated community
group participation in planning and implementation. *Spring.* Dawson; staff.
- 242 FIELD WORK: PROGRAM DEVELOPMENT AND COMMUNITY ACTION (2
or more). Prerequisite, Health Education 241 or permission of instructor. Client-
professional partnership in community action in selection and design of techniques
for health related behavior change and in program evaluation. *Summer.* Dawson; staff.
- 243 FIELD WORK: ADVANCED COMMUNITY HEALTH DEVELOPMENT (2 or
more). Prerequisite, Health Education 242 or permission of instructor. Client and pro-
fessional consultation in community health development, in personal development
and supervision of non-professional and professional community health workers. *Fall.*
Dawson; staff.
- 244 FIELD WORK: EVALUATION (2 or more). Prerequisite, Health Education 243 or
permission of instructor. Studies of change processes in the community setting and
evaluation of the effectiveness of the role of the change agent. *Spring.* Dawson; staff.
- 250 RESEARCH METHODS IN HEALTH EDUCATION (1-3). Corequisites, enrollment
251 in Health Education 241, 242, 243 or permission of instructor. Introduction to research
and evaluation methods of particular relevance to planned change in health-related
behavior. *Fall, spring and summer.* Earp; staff.
- 252 QUALITATIVE RESEARCH METHODS FOR COMMUNITY HEALTH (3). The
rationale and methods of qualitative research in community and the evaluation of
community based intervention programs. How qualitative methods complement quanti-
tative methods. *Two lecture and two laboratory hours per week, spring.* Staff.
- 254 PERSONNEL DEVELOPMENT (1-3). Corequisite, enrollment in Health Education
255 234, or permission of instructor. The study of training and supervision processes for
personnel development in programs of planned change; training system strategies,
design, teaching styles, methods and evaluation; the personnel development role in
supervision, effects of organizational climate, etc. *Fall and summer.* Staff.
- 310 DOCTORAL SEMINARS IN HEALTH EDUCATION (1-3). Prerequisites, master's
311 degree and permission of instructor for non-majors. A series of seminars designed
312 to explore the scientific foundations of health education and their implications for
313 health education practice. *Two to six seminar hours per week, fall, spring and summer.*
314 Staff.
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- 340 ADVANCED FIELD TRAINING IN HEALTH EDUCATION (1-3). Under guidance
341 by faculty and field counselors, students assume major responsibility for planning,
342 executing, and evaluating community health education projects. Open only to doctoral
343 students in the department. Field fee \$125.00. *Fall and spring.* Staff.
- 350 ADVANCED RESEARCH IN HEALTH EDUCATION (2-9). Permission of instructor.

- 351 Available only to students capable of pursuing independent research projects under supervision. *Four laboratory hours a week, fall, spring, and summer.* Staff.
- 392 MASTER'S PAPER (1-6). *Fall, spring and summer.* Staff.
- 393 MASTER'S THESIS (3-6) *Fall, spring and summer.* Staff.
- 394 DOCTORAL DISSERTATION (3-9). *Fall, spring and summer.* Staff.
- 400 GENERAL REGISTRATION (0).

Department of Health Policy and Administration (HPAA)

KERRY E. KILPATRICK, *Chairman*

Professors

RICHARD N. L. ANDREWS	(110)	Environmental Policy, Policy Analysis
DAN E. BEAUCHAMP	(21)	Health Politics, Ethics of Public Health, Alcohol Problems
MOYE W. FREYMANN	(2)	International Health and Population, Policy/Program/Institutional Development
SAGAR C. JAIN	(1)	Human Resources Management, Organizational Analysis and Development, International Health
ARNOLD D. KALUZYNI	(15)	Organizational Design and Behavior, Program Implementation and Evaluation
KERRY E. KILPATRICK	(131)	Application of Operations Research Methods in Health Policy Analysis, The Development of Planning Decision Support Systems, Policy Formulation for Financing of Indigent Health Care
DONALD L. MADISON	(16)	Medical Care Organization, History of Medical Care
CURTIS P. McLAUGHLIN	(61)	Financial Management, Cost-Effectiveness, Health Administration Research
NANCY MILIO	(51)	Public Policy and Health Promotion, USA and International
JAMES E. VENEY	(18)	Social Research Methods, Evaluation, International Health
WILLIAM WEISSERT	(103)	Aging, Program Evaluation

Associate Professors

JAMES E. ALLEN	(11)	Long Term Care Administration, U.S. Health Policy, Aging
PATRICIA Z. BARRY	(20)	Accident and Injury Control, Emergency Health Services
LAUREL A. FILES	(28)	Organization Theory, Interorganization Coordination, Hospital Administration
DEBORAH A. FREUND	(75)	Health Economics, Econometrics, Health Services Research
WILLIAM T. HERZOG	(23)	Human Resources Management, Organizational Change, Health Pro- motion and Disease Prevention
ROBERT A. McLEAN	(125)	Financial Management, Health Care Organizations
BARNETT R. PARKER	(60)	Operations Research, Marketing, Information Systems
RICHARD GARY ROZIER	(29)	Dental Public Health
KENNETH R. WING	(58)	Health Law

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| WILLIAM N. ZELMAN | (62) | Health Care Financial Management,
Organizational Performance
Indicators |
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Assistant Professor

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|----------------|-------|---------------------------------|
| THOMAS H. RICE | (100) | Health Economics, Health Policy |
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Lecturers

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| WILLIAM F. BAXTER | (79) | Mental Health |
| ROBERT BURNS MOORHEAD | (33) | Financial Management, Administrative
Computer Applications |
| KIT N. SIMPSON | (118) | Human Resources Management,
Organizational Change and
Development |

Clinical Professors

- | | | |
|------------------------|-------|---|
| JAMES P. DIXON | (74) | Health Administration, Higher Education,
Health Systems Agencies |
| JEAN PAUL GAGNON | (108) | Pharmacy Administration |
| KANDIAH KANAGARATNAM | (89) | Health Administration, Population Policy
and Program Management |
| ROBERT A. LODDENGAAARD | (32) | Financial Management, Population
Program Management, Program
Evaluation |

Clinical Associate Professors

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|----------------------|-------|--|
| JAMES D. BADER | (119) | Dental Public Health |
| LAWRENCE H. BRENNER | (121) | Medical Malpractice, Health Law |
| RICHARD C. GRAVES | (120) | Dental Public Health |
| JAMES W. LUCKEY | (77) | Alcohol, Computers |
| NEIL J. McDONALD | (104) | Organizational Development and Change,
Human Resources Management,
Hospital Administration |
| WILLIAM D. PETASNICK | (105) | Operations Management |

Clinical Assistant Professors

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|---------------------|-------|---|
| BENJAMIN GILBERT | (93) | Health Policy, Health Law, Legislative
Process |
| ABRAHAM G. HARTZEMA | (109) | Pharmacy Administration |

Clinical Instructors

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|---------------------|-------|----------------------------|
| FRANCESCA ALLEGRI | (126) | Information Resources |
| ROBERT C. SCHREINER | (106) | Information Services |
| JAMES R. SUMMERS | (102) | Health Services Management |

Adjunct Professors

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|------------------|------|---|
| GEORGE D. DUDNEY | (44) | Dental Public Health |
| ERIC B. MUNSON | (92) | Hospital Administration |
| HUGH H. TILSON | (81) | Health and Human Services, Preventive
Medicine |

Adjunct Associate Professors

THOMAS J. BACON	(67)	Health Manpower
MARVIN J. BLOCK	(73)	Dental Public Health
KENNETH C. MILLS	(85)	Health Administration, Alcohol

Adjunct Assistant Professors

EDWARD BROOKS	(128)	Research Management, Rural Health Care Delivery, Health Manpower
MOSES CAREY, JR.	(84)	Health Administration, Public Health Law
MARSHA GOLD	(124)	Organization and Financing of Health Care Systems
JOHN E. PAUL	(116)	Health Care Policy, Health Care Organizations
WILLIAM A. SOLLECITO	(107)	Health Policy

Research Professors

HENRY A. LANDSBERGER	(97)	Health Policy
PATRICIA F. WALLER	(19)	Accident and Injury Control, Highway Safety

Research Assistant Professor

THOMAS R. KONRAD	(69)	Research Methodology, Health Planning
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Professors Emeriti

WILLIAM S. FLASH
 JOHN T. HUGHES
 JACOB C. KOOMEN
 HARRY T. PHILLIPS
 LEONARD S. ROSENFELD
 MORRIS SCHAEFER
 JOHN JOSEPH WRIGHT

Courses for Graduates and Advanced Undergraduates

- 101 AGING AND HUMAN DEVELOPMENT (PHNU/HEED 101) (3). Biological, medical, demographic and social aspects of aging. New methods and concepts of aging processes and their implications. *Three lecture hours per week, spring.* Staff.
- 102 DETERMINANTS OF HEALTH: BIOLOGICAL, PHYSICAL AND SOCIAL FACTORS (Maternal and Child Health 102) (3). This course will examine the role of various biological, physical and social factors in health and will be taught in three autonomous modules. *Spring.* Rozier, Watkins.
- 103 INFORMATION SOURCES IN HEALTH POLICY AND ADMINISTRATION (1). Public health information sources and search strategies for identifying and assessing both printed and online resources. Includes literature of related fields, statistics sources, and other information centers beyond the Health Sciences Library. *Fall and Spring.* Allegri.
- 105 CONCEPTS OF HEALTH ADMINISTRATION (3). Survey of health and human services organization and management including concepts of administrative systems, government, legal and public interest aspects, organizational behavior and relations. *Fall and spring.* Allen, Barry.

- 109 CONCURRENT FIELD TRAINING IN HEALTH POLICY AND ADMINISTRATION (1-6). Supervised observation or service activities in health service organizations. *Fall and spring*. Staff.
- 111 ORIENTATION TO HEALTH SERVICE ORGANIZATIONS (1-2). Opportunities for those with limited exposure to health-related organizations to visit several operating agencies, as an approach to understanding the U.S. health system. Five field trips out of eight or nine arranged are required. Attendance is required at five seminars. Additional paper required for students receiving 2 credit hours. *Fall*. Staff.
- 113 HOSPITAL ORGANIZATION AND ADMINISTRATION (3). Comprehensive overview of general hospitals, including organizational structure, governance, medical staff, external relationships, departmental organization, strategic planning, financing, regulation, accreditation, quality assessment. Addressed from perspective of chief executive officer. *Spring*. Files.
- 119 COMMUNITY HEALTH PLANNING AND EVALUATION (3). Prerequisite, permission of instructor. Philosophical, conceptual, and methodological understanding of planning and its role in society in relation to health and human services. *Fall, spring*. Staff.
- 126 INTRODUCTION TO POPULATION POLICY (3). Concepts of population policy in the context of social policy, policy implications of population dynamics, policy issues and alternatives, and studies in policy development process. *Fall*. Freymann, Kanagaratnam.
- 133 ISSUES IN HEALTH CARE (1-2). By means of presentations by national leaders in health care and of class discussions, problems and issues and changes in public policy in health care will be explored. *Spring*. Wing, Rice, Herzog.
- 137 THEORY AND PRACTICE OF PUBLIC HEALTH POLICY AND ADMINISTRATION (3). Policy and management issues and ideals, including their historical derivations and international implications, in relation to current state and local practice. *Spring*. Staff.
- 140 READINGS IN HEALTH POLICY AND ADMINISTRATION (1-6). Staff.
- 147 POPULATION PROGRAM DEVELOPMENT AND ADMINISTRATION (3). Offers basic knowledge, methods and skills required to plan, implement, administer and evaluate fertility control programs. Utilizes discussions, readings, planning exercises, and a computer game. *Spring*. Loddengaard.
- 150 A BASIC INTRODUCTION TO THE ECONOMICS OF HEALTH SCIENCES (3). An introduction to the basics of health economics. The course applies microeconomic graphical and numerical analysis to an understanding of the demand and supply of physician and hospital services, our insurance system, hospital cost inflation, and alternative delivery systems. *Fall or summer*. Freund, Rice.
- 151 HEALTH ECONOMICS FOR POLICY AND ADMINISTRATION (3). Prerequisite, Economics 100, 101, or equivalent, and permission of instructor. An indepth course on the application of advanced microeconomics and elementary econometrics and regression to the study of health institutions and markets. *Spring*. Freund, Rice.
- 156 STRATEGIES FOR PREVENTION (3). Examines effects of public policies on rates of illness, injury, and premature death. Advantages and disadvantages of various approaches to prevention, especially regulation and health promotion. *Fall*. Barry.
- 158 ETHICAL ISSUES IN MEDICINE AND HEALTH POLICY (3). Nature of ethical thought and reasoning; contributions of religion and science; historical and current issues. Sections on professional practice issues and health policy issues. *Spring*. Allen, Beauchamp.
- 165 WOMEN IN MANAGEMENT (3). Analysis of current status of women in management in corporate, health and government settings in the U.S. Contributions of social sciences to understanding problems in women achieving full equality with male managers. *Spring*. Allen, Barry.

- 167 INTRODUCTION TO DENTAL PUBLIC HEALTH: BASIC KNOWLEDGE AND SKILLS (3). Survey of the theory and practice of dental public health, epidemiology and natural history of dental disease, dental indices, methods of prevention and control on population groups. *Fall*. Rozier, Bader, Graves.
- 174 GERIATRIC HEALTH AND MEDICAL CARE (Pharmacy 174)(3). Presents a comprehensive, multidisciplinary view of medical, social and policy issues surrounding aging. *Spring*. Weissert, staff.
- 175 HEALTH POLICY AND AGING (3). Critical examination of aging policy in light of empirical findings on the elderly's economic power, utilization patterns, prevalence of dependency, and the cost-effectiveness of policy options, including long-term care. *Fall*. Weissert.
- 176 LONG TERM CARE ADMINISTRATION I (3). Introduction to administration of long term care facilities. Evolution of long term care, survey of the current field. Examination of state and national requirements. *Spring*. Allen.
- 177 LONG TERM CARE ADMINISTRATION II (3). Prerequisite, Health Policy and Administration 176 or permission of instructor. Advanced study of the administrative aspects of managing long term care facilities. *Fall*. Allen.
- 180 INTERNATIONAL ORGANIZATIONS IN HEALTH AND POPULATION (2). Permission of instructor required. Roles, problems, opportunities for different kinds of international organizations in health and population fields. Reference to general development context; organizational relationships; various subject areas; and methods of cooperation and assistance. *Spring*. Freymann.
- 182 HEALTH SERVICES INFORMATION AND CONTROL SYSTEMS (3). Prerequisite, Health Policy and Administration 211 or equivalent and permission of instructor. Purposes and nature of management control systems; acquisition, utilization and evaluation of management information systems in health care organizations. *Spring*. Parker, Schreiner.
- 183 MANAGEMENT OF HUMAN RESOURCES IN HEALTH ORGANIZATIONS (3). Basic knowledge and skills in managing people in health organizations; philosophy, productivity assessment, managerial skills, and support systems. *Spring, fall*. Herzog, Jain, Simpson, Barry.
- 188 HEALTH LAW (3). Prerequisite, permission of instructor. Familiarization with the nature, perspective, and objects of the legal process. Provides skill in understanding legal terminology, legal reasoning, and the tools of law, particularly for application to health care management and in making health policy decisions. *Fall, spring*. Wing, Carey, Gilbert.
- 189 DEVELOPMENT OF PERSONAL EFFECTIVENESS (3). Permission of the instructor required. Encourages the development of rational thinking through understanding the relationship between thinking and feelings. Uses a peer counseling approach. Topics include self-appreciation, assuming responsibility, assertiveness, relationships, sexism, racism, goal setting, and leadership. *Fall, spring*. Barry.
- 190 LEGAL PROBLEMS IN HEALTH FACILITY ADMINISTRATION (2). Prerequisite, Health Policy and Administration 188 or permission of instructor. Seminar for interdisciplinary study of legal problems in administration of hospitals and other health care facilities, including liability, labor-employee relations, etc. *Spring*. Gilbert.
- 191 MARKETING FOR NOT-FOR-PROFIT ORGANIZATIONS (3). Prerequisite, permission of the instructor. Application of basic principles of marketing and marketing decision models to problems in health care and other not-for-profit organizations. *Fall*. Parker.
- 195 IMPLEMENTING AND MANAGING CHANGE IN HEALTH ORGANIZATIONS (3). Prerequisite, permission of instructor. Alternative strategies of implementing and managing change within health organizations. Analytical models for systems approach, interpersonal dynamics, politics. Case discussions, exercises, student participation. *Fall and spring*. Herzog, Simpson.

- 199 COMPUTERS IN HEALTH ADMINISTRATION (3). The course will provide students with an understanding of the capabilities and limitations of computers in the health field. Primary emphasis will be on microcomputers with sections devoted to larger systems. *Fall, summer, spring.* Luckey.

Courses for Graduates Only

- 200 QUANTITATIVE AND ANALYTICAL METHODS FOR HEALTH POLICY AND ADMINISTRATION (3). Prerequisite, permission of instructor. Introduction to process of decision modeling, emphasizing formulation and application of basic management science models in health administration. Includes inventory theory, cost benefit analysis and linear programming. *Spring.* Parker.
- 201 RESEARCH METHODS IN HEALTH AND HEALTH SERVICES (3). Prerequisites, Biostatistics 105 and passing the math qualifying examination in Health Policy and Administration. Examinations of available methodology in terms of its application to researchable problems in health administration. Provides directed supervision of students carrying out empirical research. *Fall.* Luckey, Veney.
- 202 ISSUES IN HEALTH POLICY AND ADMINISTRATION (1-6). *Fall and spring.* Staff.
- 203 INTRODUCTION TO HEALTH SERVICES RESEARCH (3). Prerequisite, MPH student. Provides systematic introduction to selected methods for health services research, health services research literature, and research writing. A field/library research based paper is required. *Spring.* Dixon, Files, Luckey.
- 204 POLICY FOR ALCOHOL AND OTHER DRUGS (3). Examination of issues in formulating and implementing policy for drug problems, including alcohol. Conceptual frameworks for understanding of the etiology of drug problems and intervention strategies. *Fall.* Beauchamp.
- 206 FIELD WORK IN HEALTH POLICY AND ADMINISTRATION (1-12). This course provides an opportunity for supervised field observation and experience in approved health agencies. Field fee, \$450. *Fall, spring, summer.* Staff.
- 207 EVOLUTION, ORGANIZATION AND FINANCING OF HEALTH SYSTEMS (3). Societal, technological and professional forces in the evolution of health systems, current organizational and financing pattern, and various emerging issues. *Fall.* Staff.
- 208 HEALTH POLICY AND POLITICS (3). Topics include historical perspective on health, definition of community health needs, public policy process and health policy structure, legal bases of policy and policy analyses. *Spring.* Beauchamp.
- 210 HEALTH ADMINISTRATION AND PLANNING (3). Prerequisite, permission of instructor. Concepts and methods of policy and program planning and implementation in health services, oriented to systems models of management. *Fall, spring, summer.* McLaughlin, staff.
- 211 FUNDAMENTALS OF HEALTH FINANCIAL MANAGEMENT (3). Permission of instructor required. Comprehensive examination of financial management concepts and practices in health service organizations, including costing, budgeting, financial analysis and control. *Fall, spring and summer.* Zelman, McLean, Loddengaard.
- 213 ORGANIZATION AND ADMINISTRATION OF MULTIHOSPITAL SYSTEMS (3). Prerequisite, Health Policy and Administration 113 or permission of instructor. Legal, financial, and organizational issues of multihospital systems development and management, including issues of corporate reorganization, strategic planning, and marketing. Prototypes and operating examples will be considered. Will include guest speakers. *Fall.* Files.
- 217 HEALTH PROGRAM EVALUATION (3). Prerequisite, Health Policy and Administration 210 or 147 and permission of instructor. Concepts and methods of the program evaluation paradigm as applied in health administration; experiential learning of evaluation planning, design and implementation. *Fall, spring.* Veney, Simpson.

- 218 PROGRAM PLANNING IN FAMILY HEALTH (Maternal and Child Health 218). (3). Basic methods of program planning. Emphasis will be on application of methods through the development of program plans for significant family health problems. *Spring*. Peoples-Sheps.
- 224 SOME QUANTITATIVE METHODS OF PLANNING AND EVALUATION (Biostatistics 224) (3). Prerequisite, Biostatistics 101 or permission of instructor. Planning cycle, methods overview, data sources, PERT, budgeting, health indices, measurement of goal fulfilment, achievement, effectiveness, efficiency, research designs, benefit cost analysis, decision analysis, probability analysis, and decision trees. *Two lecture and two laboratory hours a week. Spring*. Coulter.
- 226 HEALTH CARE QUALITY AND UTILIZATION CONTROL SYSTEMS (3). Evolution and current status of health care quality assurance systems and programs for utilization control. Includes discussion of alternative quality assurance methods; PSROs; hospital accreditation; hospital and ambulatory care utilization studies. *Spring*. Staff.
- 227 AMBULATORY CARE AND RELATED SERVICES (3). Prerequisite, Health Policy and Administration 207 or permission of instructor. Review of experience, current status, trends, and public policy relating to ambulatory health care and such related services as home care, day care, screening, and mental health screening. *Spring*. Staff.
- 228 ORAL EPIDEMIOLOGY FOR HEALTH POLICY AND ADMINISTRATION (3). Prerequisite HPAA 167, EPID 160 or permission of instructor. Focuses on the epidemiology of oral diseases and the implications and uses of this knowledge for dental health policy making and administration of dental programs. *Spring*. Rozier, Graves.
- 230 PUBLIC POLICY AND HEALTH PROMOTION (Health Education 230) (3). Prerequisite, permission of the instructor. Policy/program options and implementation strategies in the light of contemporary patterns of illness and the efficacy of modern health improvement interventions. *Spring*. Milio.
- 240 EPIDEMIOLOGY OF ALCOHOL USE AND ABUSE (Epidemiology 240) (3). Course will examine patterns of alcohol use and abuse nationally, internationally, and ethnically. Problems of definition, measurement and methodology will also be considered, as well as implications for health. *Spring*. Magruder-Habib.
- 253 OPERATIONS RESEARCH AND THE HEALTH SYSTEM (3). Prerequisite, permission of instructor. Analysis of deterministic and stochastic models and their applicability to health services research. Formulation of decision models for health care problems, involving mathematical programming, queueing, and heuristics. *Fall*. Parker.
- 255 ETHICAL AND PHILOSOPHICAL ISSUES IN HEALTH POLICY (3). Prerequisite HPAA 208 and permission of the instructor. This course deals with the many philosophical and ethical issues in health policy analysis like moralism versus paternalism, equity versus equality, and rationing health care. *Fall*. Beauchamp.
- 263 DENTAL PUBLIC HEALTH PRACTICE (3). Dental care in the comprehensive health services setting, financing and payment, social and behavioral science applications, emerging role of auxiliary personnel, prevention and health education, organization and care delivery, professional regulation and accountability, role of health department and community dentistry in the academic setting. *Spring*. Rozier, Graves.
- 266 UNITED STATES HEALTH POLICY (Maternal and Child Health 266) (2-3). Examination of policy issues pertaining to delivery of health services in the U.S. Evolution and current developments are examined in an effort to evaluate the administrative implications of current and proposed systems of health delivery in the U.S. *Fall and spring*. Miller.
- 270 ADVANCED METHODS IN POLICY ANALYSIS (3). Prerequisite, permission of instructor. Economic and quantitative methods of policy analysis and application to the health field. Students required to do a project. *Fall*. Freund, Rice.
- 275 ADVANCED QUANTITATIVE METHODS (3). Prerequisite, Health Policy and Administration 253 or permission of instructor. Analysis and application of advanced

management science models to health and public sector problems. Emphasis is given to advanced forms of mathematical programming, networks, decision theory, and queueing. *Spring*. Parker.

- 282 INTERNATIONAL AND COMPARATIVE HEALTH ADMINISTRATION (3). Permission of instructor required. Study of various health problems and responsive program systems in different (more or less developed) countries, with a comparative framework, examining special experiences, general lessons, and possibilities for cooperation. *Fall*. Freymann, Kanagaratnam.
- 283 MANAGEMENT ACCOUNTING FOR HEALTH CARE ORGANIZATIONS (3). Prerequisite Health Policy and Administration 211, or permission of instructor. The course focuses upon the concept of "cost" and the utilization of cost information in decision-making in health care organizations. Material is conveyed through lectures, problems, and cases. *Spring*. Zelman.
- 285 FINANCIAL MANAGEMENT OF HEALTH CARE ORGANIZATIONS (3). Prerequisite HPAA 211. A detailed examination of financial management techniques in health care organizations to include capital financing, capital structures, and investment decisions. *Fall*. McLean.
- 290 ANALYTIC TECHNIQUES IN HEALTH POLICY & ADMINISTRATION (3). Prerequisites, BIOS 105 and permission of the instructor. Covers a variety of analytic techniques and methodologies basic to more advanced analysis of decision problems in health administration, i.e., multivariate statistics, basic econometrics, linear algebra. *Fall*. Parker.
- 296 ORGANIZATIONAL DESIGN AND BEHAVIOR OF HEALTH INSTITUTIONS (3). Review of theory and empirical findings providing approach to management and organizational behavior. Topics include effect of technology and size on organizational structure, performance, roles of professionals. *Fall*. Kaluzny.
- 300 DOCTORAL SEMINAR IN HEALTH POLICY AND ADMINISTRATION I (3). Prerequisite, doctoral standing. Readings and discussion of various aspects of health services. Special emphasis is given to the interrelationships of administrative and organizational theory to selected health service topics. *Fall*. Freund, staff.
- 301 DOCTORAL SEMINAR IN HEALTH POLICY AND ADMINISTRATION II (3). Prerequisite, Health Policy and Administration 300. Continuation of Health Policy and Administration 300. *Spring*. Freund, staff.
- 304 SEMINAR IN TEACHING HEALTH POLICY AND ADMINISTRATION (3). Problems and processes of teaching health administration including supervised practicum experience. *Fall, spring*. Staff.
- 311 SELECTED TOPICS IN HEALTH FINANCIAL MANAGEMENT (3). Prerequisite HPAA 211. The course discusses current topics in health care financial management. The topics change from semester to semester, but usually one topic is highlighted. Seminar style classes: considerable reading and discussion. *Fall*. McLean, Zelman.
- 333 ADVANCED METHODOLOGY IN HEALTH POLICY AND ADMINISTRATION RESEARCH (1). Prerequisites, Biostatistics 145 and Health Policy and Administration 201, or permission of instructor. Research methodology as applied to understanding problems in health care delivery. Consideration is given to experimental design, data collection, and application of appropriate models of analysis of data. *Spring*. Veney, Luckey, Sollecito.
- 334 SELECTED TOPICS IN HEALTH POLICY AND ADMINISTRATION: ADVANCED SEMINAR (3). Prerequisite, permission of instructor. Integrative study of selected theory and research as it relates to the organization and delivery of health services. Separate seminars are developed to correspond to the doctoral student's specific interests and needs. *Spring*. Staff.
- 356 CURRENT ISSUES IN HEALTH POLICY AND MASS COMMUNICATIONS (Nursing 356). (2-3). Prerequisite, permission of the instructor. Provides an analytic skill in a real world context for those who will participate in the broad process of

policy formulation through their positions in the health professions and mass communications field. *Fall*. Milio.

- 373 SEMINAR IN HEALTH POLICY AND ADMINISTRATION (1-6). *Spring*. Jain.
384 ADVANCED STUDIES IN POPULATION POLICY (3). Prerequisite, permission of instructor. Individualized studies on special problems in population policy analysis and development to provide skills in aspects of goal identification, analyzing relevant organizational processes. *Spring*. Freymann, Jain.
392 MASTER'S PAPER (0-3). *Fall, spring, summer*. Staff.
393 MASTER'S THESIS (1-6). Staff.
394 DOCTORAL DISSERTATION (0-9). Staff.
400 GENERAL REGISTRATION (0). Staff.

Department of Maternal and Child Health (MHCH)

ELIZABETH L. WATKINS, *Acting Chairman*

Professors

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|-----------------------|------|---|
| JAROSLAV FABIAN HULKA | (6) | Methods of Fertility Management and Development of Delivery Systems |
| C. ARDEN MILLER | (9) | Health Policy and Priorities, Public Accountability, Child Health |
| EARL S. SCHAEFER | (11) | Family Relationships, Child Care and Education, Child Development |
| EARL SIEGEL | (12) | Perinatal Health and Family Planning, Early Child Care |
| J. RICHARD UDRY | (14) | Population, Family, Program Evaluation |
| ELIZABETH L. WATKINS | (16) | Maternal and Child Health, Migrant Health |

Associate Professor

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| JONATHAN KOTCH | (17) | Injury Prevention, Child Abuse and Neglect, Day Care and Illness |
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Assistant Professors

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| DOROTHY BROWNE | (30) | Child Abuse and Neglect, Black Families, Infants and Children at Risk |
| MARY PEOPLES-SHEPS | (31) | Maternal and Infant Health, Health Care Program Planning and Evaluation |

Lecturer

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| MICHAEL DURFEE | (24) | Health Care in the Juvenile Justice System, Adolescent Health Care, Handicapping Conditions and Chronic Diseases |
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Adjunct Professor

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| FRANK LODA | (27) | General Pediatrics, Health Promotion and Disease Prevention, Child Abuse and Neglect |
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Clinical Professor

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| HOWARD JACOBSON | (20) | Maternal and Child Health Services, Public Health Nutrition and Program Evaluation |
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Adjunct Associate Professor

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| RICHARD NUGENT | (32) | Regionalization of Perinatal Health Care Services, Early Child Care |
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Clinical Assistant Professors

- ANITA FAREL (33) Chronically Ill and Developmentally Disabled Children, Health Policy and Service Organization
- DEBORAH E. BENDER (35) International Health, Evaluation of Primary Care Strategies, Women's Roles and Maternal/Child Health Status

Research Assistant Professor

- AMY O. TSUI (34) International Family Planning, Fertility, Reproductive Health

Professor Emeritus

SIDNEY S. CHIPMAN

Associate Professors Emeritae

GERALDINE GOURLEY
E. BARBARA STOCKING

- 103 REPRODUCTIVE PHYSIOLOGY AND CONCEPTION CONTROL (Women's Studies 103) (2). Human sexuality, reproductive physiology, methods of regulation; pregnancy, fetal wastage, infertility, sterilization, abortion and community responsibilities discussed. *Two lecture hours a week, fall.* Hulka.
- 105 CURRENT ISSUES AND ADVANCES IN DEVELOPMENTAL DISABILITIES (Social Work 105) (3). Permission required. Seminar that will enable students and experts in developmental disabilities to exchange ideas and explore controversial topics. Seminar will address current research and policies which affect service delivery for persons who have developmental disabilities. *Three seminar hours per week, fall, spring.* Staff.
- 110 DEMOGRAPHY OF WOMEN AND CHILDREN IN DEVELOPING COUNTRIES (2-3). Permission required for all non-majors. Introduction to basic population concepts and measures, emphasizing demographic indicators of health and social status of women and children in developing countries. Staff.
- 140 PROBLEMS IN MATERNAL AND CHILD HEALTH (1-3). Prerequisites to be arranged with the faculty in each individual case. *Two to six hours a week, fall, spring and summer.* Staff.
- 200 ISSUES IN MATERNAL AND CHILD HEALTH (3). Prerequisite, permission of instructors. For students outside the department of MCH who desire a survey of current issues and programs in maternal and child health. Emphasis is on contemporary approaches to problems and services affecting children and families. *Two lecture and two seminar hours per week, fall.* Browne.
- 201 CHILD DEVELOPMENT AND SOCIAL POLICY (3). Permission of instructor required. Analysis of prevailing social policies as they relate to principles of child development; overview of child development and case studies on federal policies affecting children and families. *Two lecture, one seminar and one laboratory hour per week, spring.* Staff.
- 205 INTERNATIONAL FAMILY PLANNING (3). Permission required. Prerequisites. Analysis of the family planning movement, its policies, operations, and research, with emphasis on The Third World. *Three lecture hours a week, fall, spring.* Tsui.
- 207 EVALUATION OF PRIMARY HEALTH CARE SERVICES IN THE DEVELOPING WORLD (3). Permission required. Analysis of Third World Health problems, alternate

- models for solving those problems and the policies of organizations involved in the delivery of primary health care. *Three lecture hours per week, spring.* Bender.
- 208 CONCURRENT FIELD TRAINING IN MATERNAL AND CHILD HEALTH (1-4). Prerequisite, MHCH major. An elective faculty supervised field experience in community maternal and child health services in relation to background of experiences, special interests, and future professional plans. *Variable number of laboratory hours per week, fall, spring and summer.* Staff.
- 209 POLICY AND PROGRAM DEVELOPMENT IN MATERNAL AND CHILD HEALTH (2). Non-majors require permission of instructor. Examination of the development of health services and other public programs for mothers and children in the context of broader policy considerations. *One lecture and two seminar hours per week, fall.* Kotch, Farel.
- 210 MATERNAL AND INFANT HEALTH AND FAMILY PLANNING (2). Non-majors require permission of instructors. Health needs, problems, and programmatic issues in maternal-infant health and family planning. Includes biologic, sociocultural and physiological factors. *One lecture, two seminar hours, fall.* Siegel, Peoples-Sheps.
- 211 FAMILY AND CHILD HEALTH (2). Permission of instructor required for non-majors. This course addresses the major issues in child and adolescent health including interactions among children, their families and environment. Consideration is given to models of intervention with emphasis on the preventive public health approach. *One lecture and two seminar hours a week, spring.* Watkins.
- 212 SEMINAR ON FAMILY FUNCTION (Public Health Nursing 212) (1). Permission required. Family theory, research and assessment; family relationships and environments that influence adult and child health and development; professions and institutions that influence family functioning. *Spring and summer.* Schaefer.
- 213 RESEARCH UTILIZATION IN MATERNAL AND CHILD HEALTH (2). Permission required. This course is designed to provide each student with major interests in maternal and child health the ability to utilize research conducted by others. Emphasis is upon evaluating the research methodology used by others and applying that research to the assessment, planning and implementation of policies and programs in maternal and child health. *Two hours per week, spring.* Staff.
- 214 FIELD TRAINING IN MATERNAL AND CHILD HEALTH (2-8). Required of selected students in terms of their background of experience, special interests and future professional plans. An additional field fee of \$350.00 will be assessed. *Summer, 6-10 weeks.* Staff.
- 215 ANALYSIS OF DEVELOPMENTAL INTERVENTION PROGRAM (Public Health Nursing 215) (2). Permission of instructor required. Critical review of intervention programs for infants and young children aimed at the prevention of developmental deficits. Examination of rationale for intervention, content and form of program delivery and methods for evaluating effectiveness. *One lecture and two seminar hours per week.* Staff.
- 217 DEVELOPMENTAL INDICES OF HEALTH STATUS IN INFANTS AND YOUNG CHILDREN (Public Health Nursing 217) (2). Permission of instructor required. Concepts and methods in the early identification of developmentally at-risk populations. Examines issues in reliability, validity, and applicability of measurements used in the assessment of early cognitive and social development. *One lecture and two seminar hours per week.* Staff.
- 218 PROGRAM PLANNING IN FAMILY HEALTH (Health Policy and Administration 218) (3). Permission required for non-majors. Basic models and methods of program planning. Emphasis will be on application of methods through the development of program plans for significant family health problems. *Three lecture hours, spring.* Peoples-Sheps.

- 220 SERVICES FOR HANDICAPPED CHILDREN (3). This course focuses on the design, organization, and implementation of services for children with special needs. Participants will analyze the range of services needed by these children. *Spring*. Farel.
- 222 FAMILY PLANNING THEORY: ASSESSMENT AND CARE OF WOMEN IN THE REPRODUCTIVE YEARS (Public Health Nursing 222) (1). For health professionals doing family planning counseling. Includes mode of action, effectiveness, contraindications, side effects, complications, advantages, disadvantages of temporary and permanent methods of birth control. *On request*. Staff.
- 224 CHILDREN OF SCHOOL AGE: HEALTH PROBLEMS AND PROGRAMS (Public Health Nursing 224) (3). Permission of instructor required. Health needs of school age children; analysis of policies and programs that are responsive to those needs with emphasis on school based initiatives, and school-community interactions. *Two lecture and two seminar hours per week, spring*. Asay.
- 225 PRACTICUM: LEADERSHIP IN SCHOOL HEALTH PROGRAMS (Public Health Nursing 225) (1-4). Prerequisites, Maternal and Child Health 224 or equivalent and permission of instructor. An elective, individually planned and supervised school-community based field experience. Designed to provide leadership experiences in delivery of school health services. *Spring*. Asay.
- 254 SOCIAL WORK IN PUBLIC HEALTH (2). Permission of instructor required. Analyzes role and functions of social workers in Public Health with emphasis on multidisciplinary practice. Focus is on planning social work component of health program. Observational visits to selected sites. *Fall*. Watkins.
- 255 CONSULTATION IN PUBLIC HEALTH (Public Health Nursing 255) (2-3). Examination of the practice of case and program consultation in public health settings. Analysis of consultation as a mutual problem-solving process including evaluation. Roles and relationships of consultant and consultee are considered with provision for experiential learning opportunities. Emphasis is on multidisciplinary practice. *One and one-half lecture hours per week. Field experience and written report accepted for additional credit hours, fall and spring*. Watkins.
- 300 DOCTORAL SEMINAR IN MATERNAL AND CHILD HEALTH (1-3). Advanced topics in Maternal and Child Health. Required of departmental doctoral students every semester until admitted to candidacy. *Two or more hours a week, fall, spring or summer*. Staff.
- 307 SEMINAR IN DISORDERS OF DEVELOPMENT AND LEARNING IN CHILDHOOD (Physical Therapy 307) (2). Prerequisite, permission of the instructor. Seminar for students with prior background in child development or related areas on interdisciplinary diagnosis and management of development problems in childhood. Focus on staff and student prepared case material. *Two seminar hours a week, spring*. C. Knobloch and CDL Staff.
- 309 ISSUES OF ADVOCACY IN MATERNAL AND CHILD HEALTH (3). Permission required. Examines advocacy as a process for influencing policies affecting mothers and children. *Three lecture hours a week, spring*. Browne.
- 315 SEMINAR IN MATERNAL AND CHILD HEALTH (1). Nonmajors require permission of instructor. This seminar provides an opportunity for students and faculty to explore in greater depth selected subjects within the field of maternal and child health. *Four seminar hours a week, summer*. Staff.
- 320 SEMINAR IN PROGRAMS TO AFFECT HUMAN REPRODUCTION (2). Application of health services research and behavioral, biological, epidemiological, and clinical studies in human reproduction to the design of programs to affect patterns of reproduction and reproductive outcomes. *Four hours a week, on request*. Udry.
- 321 SEMINAR IN PROGRAMS TO AFFECT CHILD CARE AND DEVELOPMENT (2). Analysis of programmatic research and behavioral and biological studies in child care and development; its contribution to the design and to the research and evaluation

of programs affecting child care and development. *Four hours a week, on request.*
Schaefer, Siegel.

- 322 HUMAN SEXUAL BEHAVIOR (3). Permission of instructor required. Scientific foundation for understanding human sexual behavior, including biological, psychological and sociological perspectives. Research emphasis. *Three lecture hours per week, spring.*
Udry.
- 392 MASTER'S PAPER (1). *Fall, spring and summer.*
- 393 MASTER'S THESIS (3-6). *Fall, and spring.*
- 394 DOCTORAL DISSERTATION (3 or more). *Fall, spring and summer.*
- 400 GENERAL REGISTRATION (0).

Department of Nutrition (NUTR)

MILDRED KAUFMAN, *Chair*

Professors

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|---------------------|------|--|
| JOHN J. B. ANDERSON | (2) | Calcium and Phosphorus Metabolism, Endocrines and Food Nutrients, Physiology |
| JOSEPH C. EDOZIEN | (1) | Malnutrition, Abnormal Intake of Nutrients and the Endocrines, Clinical Nutrition |
| MILDRED KAUFMAN | (20) | Nutrition Policy and Planning, Maternal, Child and Community Nutrition and Aging |
| BARRY M. POPKIN | (17) | Socio-economic Determinants of Malnutrition, International Nutrition, Evaluation and Cost-Analysis |

Associate Professor

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| BOYD R. SWITZER | (5) | Nutritional Biochemistry, Research Methods, Hormones |
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Assistant Professors

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| PAMELA S. HAINES | (32) | Nutrition Program Evaluation; Dietary Intake Methodology; Chronic Disease Epidemiology |
| BETTY G. KIRKLEY | (33) | Eating Disorders, Behavior Therapy, Health Promotion |

Adjunct Professor

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| ALI PAYDARFAR | (31) | Social Aspects of Nutrition; Food Habits |
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Adjunct Associate Professor

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| BARBARA A. HUGHES | (22) | Nutrition and Dietary Services Administration |
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Adjunct Assistant Professor

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| THOMAS J. CHEGASH | (29) | Food Service Systems Management |
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Clinical Associate Professor

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| MARYANN C. FARTHING | (21) | Nutrition, Education, Community Nutrition, Therapeutic Nutrition |
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Clinical Assistant Professor

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| JEAN C. BURGE | (24) | Vitamin and Trace Minerals, Calcium and Vitamin D, Taste in Relation to Renal Disease |
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Clinical Instructor

CAROLYN J. BARRETT

(28) Pediatric Nutrition

Associate Professor Emerita

REBECCA B. BRYAN

- 100 NUTRITION AND HUMAN HEALTH (3). Prerequisite, EPID 160. A review of the physiological and environmental determinants of human nutritional requirements and the relation of diet to human health and disease. *Two lecture hours per week, spring.* Anderson, staff.
- 101 AGING AND HUMAN DEVELOPMENT (Public Health Nursing, Health Education and Health Policy and Administration 101) (3). Biological, medical, demographic, and social aspects of aging. New methods and concepts of the aging processes and their implications. *Three lecture hours per week, fall.* Staff.
- 110 APPLIED NUTRITION FOR HEALTH PROFESSIONS (3). Prerequisites, previous or concurrent courses in chemistry, biochemistry, and physiology/anatomy at undergraduate or graduate level. Knowledge and understanding of nutrition and application to the preventative and therapeutic care of man in a health-team approach. *Three lecture hours per week, spring.* Anderson, staff.
- 120 NUTRITION EDUCATION FOR TEACHERS (3). Prerequisites, Teacher Certification and permission from the instructor. Review of basic nutrition information, materials, and techniques which provide a framework for integrating nutrition education into various subject areas of existing school curriculum in grades K-12. *Fifteen hours per week for three weeks, second summer session.* Farthing.
- 140 READINGS IN NUTRITION (1-6). Prerequisite, permission of instructor. Reading and tutorial guidance in special areas of nutrition such as international nutrition and nutrition and population. *Fall, spring, summer.* Staff.
- 150 CELL BIOLOGY (4). Prerequisites, a course each in biochemistry and physiology or permission of instructor. A review of the general structure and function of the cell. Chemistry and metabolism of carbohydrates, proteins, lipids, vitamins and minerals. Endocrine and nervous integration of cellular mechanisms. *Four lecture hours per week, fall.* Anderson, Switzer.
- 151 CELL BIOLOGY LABORATORY (3). Prerequisites, two chemistry laboratory courses and concurrent registration in Nutrition 150. A laboratory course designed to acquaint students with the equipment and theory of modern biochemical and biophysical methods used in nutrition research. *Six laboratory hours per week, fall.* Switzer, Anderson.
- 152 MEAL PLANNING, FOOD SELECTION AND PREPARATION (3). Prerequisite, Nutrition 50 or equivalent. Introduction to foods important in the American diet; composition and properties; factors affecting the selection, handling and preparation of foods; menu planning and meal preparation. A laboratory is included. *Three lecture hours per week, fall.* Barrett.
- 153 FOOD PRODUCTION, PROCESSING AND PACKAGING (3). Prerequisite, Nutrition 50 or equivalent. Impact of all parts of food industry on availability and nutritive value of foods, and food safety. *Three lecture hours per week, spring.*
- 154 HUMAN NUTRITION (3). Prerequisites, Nutrition 50 or equivalent, Biochemistry 100, Biology 45, or permission of instructor. A second level course in human nutrition which deals with nutrient requirements in relation to specific cellular needs and mechanisms. Structural and metabolic aspects of carbohydrates, lipids, proteins, vitamins and minerals. *Three lecture hours per week, fall.* Burge.
- 155 INTRODUCTION TO PUBLIC HEALTH NUTRITION (3). Prerequisite, Nutrition 50 or equivalent. The functions of the nutritionist in the community, including an

- assessment of nutritional needs of individuals, with emphasis on interviewing and counseling skills. Existing community food and nutrition programs and services are introduced and their relationship to other health and social programs is studied. *Three lecture hours per week, fall.* Haines.
- 156 FOOD SERVICE SYSTEMS MANAGEMENT (3). Basic concepts of food service system management applied to small and medium-sized group and health care facilities in the community. *Two lecture hours and two laboratory hours per week. Fall and spring.* Chegash.
- 157 CLINICAL NUTRITION (3). Prerequisites, Biology 45, Biochemistry 100, and corequisite Nutrition 154 or equivalent courses. A study of the relationship of diet to diseases of man and of dietary intervention in the prevention and/or treatment of these conditions. *Three lecture hours per week, spring.* Burge.
- 157L CLINICAL NUTRITION LABORATORY (1). Corequisite NUTR 157. Development of clinical nutrition skills. Application of clinical nutrition principles and development of interviewing assessment and counseling skills. *Two laboratory hours per week, spring.* Burge.
- 159 FOOD HABITS (3). Social, cultural, and psychological influences on food consumption patterns of individuals. Includes a study of selected research methodologies and alternate U.S. food consumption patterns. *Three lecture hours per week, spring.* Kirkley.
- 160 ECONOMICS OF NUTRITION AND PUBLIC HEALTH (3). Prerequisite, two social science courses. Concepts and methodologies used by economists in examining health and nutritional issues at the microeconomic level. Emphasis will be on examining how economics can be used to understand the determinants and consequences of health/nutritional status and a few key aspects of health and nutrition behavior. *Three lecture hours per week, spring.* Popkin.
- 200 MATERNAL, INFANT AND CHILD NUTRITION (3). Prerequisite, Nutrition 154 or permission of instructor. This course covers the nutritional needs of women during the childbearing years, infants and children; the community, ethnic and socioeconomic influences on food intake of these target populations, and community food and nutrition programs designed to meet their unique nutritional needs. *Two lecture and two seminar hours per week, fall.* Farthing.
- 201 NUTRITION OF ADULTS AND THE ELDERLY (3). Prerequisite, Nutrition 154 or equivalent or permission of instructor. A review of the effects of the aging process on human nutrition. Physiological, psychological and sociological factors which affect dietary habits and nutrient intake will be examined. *Three lecture hours per week, spring.* Edozien.
- 202 ADVANCED HUMAN NUTRITION (3). Prerequisite, Nutrition 154. A review of the epidemiology, pathology and prevention of disorders related to diet and nutrition. *Three lecture hours per week, spring.* Burge, staff.
- 205 PRINCIPLES OF PUBLIC HEALTH NUTRITION (4). Prerequisite, Nutrition 155 or equivalent. Roles and functions of nutritionist in community health. Emphasis is on understanding the role and function of the health agency and the nutritionist and in community assessment to identify major needs for nutrition programs and services. *Two lecture hours and one day concurrent field experience per week, fall.* Kaufman.
- 207 NUTRITION EDUCATION (3). Prerequisite, Nutrition 50 or equivalent or permission of instructor. Principles and practice of nutrition education with emphasis on the community setting for small groups and individuals. Use of modern techniques, including written and audiovisual instruments, geared to modification of dietary behavior and to prevention of disease. *Three lecture hours per week, spring.* Farthing.
- 208 NUTRITION PROGRAMS AND SERVICES (4). Prerequisite, Nutrition 205. An overview of the planning and management of local, state and federal public health nutrition programs covering their legislative and administrative structures and responsibilities of the nutritionist. *Four hours of seminar and concurrent field experience per week, spring.* Kaufman.

- 212 NUTRITIONAL ASSESSMENT (3). Prerequisite, Nutrition 154 and laboratory experience in chemistry or nutrition science. This course develops the theory and rationale of nutritional assessment of individuals and communities with various techniques including clinical, anthropometric, dietary and laboratory methods. *One lecture hour and four laboratory hours per week, spring.* Switzer, staff.
- 215 INTERNATIONAL NUTRITION (3). Critical review of the dimensions of world problems in nutrition, with emphasis on the micro and macro determinants of malnutrition, the consequences of malnutrition, and the programs and policies for eliminating malnutrition. *Three lecture hours per week, fall.* Popkin.
- 240 PROBLEM IN NUTRITION (1-6). Prerequisite, permission of instructor. A course for students who wish to make a study of some special problem in nutrition. Lectures, seminars and/or laboratory work according to the special area under study. *Fall, spring and summer.* Staff.
- 250 CLINICAL NUTRITION PRACTICE (1-6). Prerequisites, Nutrition 152, 157 and 157L or equivalent. Students are assigned to a medical facility where, under supervision of registered dietitians, they participate in nutritional care of patients. Field fee \$450. *Forty hours per week for twelve weeks, summer.* Barrett, Burge and field preceptors.
- 251 FIELD EXPERIENCE II (1-4). Students are assigned to state, local or district health agency or other appropriate agency for supervised field experience. Field fee \$450. A brief written report of activities is required. *Fall, spring and summer.* Kaufman, staff and field preceptors.
- 252 NATIONAL NUTRITION ISSUES (1). Prerequisite Nutrition 208 or permission of instructor. Three-day indepth seminars held in Washington, D.C., on current national nutrition issues, policy formulation and program development with key congressional staff, federal agencies staff and pertinent public interest/consumer advocacy groups. Field fee \$50. *First summer session.* Kaufman.
- 300 NUTRITIONAL ASPECTS OF PROTEIN, LIPID AND CARBOHYDRATE METABOLISM (3). Prerequisites, Nutrition 150 and 154. Recent advances in the nutritional aspects of protein, lipid and carbohydrate metabolism will be reviewed. *Six seminar hours per week, fall.* Switzer.
- 301 NUTRITIONAL ASPECTS OF MINERAL METABOLISM (3). Prerequisites, Nutrition 150 and 154; 201, 202 or 212. Recent advances in the nutritional aspects of mineral metabolism will be reviewed. *Six seminar hours per week, spring.* Anderson, Burge.
- 302 NUTRITIONAL BIOCHEMISTRY (3). Prerequisites, Nutrition 151 and 212. Experimental and laboratory procedures in nutritional biochemistry and physiology, including the identification and measurement of nutrients and their metabolites in foods and in human and animal tissues and body fluids. *Six laboratory hours per week, fall.*
- 303 ADVANCED SEMINAR IN PUBLIC HEALTH NUTRITION (3). Prerequisites, Nutrition 205; Nutrition 208 or 215. The broad aspects of nutrition policy, such as U.S. and international nutrition problems and issues, intervention options and policy decisions—basis and rationale—will be discussed. *Six seminar hours per week, spring.* Haines.
- 304 ADVANCED SEMINAR IN NUTRITION BEHAVIOR (3). Prerequisites, Nutrition 159 and 207 or permission of instructor. Analysis of the ways anthropology, economic and psychological approaches can be used to understand nutrition behavior and effect nutrition change. *Six seminar hours per week, fall.* Kirkley.
- 340 SEMINAR IN NUTRITION (1-6). Prerequisites, a minimum of one year of graduate work in nutrition and permission of instructor. Seminars and/or laboratory work, according to the special area under study. *Two or more hours per week, fall, spring and summer.* Staff.
- 355 NUTRITIONAL RESEARCH METHODOLOGIES (3). Prerequisites, Nutrition 205 and 208, or permission of instructor. Development of skills, techniques and competencies, through practical experience, in the assessment of the nutritional needs of a community, or in the planning and delivery of community nutrition services in a health

- or other appropriate agency or the evaluation of an ongoing nutrition program. *Six laboratory hours per week, fall, spring and summer.* Staff.
- 389 PREPARATION OF RESEARCH PROSPECTUS (1). Theoretical and practical aspects of selecting a research topic and designing and preparing the research proposal. *Fall, spring.* Popkin.
- 390 NUTRITION RESEARCH (1-9). Individual arrangements will be made by the student to spend part or all of his time in supervised investigation related to thesis or dissertation. *Two or more laboratory or field hours per week, fall, spring and summer.* Staff.
- 391 NUTRITION RESEARCH SEMINAR (1). Instruction in preparing seminars. Students will also attend and learn to critique nutrition faculty seminars. *Two or more hours per week. Fall and spring.*
- 392 MASTER'S PAPER (1-6). *Fall, spring and summer.* Staff.
- 393 MASTER'S THESIS (0-6). *Fall, spring and summer.* Staff.
- 394 DOCTORAL DISSERTATION (3-9). *Fall, spring and summer.* Staff.
- 400 GENERAL REGISTRATION (0).

Department of Parasitology and Laboratory Practice (PALP)

JOHN R. SEED, *Chairman*

Professors

HILTON T. GOULSON	(2)	Immunity to Helminths, Host-parasite Relations, Diagnostic Parasitology
JOHN R. SEED	(12)	Biochemistry of the Host-parasite Relationship
NORMAN F. WEATHERLY	(3)	Immunoparasitology, Immunity to Helminths, Host-parasite Relations

Assistant Professors

RALPH S. BARIC	(21)	Public Health Virology; Molecular Virology
JAMES E. HALL	(14)	Host-Parasite Metabolism; Biological Chemistry
STEPHEN C. MERRITT	(15)	Parasitic Protozoa: Molecular Biology
LOLA V. STAMM	(19)	Public Health Bacteriology, Molecular Cloning, Pathogenics of Infectious Disease

Clinical Professor

JERRY J. TULIS	(11)	Biological Safety, Biohazards, Infectious Diseases
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Clinical Assistant Professor

ERNEST SCHOENFELD	(13)	Laboratory Practice
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Adjunct Professors

W. EMMETT BARKLEY	Biohazard Science Research
VULUS R. DOWELL, JR.	Public Health Microbiology Research
JOYCE D.K. ESSIEN	Public Health Microbiology Research
LEO KAUFMAN	Public Health Microbiology Research
ATHOS OTTOLENGHI	Public Health Microbiology Research
G. BRIGGS PHILLIPS	Public Health Microbiology Research

Adjunct Associate Professors

LIBERO AJELLO	Public Health Microbiology Research
WILLIAM L. ALBRITTON	Public Health Microbiology Research
ROBERT C. BARNES	Public Health Microbiology Research
JOHN E. BENNETT	Biohazard Science Research
CARL H. BLANK	Public Health Microbiology Research
DON J. BRENNER	Public Health Microbiology Research
JOHN B. BROOKS	Public Health Microbiology Research
GARY H. CAMPBELL	Public Health Microbiology Research
EDWARD L. CAVENAUGH	Public Health Microbiology Research
SOTORIS D. CHAPARAS	Public Health Microbiology Research
ROBERT C. COOKSEY	Public Health Microbiology Research
WALTER R. DOWDLE	Public Health Microbiology Research

JOHN J. FARMER III	Public Health Microbiology Research
JOHN C. FEELEY	Public Health Microbiology Research
GEORGE W. GARY	Public Health Microbiology Research
ROBERT C. GOOD	Public Health Microbiology Research
WILLIAM H. HANNON	Public Health Microbiology Research
H. ROBERT HARRISON	Public Health Microbiology Research
GEORGE C. HATCH	Biohazard Science Research
CHARLES L. HATHEWAY	Public Health Microbiology Research
DAVID K. HENDERSON	Biohazard Science Research
GALE B. HILL	Public Health Microbiology Research
ALAN P. KENDAL	Public Health Microbiology Research
MICHAEL P. KILEY	Public Health Microbiology Research
JAMES C. LAMB	Biohazard Science Research
MALCOLM A. MARTIN	Biohazard Science Research
JOSEPH B. MCCORMICK	Public Health Microbiology Research
ROBERT W. MCKINNEY	Biohazard Science Research
MAX D. MOODY	Public Health Microbiology Research
C. WAYNE MOSS	Public Health Microbiology Research
ERSKINE L. PALMER	Public Health Microbiology Research
LEO PINE	Public Health Microbiology Research
JOHN A. REIDY	Public Health Microbiology Research
CHARLES B. REIMER	Public Health Microbiology Research
MICHAEL A. RIGGS	Ecology of Parasites
ERROL REISS	Public Health Microbiology Research
ERIC B. SANSONE	Biohazard Science Research
MARY JANE K. SELGRADE	Biohazard Science Research
PETER B. SMITH	Public Health Microbiology Research
FRANCIS W. SPIERTO	Public Health Microbiology Research
ALEXANDER J. SULZER	Public Health Microbiology Research
DAVID C. SWAN	Public Health Microbiology Research
CLYDE THORNSBERRY	Public Health Microbiology Research
I. KAYE WACHSMUTH	Public Health Microbiology Research

Adjunct Assistant Professors

FRANK V. CROUT	(18)	Public Health Virology
NANCY S. HUNTER	(17)	Public Health Bacteriology
JAMES P. O'CONNELL	(16)	Immunodiagnostics; Public Health Microbiology Research
HAZEL W. WILKINSON		Public Health Microbiology Research

Professors Emeriti

ELMER F. CHAFFEE	(6)	Public Health Diagnostic Bacteriology and Mycology, Serological Reactions in Parasitic Infections
JAMES R. HENDRICKS	(4)	Diagnostic Parasitology, Survey Methods, Helminth Life Cycles
JOHN E. LARSH	(1)	Immunoparasitology, Immunity to Helminths, Host-parasite Relations

131 PARASITISM AND HUMAN DISEASE (3). An overview of the principles of infectious disease. Lectures and discussions will introduce all aspects of microbiology as

- well as other topics, including immunity, pathogenesis, biosafety, and molecular biology. *Three lecture hours a week, fall.* Goulson.
- 134 MEDICAL HELMINTHOLOGY (2). Lectures and discussions on the helminth parasites of man with special emphasis on their life cycles, host responses, and epidemiology. *Two lecture hours a week, fall.* Weatherly.
- 134L MEDICAL HELMINTHOLOGY LABORATORY (2). Laboratory exercises dealing with the biology, host-parasite relations, and diagnosis of helminthic infections of man. *Four laboratory hours a week, fall.* Weatherly and Goulson.
- 135 MEDICAL PROTOZOOLOGY (2). Lectures and discussions on the protozoal parasites of man, with special emphasis on their life cycles, host responses, and epidemiology. *Two lecture hours a week, spring.* Merritt.
- 135L MEDICAL PROTOZOOLOGY LABORATORY (2). Laboratory exercises dealing with the biology, host-parasite relations, and diagnosis of protozoal infections of man. *Four laboratory hours a week, spring.* Merritt.
- 138 HOST-PARASITE METABOLIC INTERACTIONS (3). Prerequisite, permission of instructor. Metabolic interactions between host and parasite in medically important protozoan and helminthic infections will be discussed. How these interactions contribute to the pathogenesis of the diseases will be considered. *Three lecture hours a week, fall.* Hall.
- 139 MOLECULAR BIOLOGY OF PARASITES (3). Prerequisite, PALP 135 or permission of instructor. A comprehensive introduction to the medically important human parasites. Methodological approaches to the study of gene structure and function in the parasitic protozoa will be emphasized. *Three lecture hours a week, spring.* Merritt.
- 140 PROBLEMS IN PARASITOLOGY (1 or more). A course for students who wish to
141 make an intensive study of some special problem in human parasitology. *Two or more hours a week, fall and spring.* Staff.
- 142 PROBLEMS IN PUBLIC HEALTH LABORATORY PRACTICE (1 or more). A
143 course for students who wish to make an intensive study of some special problem in the laboratory field. *Two or more hours a week, fall and spring.* Staff.
- 150 PUBLIC HEALTH BACTERIOLOGY (4). Prerequisite, permission of instructor. Lectures and laboratory studies of the human pathogenic bacteria and fungi with particular emphasis on those submitted to public health laboratories for complete identification. *Two lecture and four laboratory hours a week, fall.* Stamm.
- 151 PUBLIC HEALTH VIROLOGY (3). Prerequisites, PALP 150 and permission of instructor. Lectures and laboratory studies on isolation and identification techniques. *Two lecture and two laboratory hours a week, spring.* Baric.
- 161 SURVEY OF HEALTH LABORATORY MANAGEMENT ISSUES (2). A broad-based coverage of current and critical issues in the management of health laboratories. Topics will include human and physical resources, fiscal considerations, and the impact of technological innovations. *Two lecture hours a week.* Schoenfeld, Cavanaugh.
- 230 THE NATURE OF PARASITISM (3). Prerequisite, permission of instructor. Lectures and discussions on the immunology of parasitic protozoa and helminths. Host and parasite factors thought to be important in pathogenesis are presented. Medically important protozoa and helminths are stressed. *Three lecture hours a week, spring.* Seed.
- 231 ECOLOGY OF PARASITIC DISEASE (3). Introduction to the measurement and analysis of the dynamics of parasite infection in populations of animal hosts. *Two lecture and two seminar hours a week. Spring.* Riggs.
- 233 MALARIOLOGY (3). Prerequisite, permission of instructor. Lectures, demonstrations, and laboratory devoted to the study of malaria in man and mosquito. The biology and classification of mosquitoes are also considered. *Two lecture and two laboratory hours a week, fall.* Staff.
- 235 PROBLEMS IN PUBLIC HEALTH LABORATORY METHODOLOGY (1 or more).
236 Prerequisites, Parasitology and Laboratory Practice 142 or 143, and permission of instructor. *Two or more hours a week, fall and spring.* Goulson.

- 250 PUBLIC HEALTH LABORATORY METHODS I (2). Prerequisite, permission of instructor. Lectures and seminars pertaining to current diagnostic techniques in Public Health Bacteriology and Mycology. *One lecture and two seminar hours a week, fall.* Staff.
- 251 PUBLIC HEALTH LABORATORY METHODS II (3). Prerequisite, permission of instructor. Lectures, demonstrations, and laboratory work on the most important microbiological diagnostic procedures, e.g., immunoserology, used in the modern public health laboratory. *Three lecture hours a week, spring.* O'Connell.
- 260 PUBLIC HEALTH LABORATORY MANAGEMENT I (2). Prerequisite, permission of instructor. An exploration of the functions of public health laboratory directors. Topics include budgeting, planning, organizing, personnel management, and physical requirements of laboratory operations. *Two lecture and two seminar hours a week, fall.* Schoenfeld and Cavanaugh.
- 261 PUBLIC HEALTH LABORATORY MANAGEMENT II (3). Prerequisite, permission of instructor. A continuing study in depth of the responsibilities and activities of the public health laboratory. *Two lecture and two seminar hours a week, spring.* Schoenfeld and Cavanaugh.
- 270 BIOHAZARD SCIENCE I (3). Prerequisite, permission of instructor. Philosophy of safety, laboratory-acquired and nosocomial infections, other biohazards, fundamentals of laboratory safety, and principles of disinfection and sterilization. *Three lecture hours per week, fall.* Tulis.
- 271 BIOHAZARD SCIENCE II (3). Prerequisite, Parasitology and Laboratory Practice 270. Lectures and demonstrations on biohazard containment systems, aerosol and surface sampling, filtration technology, hazards of animal experimentation, carcinogen research, oncogenic virus studies, recombinant DNA, and aspects of biohazard control. *Three lecture hours per week, spring.* Tulis.
- 275 LABORATORY METHODS IN BIOHAZARD SCIENCE (3). Prerequisites, Parasitology and Laboratory Practice 270 and 271. Fundamentals of disinfection and sterilization processes including official methodology, packaging, dosimetry, inactivation kinetics, process control, sterility testing, and use of containment facilities and aerosol and surface sampling equipment. *Three lecture and ten laboratory hours per week, summer.* Tulis.
- 276 ADVANCED STUDIES IN BIOHAZARD SCIENCE (3). Prerequisites, Parasitology and Laboratory Practice 270, 271, and permission of instructor. Lectures and seminars concerned with biohazard risk assessment, medical surveillance, impact of state and federal regulations, environmental issues, principles of quality assurance, laboratory design, and safety management. *Two lecture and two seminar hours per week, fall.* Tulis.
- 277 SPECIAL TOPICS IN BIOHAZARD SCIENCE (2). Prerequisites, Parasitology and Laboratory Practice 270, 271, and permission of instructor. Current problems and trends in biohazard science, impact of emerging legislation, development of standards, and other topics. *One lecture and two seminar hours per week, spring.* Tulis.
- 331 SEMINAR IN PARASITOLOGY AND LABORATORY PRACTICE (1). Prerequisite, permission of staff. Discussion of selected topics in medical parasitology, laboratory practice, and biohazard science. Intended for MSPH and MPH students. *One seminar hour a week, spring.* Staff.
- 333 ADVANCED SEMINAR IN PARASITOLOGY AND LABORATORY PRACTICE (1). Prerequisite, permission of staff. Research presentations by doctoral students in medical parasitology, laboratory practice, and biohazard science. *One seminar hour a week, spring.* Staff.
- 334 RESEARCH IN PARASITOLOGY (2 or more). Open to advanced students only. *Four or more laboratory hours a week, to be arranged, fall and spring.* Goulson, Hall, Seed, Weatherly.
- 336 RESEARCH IN PUBLIC HEALTH LABORATORY METHODOLOGY (2 or more).

- 337 Open to advanced students only. *Four or more laboratory hours a week, to be arranged, fall and spring.* Weatherly, Goulson, Tulis, Stamm, Baric.
- 392 MASTER'S PAPER (1-3). *Fall, spring and summer.* Staff.
- 394 DOCTORAL DISSERTATION (3-9). *Fall and spring.* Staff.
- 400 GENERAL REGISTRATION (0).

Curriculum in Public Health Nursing (PHNU)

MARLA E. SALMON, *Chair*

MAIJA L. SELBY, *Deputy Chair for Research Development*

MARION E. HIGHRITER, *Deputy Chair for Student Affairs*

Associate Professors

MARION E. HIGHRITER	(4)	Public Health Nursing and Program Evaluation
MARLA E. SALMON	(5)	Occupational Injuries, Women's Leadership, and Health Services Research
MAIJA L. SELBY	(6)	Infant and Perinatal Health, Educational Research

Clinical Assistant Professors

M.E. BONNIE ROGERS	(16)	Occupational Health Nursing
RACHEL H. STEVENS	(15)	Public Health Nursing Education
CLARA R. WALTERS	(17)	Public Health Nursing Education

Lecturers

NANCY L. TIGAR	(14)	Public Health Nursing Administration
ELIZABETH M. TORNUQUIST	(18)	
LOU K. BREWER	(19)	

Professor Emerita

DOROTHY M. TALBOT

Associate Professors Emeritae

NORA F. CLINE
ELIZABETH M. EDMANDS
ANN C. HANSEN
MARIE J. MCINTYRE
BEATRICE B. MONGEAU
JULIA D. WATKINS

Assistant Professor Emerita

ROSE G. GEORGE

- 101 AGING AND HUMAN DEVELOPMENT (Health Policy and Administration, Health Education, Nutrition 101) (3). Lectures concerned with biological, physical, emotional, demographic and social aspects of aging. Field trips to institutions and home visits. *Three lecture hours per week.* Staff.
- 140 READING IN PUBLIC HEALTH NURSING (1-3). Prerequisites to be arranged with the faculty. Reading and tutorial guidance in a selected area of public health nursing. *Fall, spring and summer.* Staff.
- 142
- 160 DELIVERY OF COMMUNITY NURSING SERVICES (3). Permission of instructor required. Analysis of patterns of organization of community nursing services and relationships to the health care delivery system. Special emphasis on basic management skills and their application. *Three lecture hours per week.* Tigar.

- 171 CONTINUING EDUCATION PROGRAM DEVELOPMENT (2). Permission of instructors required. Use of systematic approach to educational program development for adult learners. Includes strategies for designing, implementing and evaluating CE and inservice programs. *Two lecture hours per week, fall.* Staff.
- 172 IMPLEMENTATION OF CONTINUING EDUCATION PROGRAMS (1). Permission of instructors required. Prerequisite, Public Health Nursing 171. Application of teaching-learning concepts, principles of adult education and group teaching strategies in the implementation of CE and inservice programs. *Two seminar hours per week, spring.* Staff.
- 182 HEALTH CARE SERVICES IN OCCUPATIONAL SETTINGS (3). Introduction to population-based health care for workers. Includes major causes of work-related morbidity and mortality, strategies for the team approach and components of occupational health programs. *Three lecture hours per week.* Staff.
- 185 TOPICS IN WORKSITE HEALTH PROMOTION (3). An overview of critical scientific, political, economic, behavioral and other issues as they affect planning, conduct and evaluation of health promotion/risk reduction programs at the worksite. *Spring.* Hochbaum and Staff.
- 193 INNOVATION AND CHANGE IN PUBLIC HEALTH NURSING PRACTICE I (3). Permission of instructor required. Analysis of factors and approaches considered in innovation and change in public health nursing. This includes the development of the theoretical base of public health nursing practice. *Two lecture and two seminar hours per week.* Staff.
- 196 ADVANCED PRACTICE IN PUBLIC HEALTH NURSING (3). Permission of instructor required. Prerequisite: licensure as registered nurse in North Carolina. Concepts of health promotion/illness prevention applied to families/groups/community. Methods of assessment and intervention. Selected practice experiences. Analysis of case materials. Field fee: \$150.00. *Two seminar and two laboratory hours per week.* Staff.
- 201 SPECIAL STUDIES (1-3). Permission of instructor required. Sections will focus on specific topics of current interest to health workers. Flyers describing the section offering will be distributed prior to registration each semester. *Lecture hours dependent upon credit.* Staff.
- 212 SEMINAR ON FAMILY FUNCTION (Maternal and Child Health 212) (1). Permission of instructor required. Family theory, research and assessment; family relationships and environments that influence adult and child health and development; professionals and institutions that influence family functioning. *Two seminar hours per week.* Schaefer.
- 215 ANALYSIS OF DEVELOPMENTAL INTERVENTION PROGRAMS (Maternal and Child Health 215) (2). Permission of instructor required. Critical review of intervention programs for infants and young children aimed at the prevention of developmental deficits. Examination of rationale for intervention, content and form of program delivery and methods for evaluating effectiveness. *One lecture and two seminar hours per week.* Staff.
- 217 DEVELOPMENTAL INDICES OF HEALTH STATUS IN INFANTS AND YOUNG CHILDREN (Maternal and Child Health 217) (2). Permission of instructor required. Concepts and methods in the early identification of developmentally at-risk populations. Examines issues in reliability, validity, and applicability of measurements used in the assessment of early cognitive and social development. *One lecture and two seminar hours per week.* Staff.
- 220 ANTEPARTAL THEORY: ASSESSMENT AND CARE OF PREGNANT WOMEN (Maternal and Child Health 220) (2). Theoretical basis of antepartal care emphasizing the concept of risk and assessment of maternal and fetal well-being. *Two lecture hours per week, spring.* Staff.
- 221 ANTEPARTAL THEORY: ASSESSMENT AND CARE OF PREGNANT WOMEN: CLINICAL PRACTICE (Maternal and Child Health 221) (3). Prerequisite, permission

- of instructor. Co-requisite, Maternal and Child Health 220. Initial and on-going assessment of pregnant women including physical and pelvic examinations. Designed for nurses. *Six laboratory hours per week, spring.* Staff.
- 222 FAMILY PLANNING THEORY: ASSESSMENT AND CARE OF WOMEN IN THE REPRODUCTIVE YEARS (Maternal and Child Health 222) (1). For health professionals doing family planning counseling. Includes mode of action, effectiveness, contraindications, side effects, complications, advantages, disadvantages of temporary and permanent methods of birth control. *One lecture hour per week. First summer session.* Staff.
- 223 FAMILY PLANNING ASSESSMENT AND CARE: CLINICAL PRACTICE (Maternal and Child Health 223) (2 or 3). Prerequisite, permission of instructor. Co-requisite, Maternal and Child Health 222. Initial and on-going assessment of women requesting or utilizing temporary birth control methods. Nurse students competent in performing physical and pelvic exams, 2 credits; other nurses, 3 credits. *Four or six laboratory hours per week, second summer session.* Staff.
- 224 SCHOOL AGE POPULATION: HEALTH PROBLEMS AND PROGRAMS (Maternal and Child Health 224) (3). Permission of instructor required. Health needs and problems of school aged population. Development and evaluation of programs to meet those needs, including examination of legislative mandates, administrative structures and manpower utilization. *Three lecture hours per week.* Staff.
- 225 PRACTICUM: LEADERSHIP IN SCHOOL HEALTH PROGRAMS (Maternal and Child Health 225) (1-4). Permission of instructor required. Prerequisite, Public Health Nursing 224 or equivalent. An elective, individually planned and supervised school-community based field experience, designed to provide leadership experiences in delivery of school health services. *Three to twelve laboratory hours per week.* Staff.
- 240 PROBLEMS IN PUBLIC HEALTH NURSING (1-4). A course for students in public health nursing. Students will make an intensive study of some special problem in public health relevant to public health nursing. The study will demonstrate the application of research principles. *Hours to be arranged. Fall, spring and summer.* Staff.
- 242
- 255 CASE AND PROGRAM CONSULTATION IN PUBLIC HEALTH (Maternal and Child Health 225) (2-3). Examination of the practice of case and program consultation in public health settings. Analysis of consultation as a mutual problem-solving process including evaluation. Roles and relationships of consultant and consultee are considered with provision for experiential learning opportunities. Emphasis is on multidisciplinary practice. *Spring (3 with practicum); summer (2).* Watkins.
- 261 ADMINISTRATION OF COMMUNITY NURSING SERVICES I (3). Permission of instructor required. Concepts and methods of administering community nursing services. Functions of the nurse administrator in areas of organizing, staffing, program planning, priority setting and evaluation of services. *Three lecture hours per week.* Tigar.
- 262 ADMINISTRATION OF COMMUNITY NURSING SERVICES II (3). Public Health Nursing 261 and permission of instructor required. Continuation of Public Health Nursing 261. Aspects of fiscal management, personnel management, legal considerations, records and reporting related to delivery of community nursing services. Leadership styles, motivation and application of administrative processes. *Two lecture and two seminar hours per week.* Tigar.
- 271 INSTRUCTIONAL APPROACHES IN COMMUNITY HEALTH NURSING (3). Permission of instructor. Prerequisites, Education (EDCI) 208 and 265 or equivalents. Application of educational theories and curriculum development in nursing education. Study and critique of Public Health Nursing content in nursing curriculum, of bases and strategies for curricular decisions and instructional approaches. *Two lecture and two seminar hours per week, fall.* Walters.
- 272 PRACTICUM IN TEACHING COMMUNITY HEALTH NURSING (3-6). Permission of instructor. Supervised experience involved in teaching community health nursing

- to students at the undergraduate level. Problems related to curriculum, organization, and faculty roles will be explored under faculty direction. Field fee: \$450.00. *One seminar biweekly; laboratory hours vary, fall, spring.* Walters.
- 281 OCCUPATIONAL HEALTH NURSING I (2-3). Permission of instructor required. Systems approach to the practice of occupational health nursing. Theoretical and experiential exposure to salient context, inputs, processes involved in occupational health and safety programs. *Three lecture hours per week.* Rogers.
- 282 OCCUPATIONAL HEALTH NURSING II (3). Public Health Nursing 281 and permission of instructor required. Continuation of Public Health Nursing 281. Role components of Occupational Health Nursing with emphasis on designing, implementing, evaluating occupational health programs. Application of principles of toxicology, epidemiology in Occupational Health Nursing role. *Three lecture hours per week.* Rogers.
- 283 OCCUPATIONAL HEALTH NURSING, FIELD PRACTICUM I (1-3). Pre-corequisite, PHNU 281. Permission of instructor required. The student will have the opportunity to discuss concepts of OHN practice and the work environment. Concepts related to workplace hazards, interdisciplinary activities, and nursing interventions with worker aggregates will be emphasized. *Three to nine laboratory hours per week.* Rogers.
- 284 OCCUPATIONAL HEALTH NURSING FIELD PRACTICUM II (1-3). Prerequisites, PHNU 281, 283. Corequisite, PHNU 282. Permission of instructor required. The student will have the opportunity to learn about the managerial and administrative role of the OHN. Emphasis is placed on analysis of the organizational structure, external influencing factors, and evaluation mechanisms. *Three to nine laboratory hours per week.* Rogers.
- 293 INNOVATION AND CHANGE IN PUBLIC HEALTH NURSING PRACTICE II (3-6). Permission of instructor required. Integration of selected factors of innovation and change into the practice of public health nursing. Evaluation of the adequacy of the change in practice. Practice credit variable. *Two lecture, two seminar, and zero to nine laboratory hours per week.* Staff.
- 297 SUPERVISION IN PUBLIC HEALTH NURSING (3). Permission of instructor required. For public health nursing and other selected students. Philosophy, principles and methods of supervision with emphasis on the supervisor's role in staff development and first-level management. *One lecture and four seminar hours per week.* Tigar.
- 299 RESEARCH METHODS IN PUBLIC HEALTH NURSING (2-4). Permission of instructor required. Prerequisite: Biostatistics 101. Analysis of nursing research emphasizing methodology and implications for community health nursing practice. For over two credits, students develop a research design or participate in the research process. *Two lecture and two seminar hours for ten weeks for two credits.* Selby.
- 300 SEMINAR IN PUBLIC HEALTH NURSING (3). Permission of instructor required for non-majors. A departmental core course designed to strengthen knowledge bases and leadership skills important to advanced public health nursing practice. Emphasis is placed on nursing theory and current issues affecting practice. *Two lecture and two seminar hours per week.* Staff.
- 301 FIELD OBSERVATION OF NATIONAL COMMUNITY HEALTH NURSING SERVICE (1). Permission of instructor required. Class size limited. Visits to National agencies/organizations in the Washington, D.C. area concerned with community health nursing practice. Field fee \$150. *Three consecutive days of visits and seminars during spring break.* Staff.
- 302 PUBLIC HEALTH NURSING I (3). Prerequisite, permission from instructor required for non-majors. A core course designed to strengthen knowledge bases and leadership skills in advanced public health nursing practice, and community assessment. *Two lecture and two seminar hours per week, fall.* Staff.

- 303 PUBLIC HEALTH NURSING II (3). Prerequisites, Public Health Nursing 302 and permission from instructor, required for nonmajors. A core course designed to strengthen knowledge bases and leadership skills in advanced public health nursing practice. Supervised experience emphasizing design and evaluation of PHN interventions for population aggregates. *Two lecture and two laboratory hours per week, spring.* Staff.
- 340 RESEARCH IN PUBLIC HEALTH NURSING (1-4). Public Health Nursing 299 or
341 the equivalent and permission of instructor. Independent research in public health
342 nursing under supervision. *Two to eight laboratory hours per week, fall, spring, summer.*
Staff.
- 360 ADVANCED STUDIES IN ADMINISTRATION OF COMMUNITY NURSING
SERVICES (3). Prerequisite, permission from instructor. Integration of theories, concepts, methods of administration and nursing; their application to delivery of community nursing services. Emphasis placed on roles and functions of nurse manager. *Three lecture hours per week, spring.* Tigar.
- 392 MASTER'S PAPER (1-6). *Fall, spring, summer.* Staff.
- 393 MASTER'S THESIS (3-9). *Fall, spring, summer.* Staff.
- 396 FIELD PRACTICE IN COMMUNITY HEALTH NURSING (3-9). Permission of instructor. Field experience in public health nursing or occupational health nursing practice. Study and observation of selected areas related to students' program of study. Field fee, \$450.00. *For three credits, twenty-seven hours practice per week per summer session.* Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF RADIO, TELEVISION AND MOTION PICTURES

GORHAM A. KINDEM, *Chair*

Professors

- | | | |
|------------------|------|---|
| JOHN R. BITTNER | (14) | Social Implications of Mass Media, Telecommunication Policy, Broadcast Journalism, Management |
| A. RICHARD ELAM | (11) | Mass Media Management, Communications Measurement, Broadcast Journalism, Writing |
| WILLIAM M. HARDY | (2) | Writing, Directing, Performance |

Associate Professors

- | | | |
|--------------------|------|---|
| ROBERT C. ALLEN | (13) | Motion Picture History, Media Aesthetics, Popular Culture |
| ROBERT J. GWYN | (1) | International and Third World Communication, Sociology of Mass Communication, Cultural Studies of Communication |
| GORHAM A. KINDEM | (10) | Motion Picture Production, History of Motion Picture Industry, Media Theory and Aesthetics |
| RICHARD H. SIMPSON | (15) | TV and Motion Picture Production |
| LOY A. SINGLETON | (12) | Telecommunication Regulation, Policy and History; New Technologies; Broadcast Journalism |

Assistant Professors

- | | | |
|-------------------|------|--|
| SETH FINN | (16) | Broadcast Journalism, Information Theory, International Communication |
| ANNE J. WADSWORTH | (17) | Political Communication, Mass Communication Theory, Writing for Mass Media |

Professors Emeriti

ELIZABETH CZECH-BECKERMAN
J. PAUL NICKELL
WESLEY H. WALLACE

The Department offers a research-based graduate program leading to the degree of Master of Arts. The master's program is open to students with undergraduate degrees in the field and to those with degrees in other areas. It serves both the student preparing for a higher degree program and the student for whom a rigorous, broadly-based course of graduate study is needed for a career in a media-related profession. The master's curriculum is structured around a core of four seminars (RTVMP 201, 202, 205, 300), which are designed to expose the student to important issues, theories, and approaches that arise from media production and writing,

social scientific research, and historical, theoretical, and critical research. The seminars also provide a foundation upon which students will structure further, more specialized work. Beyond the core seminars, the student's course of study is tailored to fit his or her individual interests and needs and is devised in consultation with the student's advisor.

The Department's is one of the oldest graduate programs in mass media in the South. Its alumni are represented in virtually every area of media activity, including commercial and public broadcasting, government service, education, business, and the motion picture industry. In keeping with this tradition, the faculty represents a wide variety of interests and professional backgrounds.

The Davis and Wilson Libraries are excellent research facilities for the study of mass media. The program focuses on empirical research, policy, management, history, theory, criticism, and scriptwriting as thesis areas. Production facilities are available for some graduate course work.

Requirements for the Master of Arts Degree

The Thesis: This requirement may be satisfied by completing an approved research or written creative thesis. The type of thesis allowed for a particular student depends upon satisfactory completion of appropriate course work. The thesis area must receive prior approval by a committee of the Department's graduate faculty.

Minimum Graduate Courses Required: Thirty semester hours are required to complete the program. New graduate students begin course work in the fall semester only and will enroll in three core seminars:

- RTVMP 201 Historical, Theoretical, and Critical Methods in Mass Media Research
- RTVMP 202 Social Scientific Methods in Mass Media Research
- RTVMP 205 Media Writing and Production Methods

In the spring semester, students will then enroll in RTVMP 300 (Seminar in Mass Media).

A minimum of four remaining courses in addition to RTVMP 393 (Thesis, 6 hours) will be selected by the student in consultation with a faculty advisor. A committee of the graduate faculty will approve the plan of study before the student begins his or her spring semester. These courses can come from outside or inside the Department and will together constitute a curricular concentration that supports the work undertaken in the thesis. At the discretion of the Graduate Studies Committee, students without significant coursework or experience in the area of their thesis may be required to complete up to six semester hours of undergraduate or graduate course work beyond thirty hours to prepare them for thesis work.

Minimum Resident Requirement: Consistent with Graduate School policy, students must be in residence at least two semesters.

Courses for Graduates and Advanced Undergraduates

- 101 SPECIAL TOPICS IN WRITING (3). Prerequisites, RTVMP 20, 25, 30, and may require departmental and/or instructor permission. A special topics course on a selected aspect of dramatic and nonfiction writing for broadcasting and film. Hardy.
- 102 SPECIAL TOPICS IN LAW AND POLICY (3). Prerequisite, may require departmental and/or instructor permission. A special topics course on a selected aspect of mass media law, regulation, and policy. Bittner, Singleton, Elam.
- 103 SPECIAL TOPICS IN MEDIA MANAGEMENT (3). Prerequisites, may require departmental and/or instructor permission. A special topics course on a selected aspect of mass media management. Elam, Bittner.
- 104 SPECIAL TOPICS IN FILM STUDY (3). Prerequisite, may require departmental and/or instructor permission. A special topics course on a selected aspect of film history, theory, or criticism. Kindem, Allen.
- 105 SPECIAL TOPICS IN MEDIA STUDY (3). Prerequisite, may require departmental and/or instructor permission. A special topics course on a selected aspect of the mass media. Staff.
- 113 INTRODUCTION TO INSTRUCTIONAL MATERIALS PRODUCTION (Education 113) (3). Prerequisite, permission of the instructor. The planning and production of two and three dimensional instructional materials, such as: television graphics, slides, overhead transparencies, manipulative tactile materials and animated pictures. Open to RTVMP majors (seniors and graduate students only). *One lecture and six laboratory hours per week.* Wileman.
- 120 CINEMA OF THE THIRD-WORLD (3). Designed for the non-major this course examines contemporary filmmaking in Africa, Latin America, and the Middle East as an aesthetic response to the conventions of "dominant" Hollywood style. Allen, Kindem.
- 125 MASS MEDIA CRITICISM AND THEORY (3). Prerequisite, RTVMP 25. Examination and application of contemporary critical approaches to mass mediated works, survey of current issues in aesthetic theory as related to mass media. Kindem, Allen.
- 130 MASS MEDIA AND AMERICAN POPULAR CULTURE (3). Prerequisites, RTVMP 25 and permission of the Department. An examination of the processes of communication and an assessment of the cultural significance of popular films and television programs. The theoretical discussion of popular culture will focus on the problematic distinction between high art and low art, elite culture and popular culture. Popular works of art will be considered in the light of their authors, genre, and social, cultural and historical contexts. Allen, Kindem.
- 140 EDUCATIONAL TELEVISION PRODUCTION AND INSTRUCTION (3). Permission of the Department. To prepare the educational television participant, including the producer-director, the classroom and studio of instructional materials. Current uses of television; content considerations; cooperative program planning; techniques of television teaching; classroom considerations; production techniques; sources of material; special visual considerations; potentials of various instructional forms; evaluation methodology. *Two lecture and two laboratory hours per week.* Gwyn.
- 141 CONCEPTS OF PUBLIC BROADCASTING (3). Provides students with the understanding of the rationales, modes, and processes of public broadcasting; permits students to examine the underlying assumption of commercial broadcasting. Gwyn.
- 143 BROADCAST CRITICISM (3). Prerequisites, RTVMP 25 and permission of the Department. Study of contemporary radio and television, aimed at developing sound critical criteria for media. Current criticism will be examined, relationship of criticism to broadcasting content in recent years will be considered. *Two lecture and two laboratory hours per week, spring.* Hardy.
- 144 THE DOCUMENTARY IDEA (3). Prerequisites, RTVMP 25 and permission of the Department. Historical and theoretical examination of expressions of the documentary idea in different eras and various modes including film, television, and radio. *Three lecture and two laboratory hours per week.* Allen, Kindem.

- 145 HISTORY OF FILM (3). Prerequisites, RTVMP 25 and permission of the Department. Study of the development of the art and craft of the film through examination of individual films and topics stressing the interaction of aesthetic considerations with socio-cultural and institutional settings. Allen, Kindem.
- 146 INTERNATIONAL COMMUNICATION AND COMPARATIVE JOURNALISM (Journalism 146) (Political Science 146) (3). Development of international communication; the flow of news and international propaganda; the role of communication in international relations; communication in the developing nations; comparison of press systems. Cole.
- 147 BROADCASTING IN DEVELOPING COUNTRIES (3). The cultural and educational uses of radio and television are studied in the developing countries of Africa, Latin America and India. Emphasis will be placed on the new electronic media and its effectiveness in serving developing countries.
- 150 MINORITIES AND THE MEDIA (3). The course traces the development of minorities in film, radio and television, and the press, looking at trends and treatment of minorities by the media, and how and if they have changed.
- 154 MASS COMMUNICATION AND INFORMATION TECHNOLOGIES (3). A survey of developing telecommunication systems and technologies and their impact on the traditional electronic media and society. *Spring*. Singleton.
- 155 CABLE SYSTEM OPERATIONS (3). Examination of the technology, organization, programming, and franchising of cable systems, and the structure, history, and regulation of the cable industry. Singleton.
- 156 BROADCAST OPERATIONS AND MANAGEMENT (3). Examines sources of broadcast revenues, programming decisions, concepts in human resources and personnel, ratings, advertising and promotion, organizational structures of stations and parent companies. Elam, Bittner, Singleton.
- 157 INTRODUCTION TO BROADCAST LAW AND REGULATION (3). Prerequisite, permission of the Department or graduate standing. A study of laws affecting broadcasting; the role of the courts and federal regulatory agencies in broadcast regulation. Singleton, Bittner.
- 158 CONTEMPORARY ISSUES IN BROADCAST LAW & REGULATION (3). Prerequisite, permission of the Department or graduate standing. A study of current issues and the changing dimensions of broadcast on contemporary society. Bittner, Singleton.
- 159 BROADCAST FINANCIAL PLANNING AND DECISION MAKING (3). Prerequisites, RTVMP 156 or permission of the instructor. Examines the unique financial structure of an industry producing an artistic product under federal regulatory control. Includes analysis of such problems as station acquisitions, depreciation, strategic planning, budgeting, and accounting. Elam, Bittner.
- 160 COMMUNITY AND MEDIA (3). A study of the electronic media as feedback mechanisms for community organization and social change. A variety of broadcast and non-broadcast uses of the media are studied. Gwyn.
- 161 INFORMATIONAL BROADCASTING (3). Study of the structure, preparation and production of informational radio and television programs including the investigative documentary and radio and television "talk" programs. Instruction in data collection, analysis and preparation of informational programs. Gwyn.
- 171 IDEA, FORM, AND MEDIUM (3). Prerequisites, RTVMP 25 and permission of the Department. An investigation of the relationship between the idea to be expressed, the form of expression, and the medium chosen. Examples of this relationship will be studied in the works chosen from four media: the stage, the motion picture, radio, and television, and will include examples from Greek, Tudor, and modern drama as well as selected examples of naturalism, expressionism, and related forms in radio, television and motion pictures. Allen.
- 174 ADVANCED BROADCAST NEWS REPORTING (3). Prerequisite, RTVMP 73. Examination and application of in-depth broadcast news reporting techniques, especially

- investigative reporting, special events coverage, and the documentary. Students film and produce radio and television programs of actual news events. *Two lecture and two laboratory hours per week.* Singleton, Elam, Bittner.
- 177 TELEVISION DIRECTING (3). Prerequisite, RTVMP 77. The aesthetics of television directing: script analysis, direction of performance, set and lighting design, creative visual and audio communications. Students direct several television projects. *One lecture, one seminar, and four laboratory hours per week.* Simpson.
- 179 ADVANCED SCRIPTWRITING FOR BROADCASTING, FILM AND STAGE (Dramatic Art 179) (3). Prerequisites, RTVMP 78 or 81 and permission of instructor. A major writing project will be completed by each student, either dramatic or nonfiction for radio, television, film or stage. *Three lecture hours per week.* Hardy.
- 182 MEDIA ACTING AND PERFORMANCE (Dramatic Art 182) (3). Prerequisite, permission of instructor. Study and practice in acting and performance for radio, television and motion pictures. Limited to majors in fine arts and speech. *Two lecture and two laboratory hours per week.*
- 187 FILM THEORY AND PRACTICE (3). Prerequisites, RTVMP 87 and permission of the Department. The theory and techniques of film form are studied in lecture, demonstration, and individual student films. *Two courses for graduate lecture and two laboratory hours a week.* Kindem.

Courses for Graduates

- 201 HISTORICAL, THEORETICAL, AND CRITICAL METHODS IN MASS MEDIA RESEARCH (3). Permission of Department. Examination and application of historical, theoretical, and critical methods to mass media research. Consideration of the philosophical systems implicit in these methods. Staff.
- 202 SOCIAL SCIENTIFIC METHODS IN MASS MEDIA RESEARCH (3). Permission of Department. Examination and application of social science methods to mass media research. Special emphasis on survey research, content analysis, and experimental design. Staff.
- 205 MEDIA WRITING AND PRODUCTION METHODS (3). Permission of Department. Study of problems involved in writing and producing various forms of media programming. Emphasis on script analysis and production elements necessary to translate scripts into media products. Staff.
- 251 MEDIA RESEARCH METHODS (Journalism 251) (3). Prerequisite, Journalism 51 or equivalent. A high degree of sophistication in research methodology is also necessary. Advanced work in experimental design in communication research, audience surveys, and content analysis.
- 300 SEMINAR IN MASS MEDIA (3). Prerequisites, RTVMP 201, 202, 205, permission of Department. Application of major forms of quantitative and qualitative research methods to a selected mass media phenomenon; individual research and reports. Presentation of trial thesis proposals.
- 301 SEMINAR IN MASS MEDIA THEORY AND AESTHETICS (3). Prerequisite, RTVMP 201. Selected problems in media aesthetics. Exact topic to be covered will be announced before preregistration.
- 302 SEMINAR IN MASS MEDIA SYSTEMS AND EFFECTS (3). Prerequisite, RTVMP 202. Survey of contemporary research into the organization of mass media systems and their social effects. Emphasis on empirical studies. Staff.
- 303 SEMINAR IN THE HISTORY OF MASS MEDIA (3). Prerequisite, RTVMP 201. Application of historical research techniques to problems in the mass media. Exact topic to be covered each semester will be announced before preregistration.
- 305 PRODUCTION PROJECTS (3). Prerequisite, RTVMP 76, 177 or 187, and permission of the Department. Individual students carry through to completion projects they initi-

ate, which may include documentary films, a series of dramatic or documentary radio programs, or a television drama.

- 310 **WRITING PROJECTS (3).** Prerequisites, RTVMP 179, 205. Individual media writing projects accomplished with appropriate research, conference, and criticism.
- 392 **READING AND RESEARCH (3).** Prerequisite, graduate standing in RTVMP or Journalism. Advanced reading or research in a selected field; reports to and conferences with the responsible member of the graduate staff. Graduate staff.
- 393 **MASTER'S THESIS (3 or more).** Staff.
- 400 **GENERAL REGISTRATION (0).**

DIVISION OF REHABILITATION COUNSELING

PAUL LEUNG, *Director*

Professor

ROBERT SAKATA (1) Administration, Research and Curriculum,
Graduate Education

Associate Professors

PAUL LEUNG (12) Rehabilitation Psychology, Chronic Disease
and Disability

CYNTHIA L. WILHELM (5) Pediatric Rehabilitation Psychology,
Psychosocial Adjustment to
Disability, Community Psychology

Assistant Professors

CHARLENE KAMPFE (17) Rehabilitation and Psychosocial Aspects of
Hearing Impairment, Rehabilitation
and Psychosocial Aspects of Aging,
Grants Management and Staff
Development

STEVEN OSTBY (16) Rehabilitation Psychological and Vocational
Assessment, Research Methodology,
Social Problem Solving

The Division of Rehabilitation Counseling of the Department of Medical Allied Health Professions offers a graduate program leading to the Master of Science degree in Medical Allied Health Professions with a major in Rehabilitation Counseling.

The graduate courses offered in Rehabilitation Counseling are designed to present and discuss theoretical constructs and their application to clinical practice; to stimulate critical, analytical and creative thought; and to prepare students for professional positions in private and public rehabilitation programs.

Students enrolled in this two-year master's program are expected to complete thirty hours of core academic course requirements, plus two semesters of practicum and a one-semester internship. Students are encouraged to take courses in areas which allow for specialization within the field of Rehabilitation Counseling.

Requirements for Admission

1. A bachelor's degree with a major in Psychology, Sociology, Special Education, Business Administration, or related areas from an accredited college or university.
2. A grade point average of *B* or better in the area of the major.
3. Submission of Graduate Record Examination scores.

4. Three letters of recommendation.
5. A pre-admission interview with the Rehabilitation Counseling faculty.

Courses for Graduates

- 200 INTRODUCTION TO REHABILITATION COUNSELING (3). The introduction to principles and practices of rehabilitation including the psychological and social aspects of disability. *Three lecture hours a week, fall.* Leung.
- 202 THEORIES OF COUNSELING APPLIED TO REHABILITATION (3). The introduction to theories of counseling and behavior as they apply to rehabilitation settings and populations. Emphasis will be the generation of effective treatment models. *Three lecture hours a week, fall.* Kampfe.
- 204 MEDICAL ASPECTS OF REHABILITATION (3). Orientation to the disease or disability process and intervention using principles and practices of medicine and rehabilitation. *Three lecture hours a week, spring.* Leung.
- 206 MEASUREMENT AND EVALUATION IN REHABILITATION (3). Orientation and information on assessment and evaluation techniques used in rehabilitation settings will include performance measures, work samples and job simulation. *Three lecture hours a week, spring.* Ostby.
- 208 CAREER DEVELOPMENT AND SELECTIVE PLACEMENT IN REHABILITATION (3). Orientation to career development theory and vocational information applicable to rehabilitation settings. Also presented are selective placement consideration for the severely disabled. *Three lecture hours a week, fall.* Ostby.
- 210 REHABILITATION COUNSELING PRACTICUM (5). Prerequisites, Rehabilitation Counseling 200, 202, 206. A supervised clinical experience in techniques of interviewing, case planning, and case management. *Five lab hours a week, fall, spring.* Staff.
- 212 REHABILITATION OF PSYCHOSOCIAL DISABILITIES (3). Prerequisites, Rehabilitation Counseling 200, 202. Introduction to treatment information and strategies for counseling interventions related to psychiatric rehabilitation. *Three lectures a week, spring.* Sakata.
- 214 PRINCIPLES OF GROUP COUNSELING IN REHABILITATION (3). Prerequisites, Rehabilitation Counseling 200. Introduction to theories, principles and research in small group counseling techniques useful in treatment of the severely disabled. *Three lecture hours a week, fall, summer.* Wilhelm.
- 216 REHABILITATION COMMUNITY ORGANIZATION (3). Introduction to community based treatment facilities and programs, the identification of rehabilitation community organization, structural, political and economic. *Fall.* Staff.
- 218 LAB-REHABILITATION AND SMALL GROUP BEHAVIOR (2). Prerequisite, permission of instructor. The laboratory education model of learning will be used to teach group dynamics from an experimental point of view. Training group theory and practice will be explored through the experiences generated from participation in small group activities. *Fall.* Staff.
- 300 RESEARCH IN REHABILITATION (3). Prerequisites, Rehabilitation Counseling 200, 202. An introduction to research models and models encountered in rehabilitation. Emphasis is on the utilization of research findings in the treatment process. *Three lecture hours a week, spring.* Sakata.
- 302 ADVANCED TECHNIQUES IN REHABILITATION COUNSELING (5). Prerequisites, Rehabilitation Counseling 200, 202, 210. Emphasizes the refinement of counseling skills and techniques, development of integrated plans and models for rehabilitative intervention. *Five lab hours a week, fall, spring, or summer.* Staff.
- 306 PROBLEMS IN REHABILITATION COUNSELING (3). Prerequisites, Rehabilitation Counseling 200, 202. Individually guided study or research in rehabilitation counseling. May be repeated for credit. *Three lab hours a week, fall, spring, or summer.* Wilhelm.

- 308 APPLICATION OF SMALL GROUP THEORY AND INTERVENTION TECHNIQUES IN REHABILITATION (3). Prerequisites, Rehabilitation Counseling 214 or equivalent and permission of instructor. This advanced course is designed to provide the prospective group counselor with a substantial overview of current theory, research and practice in small group intervention. Seminars and experimental learning modules will provide the opportunity for the acquisition of basic leader skills in rehabilitation. *Fall*. Staff.
- 310 INTERNSHIP IN REHABILITATION COUNSELING (9). Prerequisites, Rehabilitation Counseling 200, 202, 206, 210, 212. Full-time supervised clinical counseling experience; integrates previous academic and field experiences into working models. *Forty lab hours a week, fall, spring, or summer*. Kampfe.
- 393 MASTER'S THESIS (3). *Fall, spring, and summer*. Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF RELIGIOUS STUDIES

JOHN VAN SETERS, *Chairman*

Professors

JACK M. SASSON	(9)	Ancient Near Eastern Religions
JOHN VAN SETERS	(3)	Old Testament Studies

Associate Professors

LARRY P. CHURCHILL	(27)	Ethics; Philosophy of Religion
DAVID J. HALPERIN	(14)	Judaism in Antiquity
PETER IVER KAUFMAN	(16)	History of Christian Traditions; Patristic, Medieval and Reformation Studies
WILLIAM J. PECK	(6)	Psychology of Religion; History of Western Religious Thought
JAMES H. SANFORD	(8)	Far Eastern Religions; Japanese Buddhism
RUEL W. TYSON, JR.	(13)	Philosophy and Anthropology of Religion; Ethics and Rhetoric
GRANT A. WACKER	(15)	History of Religion in America

Assistant Professors

TOMOKO MASUZAWA	(28)	Religion and Literature
JOANNE P. WAGHORNE	(17)	History of Religion; Religions of India

Professors Emeriti

JOHN W. DIXON, JR.
ARNOLD SAMUEL NASH
JOHN H. SCHUTZ

The graduate program in Religious Studies at The University of North Carolina at Chapel Hill deals with religion both as a distinctive human experience and as a mode of culture and history. Both orientations define religion as a very broad area of human existence, and students are encouraged to explore the tension between those two general approaches. The interests of the Department's faculty express the variety of methodological orientations in such study, and faculty members within other departments of the University offer strong interdisciplinary support.

The Graduate School of the University offers two degrees in Religious Studies, the Master of Arts and the Doctor of Philosophy. All admitted students enter at the master's level and, upon successful completion of those requirements, may request to proceed to the Ph.D. Students wishing to proceed to the Ph.D. must pass qualifying exams given once each semester, and petition the Department for permission to do so.

The M.A. program introduces students to the general problems and methods in the study of religion. Specific requirements include:

- 30 hours of course credit, including Reli 200, 299, and one out-of-field elective;
- two written comprehensive examinations, one in the general field of religion and one in a specialty field;
- a thesis of 3-6 credits and an oral defense;
- demonstrated competence in French or German.

The doctoral program is primarily intended to prepare students for a career in university and college teaching and research in religious studies. It currently offers specialization in American Religious Studies, Ancient Mediterranean Religions, History and Phenomenology of Religions, Medieval and Early Modern Studies, and Religion and Culture. No specific number of hours or courses are required, but students should expect to take at least 18 hours beyond the M.A. level. Requirements in the doctoral program include:

- completion of requirements in one of the specialty fields noted above;
- Reli 200 and 299, if not taken at the master's level, and at least three graduate-only seminars;
- written and oral qualifying examinations specific to the field of specialization;
- demonstrated reading competence in French and German;
- a dissertation and oral defense.

The Department also participates with Duke University in a Cooperative Program in Judaic Studies which makes available several courses in Judaica not listed here.

For further information, please write to the Director of Graduate Studies, Department of Religious Studies, 101 Saunders Hall 043A, The University of North Carolina at Chapel Hill, Chapel Hill, NC 27514.

Courses for Graduates and Advanced Undergraduates

- 101 ISLAM: A HISTORICAL INTRODUCTION (History 101) (3). A study of Islam in the historical context of its growth from the prophecy of Muhammad to a major force in a world civilization. *Fall*. Bodman.
- 105 MYTH, HISTORY, AND RELIGION (3). An analysis of these terms in their methodological and descriptive meaning in the study of religion. *Spring*. Staff.
- 107 TOPICS IN PHILOSOPHICAL PROBLEMS IN RELIGION (3). Prerequisite, senior or graduate standing, or permission of the instructor required. The problem of intention, or knowledge of other minds, and the study of alien cultures are central issues. *Spring*. Tyson, Peck, Churchill.
- 113 BIBLICAL HEBREW (3 each semester). *Fall and spring*. Staff.
- 114
- 115 INTERMEDIATE CLASSICAL HEBREW (3). Prerequisite, 114 or permission of the instructor. Reading in biblical, *Mishnaic*, and medieval poetry and prose. *Fall*. Sasson, Halperin.
- 116 INTERMEDIATE CLASSICAL HEBREW (3). Prerequisite, 115 or permission of the instructor. Continuation of Religious Studies 115. *Spring*. Sasson, Halperin.

- 117 ELEMENTARY AKKADIAN (3 each semester). Prerequisite, permission of the instructor. An introduction to the Cuneiform script and the elements of Akkadian grammar. Selected readings in Old Babylonian (Codex Hammurabi, Atrahasis Epic) and Neo-Assyrian texts (Epic of Creation, Gilgamesh Epic). *On demand. Fall and spring.* Sasson.
- 118
- 119 GREEK NEW TESTAMENT (Greek 158) (3). Prerequisite, Greek 21 or equivalent. *On demand.* Stadter.
- 121 MYTHS AND EPICS OF THE ANCIENT NEAR EAST (Folklore 141) (3). Prerequisite, permission of the instructor. An examination of Babylonian, Canaanite, Egyptian, Hittite and Sumerian texts from the pre-biblical era, focusing on representative myths, epics, sagas, songs, proverbs, prophecies and hymns. *Spring.* Alternate years. Sasson.
- 123 THE MESSIAH AND THE APOCALYPSE (3). Ideas concerning the Messiah and the end of the world held by Jews, Christians and Muslims. Emphasis on the beginning of the Christian era. *Fall or spring.* Halperin.
- 124 HISTORY-WRITING IN ANCIENT ISRAEL (3). Prerequisite, Religious Studies 21. The course will study the historical tradition in the Old Testament as reflected in the books from Joshua to 2 Kings. *On demand.* Van Seters.
- 125 MOSES, THE MAN AND THE TRADITION (3). Prerequisite, Religious Studies 21. The course will study the formation of the biblical traditions about Moses in Egypt, the exodus and the giving of the law at Sinai. *On demand.* Van Seters.
- 127 PROBLEMS IN EARLY CHRISTIAN LITERATURE AND HISTORY (3). Prerequisite, one of the following: Religious Studies 22, 58 or 59 or permission of the instructor. *Fall.* Staff.
- 128 PROBLEMS IN THE NEW TESTAMENT AND RABBINIC JUDAISM (3). Prerequisite, permission of one of the instructors. Uses of the New Testament as a source for the study of Judaism, and the study of Judaism as an aid to understanding the New Testament. *Fall.* Alternate years. Halperin.
- 129 PROBLEMS IN RABBINIC JUDAISM AND EARLY ISLAM (3). Prerequisite, Religious Studies 24 or 25 or permission of the instructor. Examination of the Jewish element in the background of Islam and of themes developed in the literature of both religions. *Fall.* Alternate years. Halperin.
- 132 TOPICS IN MEDIEVAL PHILOSOPHY (Philosophy 152) (3). Consult Philosophy Department. *Spring.* Galligan.
- 133 THE MEDIEVAL CHURCH (History 120) (3). The nature and workings of the Western church between roughly 600 and 1300. Emphasis on the church 'from within'; organization, missionary strategies, liturgy, monasticism, popular religion. *Spring.* Alternate years. Pfaff.
- 134 THE REFORMATION (History 131) (3). Examines a movement of religious reform that shattered Latin Christendom and contributed many of the conditions of Early Modern Europe. Emphases: religious, political, social. *Spring.* Headley.
- 136 STUDIES IN CHRISTIAN THEOLOGIES AND THEOLOGIANS (3). Prerequisite, permission of the instructor. An investigation of one writer or school in the history of Christian theology as an example of typical methods, positions and problems within that tradition. *Fall or spring.* Kaufman.
- 138 MODERN WESTERN RELIGIOUS THOUGHT (3). Prerequisite, one of the following: Religious Studies 27, 29, 30, 32, 35 or Philosophy 32. Representative themes and approaches in the work of modern Western religious thinkers. *Spring.* Peck, Kaufman.
- 140 STUDIES IN AMERICAN RELIGION (3). Prerequisite, permission of the instructor. A consideration of varying topics from the intellectual, literary, social, and cultural dimensions of American religion. *Fall or spring.* Wacker.
- 142 RELIGION AND ANTHROPOLOGY (Anthropology 142, Folklore 142) (3). Prerequisite, junior/senior or graduate standing. Religion, studied anthropologically, as a cultural, social, psychological phenomenon in the works of classical and contemporary social thought. *Fall or spring.* Tyson and Peacock.

- 145 THE FIGURE OF THE FATHER IN RELIGION AND LITERATURE (3). Prerequisite, permission of the instructor. The relationship between the figure of the father and the authority of the law (religious, societal or familial) will be studied through such writers as Flaubert, Kafka, and Freud. *Fall or spring*. Masuzawa.
- 147 RELIGION IN MODERN INDIA (3). Continuation and development of religion in the context of modern India's social and political life. *Fall*. Waghorne.
- 149 RELIGION AND IDEOLOGY IN U.S. HISTORY (History 149) (3). Prerequisite, introductory History or Religious Studies course. A study of religion, collective action and collective violence in U.S. history. *Fall*. Alternate years. Mathews.
- 150 RELIGIONS OF AFRICA (3). Prerequisite, Religious Studies 10 or equivalent. A general study of religious forms in Africa. *Fall or spring*. Staff.
- 161 SELECTED TOPICS IN THE STUDY OF ASIAN RELIGIONS (3). Prerequisite, permission of the instructor. A close examination of a selected topic in Asian religions. *Fall*. Sanford.
- 164 JUDAISM AND THE RABBIS (3). Prerequisite, permission of the instructor. Exploration of rabbinic Judaism (second through sixth centuries A.D.) and its literature. *Spring*. Halperin.
- 169 MEDIEVAL RELIGIOUS TEXTS (3). Prerequisites, permission of the instructor and reading knowledge of Latin. Readings in one or two major texts in Latin which permit close study of several issues in the development of Christian life and thought during the Middle Ages. *Spring*. Kaufman.
- 174 CHINESE WORLD VIEWS (Anthropology 174) (3). An approach to Chinese history, literature, science, and society through an exploration of a few pervasive cultural themes. Chinese sources in translation and western anthropological and philosophical sources are used. *Fall or spring*. Farquhar.
- 176 CHINESE RELIGIOUS AND PHILOSOPHICAL TEXTS I (3). Prerequisite, permission of the instructor. An introduction to the reading of classical Chinese religious-philosophical texts in the original language. *On demand*. Sanford.
- 177 CHINESE RELIGIOUS AND PHILOSOPHICAL TEXTS II (3). Prerequisites, Religious Studies 176 and permission of the instructor. An in-depth reading in a single text or tradition of texts. *On demand*. Sanford.
- 178 GENDER IN THE HISTORY OF RELIGIONS (3). Developments in the use of gender as a religious symbol and a religious structure from primal religion to the beginning of the philosophical traditions in Asia, Africa, and Europe. *Fall or spring*. Waghorne.
- 180 THE RELIGIOUS IMAGINATION IN THE MEDIEVAL AND MODERN WORLD (3). A study of the religious imagination as manifested in selected literature from the Middle Ages to the present. *Spring*. Staff.
- 181 RELIGION AND MODERN ART (Art 155) (3). A study of selected works in modern art, both those that are specifically designated as religious and those that, by reshaping modern sensibility, have created a new religious consciousness. *Fall*. Staff.
- 182 THE ART OF FLORENCE (Art 156) (3). Prerequisite, Religious Studies Art 39 or Art 32 or permission of the instructor. A study of Florentine art from its beginning in the 16th century with primary emphasis on its religious dimensions. *Spring*. Staff.
- 183 THEORIES OF THE RELIGIOUS IMAGINATION (3). Prerequisite, Religious Studies 82 or permission of the instructor. A consideration of a theory of the constructive imagination and its implication for religion. *Fall or spring*. Staff.
- 184 STUDIES IN THE PSYCHOLOGY OF RELIGION (3). Prerequisite, Religion 36, 84 or permission of the instructor. The interpretation of myths, dreams, and rituals using the resources of depth psychology and the tools of cultural criticism. *Fall or spring*. Peck.
- 186 FREUD AND NIETZSCHE ON RELIGION AND INTERPRETATION (3). Prerequisite, permission of the instructor. A close examination of selected works by Nietzsche and Freud and their critical impact on the contemporary analysis of literature and religion. *Fall or spring*. Masuzawa.

- 187 STUDIES IN THE RHETORIC OF RELIGION (3). Prerequisite, permission of the instructor. Examination of ritual, allegory, and symbol as modes of religious expression in cultic and literary contexts. *Fall or spring*. Tyson.
- 188 METHODS FOR THE CROSS-CULTURAL STUDY OF RELIGION (3). Prerequisite, permission of the instructor. Advantages and limitation of literary sources for the study of non-Western material and the possibilities for the integration of visual, auditory, and other nonprint material into the field. *Fall or spring*. Waghorne.
- 190 RELIGION AND SOCIETY (Sociology 121) (3). Prerequisite, Sociology 10 or permission of the instructor. Sociological analysis of group beliefs and practices—both traditionally religious and secular—through which fundamental life experiences are given coherence and meaning. *Fall or spring*. Powell, Reed.
- 191 RELIGIOUS ETHICS AND ISSUES IN CONTEMPORARY MEDICINE (3). Prerequisite, senior or graduate standing. Examination of religious-ethical dimensions of such issues as the dying patient, organ transplants, abortion, prolongation of life, and experimentation on human beings, drawing on theory from the traditional Western religions and the social sciences. *Fall or spring*. Churchill.
- 193 SPECIAL TOPICS IN MYSTICISM (3). Prerequisite, permission of the instructor. Historical and typological study of specific aspects of mystical and non-normative religious forms. *Fall or spring*. Sanford.
- 199 INDEPENDENT STUDY (3). Prerequisites, advanced undergraduate or graduate standing and permission of the instructor. Subject matter will vary with instructor and topic but always be focused on a particular problem or issue. *Fall and spring*. Staff.
- 200 PRO-SEMINAR IN RELIGIOUS STUDIES (3). Prerequisite, graduate standing in Religious Studies or permission of the instructor. A basic problems and methods course required of all graduate students in Religious Studies. *Fall*. Staff.
- 201 WORLD HISTORY OF RELIGIONS (3). Prerequisite, graduate standing in Religious Studies or permission of the instructor. Exploration of various notions of “world” or cosmos as related to religious symbols and events, with certain paradigms used to highlight the religious meaning of the temporal/spatial continuum. *Spring*. Sanford.
- 202 HISTORY AND HISTORIOGRAPHY OF RELIGION IN AMERICA (3). Prerequisite, graduate standing in Religious Studies or permission of the instructor. A study of the main schools of interpretation of religion in America with a critical analysis of the methods and presuppositions of some major monographs in the field. Wacker.
- 203 THE RELIGIOUS MEANING OF CULTURAL CONTACT IN AMERICA (3) Prerequisite, graduate standing in Religious Studies or permission of the instructor. A study of the contact between various aboriginal and European religious traditions with emphasis upon the religious significance of that contact. Staff.
- 204 RELIGION AND LITERATURE IN AMERICA (3). Prerequisite, graduate standing in Religious Studies or permission of the instructor. A study of the religious tradition in American literature from the Puritan period to the present. Staff.
- 220 ADVANCED AKKADIAN (3). Prerequisites, Religious Studies 117-118. Readings in literary, epistolary, and juridical texts. Sasson.
- 222 UGARITIC (3). Prerequisites, Religious Studies 115-116. Readings in the alphabetic texts of Ras Shamra and a study of the elements of Ugaritic grammar. Sasson.
- 224 BIBLICAL ARAMAIC (3). Prerequisites, Religious Studies 115-116. The Aramaic texts of Daniel and Ezra and samples from the Elephantine papyri with a treatment of the elements of Aramaic grammar. Staff.
- 226 READINGS IN GRAECO-ROMAN RELIGION (3). Prerequisite, permission of the instructor. Opportunity for reading of ancient documents representing the more important religious trends of the Graeco-Roman world. Staff.
- 228 DOCUMENTS IN EARLY JEWISH AND CHRISTIAN EXEGESIS (3). Prerequisite, graduate standing in Religious Studies or permission of the instructor. A comparative study of the interpretation of the Hebrew Scriptures in rabbinic Judaism and in early Christianity; texts to be read in the original languages. Halperin.

- 243 THEORIES OF RELIGIOUS EXPERIENCE IN AMERICAN RELIGIOUS THOUGHT (3). Prerequisites, Religious Studies 84 or equivalent and Psychology 28 or equivalent. A study of Jonathan Edwards and William James as pioneers in the psychology of religion, with ancillary attention to Nathaniel Taylor, Charles Finney and H. R. Niebuhr. *Fall or spring*. Peck.
- 244 HERMENEUTICS AND CRITICAL THEORIES: A HISTORICAL SURVEY (3). Prerequisite, graduate standing in Religious Studies or permission of the instructor. A historical survey of theories of criticism, aesthetics, and hermeneutics. Tyson and Peck.
- 245 THE CRITICAL LITERATURE IN RELIGION AND ART (3). Prerequisite, permission of the instructor. Critical methodology in religion and art via selected readings in theory of religion and art, texts on art in major religious traditions, and exemplary works in criticism of religion and art. Staff.
- 246 CRITICAL WORKS IN RELIGION AND LITERATURE (3). Prerequisite, permission of the instructor. Textual analysis of several theoretical and literary works dealing with selected problems in religion and literature. Masuzawa.
- 247 THEORIES OF RELIGION AND CULTURE (3). Prerequisite, permission of the instructor. Studies in early modern, enlightenment and romantic political, philosophical and literary texts. Tyson.
- 263 EARLY JEWISH HISTORY AND LITERATURE (3). Prerequisite, permission of the instructor. An examination of the main varieties of pre-rabbinic Judaism: Hellenistic Judaism, apocalyptic Judaism and the Judaism of the Dead Sea Scrolls. Halperin.
- 264 DOCUMENTS IN RABBINIC JUDAISM (3). Prerequisite, permission of the instructor. A critical study of the history and ideology of rabbinic Judaism (second through sixth centuries A.D.); texts to be read in the original language. Halperin.
- 265 EARLY CHRISTIAN HISTORY AND LITERATURE (3). Prerequisite, permission of the instructor. A critical study of the history and literature of early Christianity from Paul to Irenaeus with texts to be read in the original languages. Staff.
- 266 THE SELEUCID-PTOLEMAIC PERIOD IN THE NEAR EAST (3). Prerequisite, permission of the instructor. A focus on the cultures of Mesopotamia and Egypt after the conquest of Alexander with special attention given to original documents illustrating religious, intellectual, and political institutions in the Hellenized Near East. Sasson.
- 269 MEDIEVAL RELIGIOUS TEXTS (3). Prerequisite, permission of the instructor. Selected texts which illumine significant aspects of medieval religious culture will be read in the original languages. Kaufman.
- 270 TEXTS OF THE CATHOLIC AND PROTESTANT REFORMATIONS (3). Prerequisite, permission of the instructor. Selected texts which illumine significant aspects of the Catholic and Protestant Reformations will be read in the original languages. Kaufman.
- 288 OBSERVATION AND INTERPRETATION OF RELIGIOUS ACTION (3). Prerequisite, permission of the instructor. Exercises in learning to read the primary modes of public action in religious traditions: sermons, testimonies, rituals, prayers, etc. Primary focus on construction and interpretation of texts from field observation. Tyson.
- 299 TOPICS IN THE STUDY OF RELIGION (3). Prerequisite, graduate standing in Religious Studies or permission of the instructor. Required of all graduate students in Religious Studies; topics vary. *Spring*. Staff.
- 300 SEMINAR IN COMPARATIVE AND HISTORICAL STUDIES (3). Topics vary; consult department. *Fall or spring*. Sanford, Kaufman, Peck, Wacker.
- 302 READINGS IN TALMUD (3). Prerequisite, permission of the instructor. An introduction to the study of the Babylonian Talmud in the original Hebrew and Aramaic, with the traditional commentaries. The emphasis will be on understanding Talmudic logic. Halperin.
- 303 SEMINAR IN AMERICAN RELIGIOUS THOUGHT (3). Prerequisite, Religious Studies 202. A comparative examination of intellectual traditions which have had en-

during significance for the study of religion. The specific choice will vary from year to year. Wacker.

- 305 SEMINAR IN BIBLICAL STUDIES (3). Topics vary; consult department. Van Seters, Sasson, Halperin.
- 306 HELLENISTIC RELIGIOUS TEXTS IN GREEK (3). Studies in Greek texts drawn from early Christianity, Judaism, and other religions of the Graeco-Roman World. Staff.
- 308 METHODS AND TOPICS IN THE STUDY OF WESTERN RELIGIOUS TRADITIONS (3). Prerequisite, permission of the instructor. Exploration of one enduring issue in the history of the Western Christian traditions. The instructor will select several case studies that illustrate both the topic and the developments within traditions. Staff.
- 309 OTHERNESS AND HISTORY IN THE STUDY OF RELIGION (3). Prerequisite, permission of the instructor. An examination of the meaning of "other" in the methodologies of the study of religion as it has to do with the subjects of myth, history, ritual, and symbol in "other cultures" or in universal human experience. Staff.
- 310 SEMINAR IN RELIGION AND CULTURE (3). Prerequisite, permission of the instructor. Topics vary; consult department. Churchill, Peck, Tyson, Masuzawa.
- 311 SEMINAR IN RELIGION AND LITERATURE (3). Prerequisite, permission of the instructor. Topics vary. Masuzawa.
- 325 READINGS AND RESEARCH (3). Prerequisite, permission of the instructor. *Fall and spring*. Staff.
- 393 MASTER'S THESIS (3 or more). *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (variable). *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION (0).

DEPARTMENT OF ROMANCE LANGUAGES

CESAREO BANDERA, *Chairman*

Professors

French

GEORGE B. DANIEL	(5)	Seventeenth-Century French Literature
I. R. STIRLING HAIG II	(6)	Nineteenth-Century French Literature
FREDERICK WRIGHT VOGLER	(7)	Seventeenth-Century French Literature
GEORGE MALLARY MASTERS	(8)	French Renaissance
CATHERINE A. MALEY	(11)	Romance Linguistics
CAROL LYNN SHERMAN	(12)	Eighteenth-Century French Literature

Italian

ALDO D. SCAGLIONE	(13)	Medieval and Renaissance Italian Literature
ANTONIO ILLIANO	(14)	Modern Italian Literature

Portuguese

FRED M. CLARK	(29)	Portuguese Language and Brazilian Literature
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Spanish

CESAREO BANDERA	(39)	Medieval and Golden Age Spanish Literature, and Theory of Literature
PABLO GIL CASADO	(23)	Contemporary Spanish Literature
ANGEL L. CILVETI	(41)	Golden Age Literature and Intellectual History
MARIA A. SALGADO	(24)	Contemporary Spanish American and Spanish Literature

Arabic

JULIO CORTÉS	(30)	Arabic Language
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Associate Professors

French

E. JANE BURNS	(33)	Medieval French Literature
SIMA N. GODFREY	(35)	Nineteenth-Century French Poetry and Poetics
EDWARD D. MONTGOMERY	(9)	Romance Philology
YVES DE LA QUÉRIÈRE	(10)	French Stylistics and Twentieth-Century French Literature

Italian

ENNIO RAO	(15)	Italian Renaissance
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Spanish

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| FRANK A. DOMÍNGUEZ | (25) | Medieval and Golden Age Language and Literature |
| ROSA PERELMUTER PÉREZ | (37) | Spanish American Literature |
| JOSÉ MANUEL POLO DE BERNABÉ | (34) | Nineteenth- and Twentieth-Century Spanish Drama and Poetry, Modern Critical Theory |
| LARRY D. KING | (36) | Spanish Linguistics |

*Assistant Professors**French*

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| JEAN-MICHEL HEIMONET | (40) | Twentieth-Century French Literature, Modern Critical Thought |
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Spanish

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| ALICIA RIVERO-POTTER | (38) | Contemporary Spanish American Literature, Modern Critical Theory |
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Professors Emeriti

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| FRANK M. DUFFEY | (17) | Spanish Phonetics and Civilization |
| ALVA V. EBERSOLE | (19) | Spanish Golden Age Literature |
| ALFRED G. ENGSTROM | (2) | Nineteenth-Century French Literature, Dante |
| EUGENE H. FALK | (3) | Contemporary French Literature |
| AUGUSTIN MAISSEN | (22) | Minor Romance Tongues |
| EDOUARD MOROT-SIR | (4) | French Thought and Criticism, Seventeenth- and Twentieth-Century French Literature |
| LAWRENCE A. SHARPE | (28) | Portuguese and Spanish Language and Literature |
| STERLING A. STOUDEMIRE | (31) | Sixteenth-Century Spanish Drama, Seventeenth-Century Spanish History, Nineteenth-Century Spanish Literature |
| W. L. WILEY | | French Renaissance Literature |

Requirements for Advanced Degrees

The degree of Master of Arts is offered with concentration in French, Italian, Portuguese (Luso-Brazilian), Spanish, or Spanish-American literature. The program for the M.A. degree is open to students holding the Bachelor of Arts degree or the equivalent, and whose major field of undergraduate study was normally a Romance language and literature. Students are expected to have proficiency in the Romance language and in English upon admission to the program.

The degree of Doctor of Philosophy is offered with concentration in Romance Languages and Literatures; Romance Philology; French, Italian, Portuguese (Luso-Brazilian), Spanish-American, or Spanish Languages and Literatures.

Teaching experience is an essential part of professional training. Therefore, teaching assistance or lecture instruction equivalent to at least three contact hours a week for two semesters, or until teaching competence is acquired, is required of all doctoral candidates.

Research Facilities

The library is a subscriber to all important periodicals in which space is given either wholly or in part to the Romance languages and literatures. Materials for research are especially rich in Romance linguistics, medieval literature, Italian medieval and Renaissance literature and cultural history, French literature of the sixteenth, seventeenth, eighteenth, nineteenth and twentieth centuries; in Spanish literature of the seventeenth and nineteenth centuries and the contemporary period; and in Latin American literature. In Spanish drama a collection of over 30,000 plays offers a wealth of material for research. The reference collection of the general library is unusually good for Romance bibliography and the collection of books in Portuguese and Catalan are also quite important.

CATALAN

Courses for Graduates and Advanced Undergraduates

- 101 INTRODUCTION TO CATALAN (3). Introduction to the Catalan language. Readings. *On demand.* Maissen.

FRENCH

Courses for Graduates and Advanced Undergraduates

- 101X ELEMENTARY FRENCH FOR GRADUATE STUDENTS (3). These courses prepare
102X the student to meet the reading knowledge requirement for graduate degrees. Passing the examination at the end of 102X will certify that this requirement has been satisfied. *Three hours a week, fall and spring.* Staff.
- 126 HISTORY OF THE FRENCH LANGUAGE (LING 164) (3). Prerequisites, French 50 or 60, 61, 62 or equivalent. *Spring.* (Alternate Years.) Montgomery, Burns, Maley.
- 145 FRENCH PHONETICS (LING 165) (3). Prerequisite, French 50 or equivalent. The theory and practice of the production of the speech sounds of modern standard French. *Lecture, discussion, and laboratory. Spring.* Maley.
- 146 STRUCTURE OF FRENCH (LING 166) (3). Prerequisite, proficiency in French language. Designed to acquaint students with the phonology, morphology, syntax, and semantics of modern standard French and with theories of modern grammar. *Fall.* Maley.

Courses for Graduates

- 203 ADVANCED COMPOSITION FOR GRADUATE STUDENTS (3). Review of advanced grammar. Exercises in translation from English into French of literary and critical materials. Free composition and training in the use of stylistic devices. *Fall.* de la Qu  ri  re, Heimonet.

- 205 FRENCH PROSEMINAR (3). An introduction to scholarly methodology, bibliography, and applied criticism. *Spring*. Haig.
- 211 FRENCH NOVELISTS OF THE TWENTIETH CENTURY (3). A study of the novels of Proust, Gide, Malraux, Bernanos, Sartre, etc. The topics may change from year to year. *Spring*. (Alternate Years.) de la Quérière, Heimonet.
- 212 FRENCH POETS OF THE TWENTIETH CENTURY (3). A study of the poetry of Claudel, cubist poetry, the major Surrealists, Ponge, Michaux. *Spring*. (Alternate Years.) de la Quérière.
- 213 MASTERS OF TWENTIETH CENTURY LITERATURE (3). This course will deal with the works of a single major author of twentieth-century French literature. *Fall*. (Alternate Years.) Heimonet, de la Quérière.
- 214 FRENCH DRAMA OF THE TWENTIETH CENTURY (3). A study of the theatre of Claudel, Giraudoux, Anouilh, Montherlant, Sartre, and the New Theatre. The topics may change from year to year. *Fall*. (Alternate years.) Heimonet.
- 221 OLD FRENCH (3). An introductory course designed to enable students to read medieval texts with rapidity and accuracy. Phonology, morphology, semantics, and syntax. *Fall*. Montgomery.
- 222 OLD FRENCH LITERATURE (3). Exploration of approaches to major genres through examination of representative works: hagiographic, epic, romance, *lai*, *fabliau*, *conte*. *Spring*. Montgomery, Burns.
- 233 THE FRENCH MEDIEVAL DRAMA (3). A survey of the medieval religious and comic theatre in France from its origins to 1548. *Spring*. (Alternate years.) Montgomery, Burns.
- 234 THE FRENCH CLASSICAL THEATRE (3). After surveying the Greek and Roman backgrounds, this course covers French classical drama, its Renaissance origins, golden age (Corneille, Racine, Molière, et al.), and decline (Crébillon *père* and Voltaire). *Fall*. (Alternate years.) Daniel, Vogler.
- 235 DEVELOPMENTS IN POST-CLASSICAL FRENCH DRAMA (3). A study of the genre from Marivaux to the end of the nineteenth century. *Spring*. (Alternate years.) Sherman.
- 236 FRENCH STYLISTICS (3). A theoretical and practical approach to the study of style. *Spring*. de la Quérière.
- 237 LITERARY CRITICISM IN FRANCE (3). Critical thought and theory from Sainte-Beuve to the present, with emphasis on formal approaches. Literary history, psychocriticism, structuralism, semiotics, post-structuralism. In English with readings in French and English. *Fall*. (Alternate years.) Haig.
- 238 STRUCTURES AND EVOLUTION OF FRENCH THOUGHT IN ITS RELATION TO LITERATURE I (3). The Greco-Latin heritage. Descartes and Cartesianism, in relation with the empiricist movement. The Enlightenment and the European scene. Jean-Jacques Rousseau and the ideologies of the French Revolution. *Fall*. (Alternate years.) Staff.
- 239 FRENCH THOUGHT FROM THE NINETEENTH CENTURY TO THE PRESENT II (3). Idealism and Romanticism; Hegel in France; socialism and utopias; Auguste Comte, Karl Marx; science and European epistemologies; existentialism and phenomenology; Bergson, Teilhard de Chardin; human sciences and structuralism. *Spring*. (Alternate years.) *Fall*. Staff.
- 248 FRENCH LITERATURE OF THE FOURTEENTH AND FIFTEENTH CENTURIES (3). A study of literary trends with emphasis on the rise of the prose *nouvelle* and lyric poetry from Machaut through Villon. *Spring*. (Alternate years.) Montgomery.
- 265 RABELAIS AND THE "ECOLE MAROTIQUE": EARLY RENAISSANCE HUMANISM AND REFORM (3). A critical historical study of the literary works of Rabelais and the poetic movement associated with Clément Marot in the perspective of early Renaissance humanism and Calvinism. *Fall*. (Alternate years.) Masters.

- 267 FRENCH RENAISSANCE POETRY: ÉCOLE LYONNAISE AND PLEIADE (3). A study of Scève, Pernette du Guillele, and Louise Labé and the poetry (epic, theatrical, scientific, lyric) and prose of the ten members of the Pléiade. *Spring*. (Alternate years.) Masters.
- 268 MONTAIGNE AND HIS AGE: PROLEGOMENA TO THE BAROQUE (3). Montaigne's *Essais* in the perspective of the political writings of La Boétie; Amyot's translations; the early baroque as seen in the works of Desportes and D'Aubigné. *Fall*. (Alternate years.) Masters.
- 271 FRENCH PROSE FICTION OF THE SEVENTEENTH CENTURY (3). A study of the development of prose fiction principally through the works of D'Urfé, Cyrano de Bergerac, Sorel, Scarron, Furetière, Perrault, and Mme. de La Fayette. *Fall*. (Alternate years.) Daniel, Vogler.
- 272 FRENCH POETRY OF THE SEVENTEENTH CENTURY (3). French poetry from Desportes through Racan emphasizing *poésie précieuse et galante, religieuse, pastorale, officielle, libertine, and satirique*. In addition to Desportes and Racan, works of Chassignet, Sponde, La Ceppède, Malherbe, Saint-Amant, Théophile de Viau, Maynard, and Régnier will be considered. *Spring*. (Alternate years.) Daniel, Vogler.
- 273 MASTERS OF SEVENTEENTH-CENTURY LITERATURE (3). This course deals with the works of a single major author of seventeenth century French literature. *Fall*. (Alternate years.) Vogler, Daniel, Haig.
- 274 THE MORALISTS (3). A study of the works of Pascal, La Rochefoucauld, Bossuet, La Bruyère and La Fontaine. *Spring*. (Alternate years.) Vogler, Daniel.
- 281 MASTERS OF EIGHTEENTH-CENTURY PROSE FICTION (3). An array of novelists and *conteurs* such as Prévost, Lesage, Marivaux, Laclous, Crébillon *fils*, Montesquieu, Diderot, Rousseau, and others. *Spring*. (Alternate years.) Sherman.
- 283 MASTERS OF EIGHTEENTH-CENTURY LITERATURE (3). Intensive study of a major eighteenth-century writer. *Fall*. Sherman.
- 284 THE "PHILOSOPHES" (3). Intellectual currents (religious, scientific, epistemological) and morals as reflected in such writers as Bayle, la Mettrie, Condillac, Helvétius, d'Holbach, the Encyclopedists, and others. *On demand*. Sherman.
- 291 THE FRENCH ROMANTIC NOVEL (3). A study of major novelists of French Romanticism (Balzac, Hugo, Sand, Stendhal). *Fall*. (Alternate years.) Haig.
- 292 FRENCH ROMANTIC POETS (3). A study of the major poets of French Romanticism (Lamartine, Hugo, Vigny, Musset, and Nerval). *Spring*. (Alternate years.) Haig.
- 293 MASTERS OF NINETEENTH-CENTURY FRENCH LITERATURE (3). Intensive study of a single major author of the Romantic or Post-Romantic period. The subject will change from year to year among writers in the different literary genres. *Fall*. (Alternate years.) Haig, Godfrey.
- 294 FRENCH PARNASSIAN AND NINETEENTH-CENTURY SYMBOLIST POETS (3). A study of leading precursors and poets of the Parnassian and early Symbolist movements (Gautier, Banville, Baudelaire, Leconte de Lisle, Heredia, Laforgue, Lauréamont, Verlaine, Rimbaud, and Mallarmé). *Spring*. (Alternate years.) Godfrey.
- 295 THE FRENCH REALISTIC AND NATURALISTIC NOVEL (3). A study of major Realistic and Naturalistic novelists (Flaubert, the Goncourts, Daudet, Zola, Maupassant, and Huysmans). *Fall*. (Alternate years.) Haig.
- 296 FRENCH BRIEF FICTION OF THE NINETEENTH CENTURY (3). A study of the nineteenth-century short story and related forms of brief fiction (Nodier, Mérimée, Balzac, Gautier, Barbey d'Aureville, Flaubert, Daudet, Maupassant, Villiers de l'Isle-Adam, et. al.) *On demand*. Godfrey.
- 330 SEMINAR (3). Staff.
- 331 THE HISTORY OF FRENCH LITERATURE BEFORE 1300 (3). *On demand*. Montgomery, Burns.
- 340 SPECIAL READINGS (3). Members of the graduate faculty. (Doctoral students only.)

- 393 MASTER'S THESIS (3). Members of the graduate faculty.
 394 DOCTORAL DISSERTATION (3). Research in a special field under the direction of a member of the graduate faculty.

ITALIAN

Courses for Graduates and Advanced Undergraduates

- 101X ELEMENTARY ITALIAN FOR GRADUATE STUDENTS (3). These courses prepare
 102X the student to meet the reading knowledge requirement for graduate degrees. Passing the examination at the end of 102X will certify that this requirement has been satisfied. *On demand.* Staff.
- 111 SURVEY OF ITALIAN LITERATURE I (to 1600) (3). Prerequisite, permission of instructor for undergraduate; none for graduate. The survey will be conducted as comprehensively as feasible on the basis of available anthologies in the original language, with particular attention to authors and texts included in the current departmental reading lists. *Fall.* (Alternate years.) Rao, Scaglione.
- 112 SURVEY OF ITALIAN LITERATURE II (1600 to present) (3). Prerequisite, permission of instructor for undergraduate; none for graduate. See description under Italian 111. *Spring.* (Alternate years.) Illiano.
- 126 HISTORY OF THE ITALIAN LANGUAGE (3). Prerequisites, Italian 15 or 21 and consent of instructor. The evolution of the Italian language as documented in literary texts from the origins to the present. *Spring.* (Alternate years.) Rao.
- 133 DANTE IN ENGLISH TRANSLATION (3). (Not open to undergraduate majors in Italian or to graduate majors or minors in Italian). *Fall.*
- 141 ITALIAN LITERATURE OF THE RENAISSANCE I (3). Prerequisites, Italian 15 or 21 or equivalent. A study of the major figures of Italian Humanism, Latin and vernacular, from Salutati to Poliziano. *Fall.* (1984 and every third year.) Rao.
- 151 ITALIAN LITERATURE OF THE RENAISSANCE II: THE CINQUECENTO (3). Prerequisite, Italian 15 or 21 or equivalent. After a brief description of the literary situation in the Cinquecento, the following three authors will be studied in detail, with close reading of the three works indicated: Machiavelli, *Il Principe* and at least one book of *I Discorsi*; Ariosto, *Orlando Furioso*; Tasso, *Gerusalemme Liberata*. *Spring.* (1983 and every third year.) Scaglione, Rao.
- 171 THE EIGHTEENTH CENTURY (3). Prerequisite, Italian 15 or 21. The literature of Arcadia, the Enlightenment, and Neo-Classicism, Vico, Goldoni, Parini, and Alfieri. *Fall.* (Alternate Years.) Illiano.
- 181 ITALIAN ROMANTICISM (3). Prerequisite, Italian 15 or 21. Preromanticism; Alfieri; the lyrics and novels of Foscolo, Leopardi, Manzoni; the Romantic drama from Pindemonte to Niccolini. *Fall.* (1985 and every third year.) Illiano.
- 182 ITALIAN LITERATURE IN THE SECOND HALF OF THE 19TH CENTURY (3). Prerequisite, Italian 51, 21 or equivalent. The major literary forms in the second half of the century with particular regard to Verismo, Verga, Carducci, Pascoli, Scapigliatura, and Decadentismo. *Spring.* (1984 and every third year.) Illiano.
- 194 MODERN ITALIAN POETRY (3). Prerequisite, Italian 15 or 21. The major poets and trends of the late nineteenth and twentieth centuries: Decadenti, Crepuscolari, Futuristi, and Ermetici. *Fall.* (1984 and every third year.) Illiano.
- 195 MODERN ITALIAN FICTION (3). Prerequisite, Italian 15 or 21. D'Annunzio, Svevo, Moravia, Pavese, Vittorini, Calvino, etc. *Fall.* (1985 and every third year.) Illiano.
- 196 MODERN ITALIAN DRAMA (3). Prerequisite, Italian 15 or 21. Grotteschi, Pirandello, Italian drama after World War II, Eduardo de Filippo, etc. *Spring.* 1984 and every third year.) Illiano.

Courses for Graduates

- 205 PROSEMINAR (3). Prerequisite, graduate standing. An introduction to modern Italian criticism and to current methods of research and scholarship. Bibliographic survey of basic tools and secondary literature. Guidance to preparation of papers, theses and dissertations. *On demand.* Staff.
- 221 OLD ITALIAN (3). An introduction to the historical development of Old Italian, Sardinian, and Dalmatian. Survey of major dialectal areas. *Fall.* (Alternate years.) Montgomery.
- 222 HISTORICAL ITALIAN GRAMMAR (3). The development from Latin to Italian linguistic structures. *On demand.* Staff.
- 231 DANTE I (3). Prerequisite, graduate standing, or consent of instructor. After a brief general presentation of Dante's life and works, the class will study the *Divina Commedia* in the original through the *Inferno* and the first 6 Cantos of *Purgatorio*. *Fall.* Scaglione.
- 232 DANTE II (3). Prerequisite, graduate standing or consent of instructor. This semester will complete the critical reading of the *Divina Commedia* starting with Canto 7 of *Purgatorio*. Under satisfactory conditions DANTE I will not be a prerequisite for DANTE II. *Spring.* Scaglione.
- 245 THE ITALIAN TRECENTO: PETRARCH AND BOCCACCIO (3). *Fall.* (Alternate years.) Scaglione.
- 330 SEMINAR (3). Special study and research in set topics, e.g., Seicento and Baroque; Italian Literary Criticism (History of); The Questione della Lingua; Drama through the Renaissance. *On demand.* Staff.
- 340 SPECIAL READINGS (3). Members of the graduate faculty.
- 393 MASTER'S THESIS (3). Members of the graduate faculty.
- 394 DOCTORAL DISSERTATION (3). Research in a special field under the direction of a member of the graduate faculty.

PORTUGUESE

Courses for Graduates and Advanced Undergraduates

- 101 SURVEY OF PORTUGUESE LITERATURE I (3). Prerequisites, Portuguese 4, 15 or equivalent. An introduction to Portuguese literature from its origin through the eighteenth century. *Fall.* (Alternate years.) Staff.
- 102 SURVEY OF PORTUGUESE LITERATURE II (3). Prerequisites, Portuguese 4, 15 or equivalent. A survey of Portuguese literature of the nineteenth and twentieth centuries. *Spring.* (Alternate years.) Staff.
- 103 SURVEY OF BRAZILIAN LITERATURE I (3). Prerequisites, Portuguese 4, 15 or equivalent. A survey of Brazilian literature of the colonial period and nineteenth century. *Fall.* (Alternate years.) Clark.
- 104 SURVEY OF BRAZILIAN LITERATURE II (3). Prerequisites, Portuguese 4, 15 or equivalent. A study of major writers of twentieth century Brazilian literature. *Spring.* (Alternate years.) Clark.
- 126 HISTORY OF THE PORTUGUESE LANGUAGE (3). Prerequisites, Portuguese 4, 15 or equivalent, or consent of instructor. Survey of the history of Portuguese with special stress on the characteristics of Brazilian Portuguese and the factors underlying them. *On demand.* Staff.
- 135 BRAZILIAN DRAMA (3). Prerequisites, Portuguese 4, 15, or equivalent, or consent of instructor. A study of representative Brazilian plays of the twentieth century with a review of the development of the theatre in Brazil. *Fall.* (Alternate years.) Clark.

Courses for Graduates

- 203 ADVANCED COMPOSITION FOR GRADUATE STUDENTS (3). Advanced grammar with exercises in translation from English into Portuguese. Free composition and training in the use of stylistic devices. *On demand*. Clark.
- 205 LUSO-BRAZILIAN BIBLIOGRAPHY AND METHODOLOGY (3). An introduction to bibliography and methodology in Luso-Brazilian literary and linguistic research. *On demand*. Clark.
- 210 THE PORTUGUESE NOVEL (3). A study of prose fiction, particularly from the nineteenth and twentieth centuries, with special emphasis on Camilo Castelo Branco, Eça de Queirós, Aquilino Ribeiro, Ferreira de Castro, and the *neo-realistas*. *Fall*. (Alternate years.) Staff.
- 212 THE BRAZILIAN NOVEL (3). Extensive reading of representative Brazilian novels from the second half of the nineteenth century to the present. *Spring*. (Alternate years.) Clark.
- 213 MACHADO DE ASSIS (3). A study of the prose fiction, drama, poetry, and criticism of Machado de Assis, with reference to other major writers of the second half of the nineteenth century. *Spring*. (1985 and every third year.) Clark.
- 214 MODERN BRAZILIAN SHORT FICTION AND ESSAYS (3). A study of Brazilian short stories, *novelas*, and essays of the twentieth century. *Spring*. (1985 and every third year.) Clark.
- 221 OLD PORTUGUESE (3). A study of Portuguese historical phonology and morphology with readings from medieval verse and prose. *Spring*. (Alternate years.) Staff.
- 231 CAMOES (3). The works of Camões (epic, lyric poetry, and drama) are studied with reference to the contemporary Iberian historical and literary background. *Fall*. (1984 and every third year.) Staff.
- 291 PORTUGUESE OVERSEAS LANGUAGE AND LITERATURE (3). A survey of the use and characteristics of Portuguese as used in Africa and Asia (especially Cape Verde *crioulo*) and readings from contemporary African authors using Portuguese. *Spring*. *On demand*. Staff.
- 330 SEMINAR IN PORTUGUESE LITERATURE (3). Staff.
- 333 SEMINAR IN LUSO-BRAZILIAN LINGUISTICS (3). Staff.
- 335 SEMINAR IN BRAZILIAN LITERATURE (3). Staff.
- 340 SPECIAL READINGS (3). Member of the graduate faculty.
- 393 MASTER'S THESIS (3). Member of the graduate faculty.
- 394 DOCTORAL DISSERTATION (3). Member of the graduate faculty.

ROMANCE

Courses for Graduates

- 205 ROMANCE BIBLIOGRAPHY.
- 220 VULGAR LATIN (3). An investigation of the development of the *sermo plebeius* from its earliest manifestations to its fragmentation into the Romance vernaculars. *Spring*. (Alternate years.) Montgomery.
- 225 PROVENÇAL (3). Linguistic analysis of the *langue d'oc* and investigation of medieval Provençal literature. *Fall*. (Alternate years.) Montgomery, Burns.
- 324 ROMANCE PALEOGRAPHY (3). Study of the development of medieval romance book hands and diplomatics from their origins to the advent of printing; with practical exercises. *Spring*. (Alternate years.) Montgomery.
- 330 SEMINAR IN ROMANCE LANGUAGES (3). Staff.
- 370 MINOR ROMANCE TONGUES (3). Introduction to historical development of Catalan, Rhaeto-Romance, and Rumanian. Readings in period texts. *On demand*. Maissen, Montgomery.

- 371 SEMINAR IN MEDIAN AND MINOR ROMANCE LANGUAGES AND LITERATURES (3). Introduction to Rumanian, Catalan, and Rhaeto-Romance: phonetics, lexicology, and grammar. Readings of linguistic and literary texts. Onomastics and folklore (Rumanian Ballad). *On demand*. Maissen.

RUMANIAN

Courses for Graduates and Advanced Undergraduates

- 101 INTRODUCTION TO RUMANIAN (3). Introduction to the Rumanian language. Readings. *On demand*. Maissen.
- 102 INTRODUCTION TO RUMANIAN: GRAMMAR, PRONUNCIATION, READING AND CONVERSATION (3). *On demand*. Maissen.

SPANISH

Courses for Graduates and Advanced Undergraduates

- 101X ELEMENTARY SPANISH FOR GRADUATE STUDENTS (3). These courses prepare the student to meet the reading knowledge requirement for graduate degrees. Passing the examination at the end of 102X will certify that this requirement has been satisfied. *Three hours a week, fall and spring*. Staff.
- 102X the student to meet the reading knowledge requirement for graduate degrees. Passing the examination at the end of 102X will certify that this requirement has been satisfied. *Three hours a week, fall and spring*. Staff.
- 117 CERVANTES (3). Prerequisites, Spanish 71, 72 or 73. The works of Cervantes, stressing the *Quijote* and the *Novelas ejemplares*, with consideration of background of Renaissance prose (the romances of chivalry, pastoral, sentimental novel.) *Spring*. Bandera.
- 126 HISTORY OF THE SPANISH LANGUAGE (LING 154) (3). Prerequisites, Spanish 71, 72 or 73. The formation of Castilian and other peninsular dialects and languages, beginning with Vulgar Latin and including Visigothic and Arabic influence. Expansion of the New World. *Spring*. Domínguez, Maissen.
- 135 MODERN SPANISH DRAMA (3). Prerequisites, Spanish 71, 72. A study of plays by principal Spanish dramatists of the twentieth century. *Fall*. (Alternate years.) Polo de Bernabé.
- 145 SPANISH PHONETICS & PHONOLOGY (LING 155) (3). Prerequisite, Spanish 51 or equivalent. The study of sounds as system in American and peninsular Spanish. Attention to practical phonetics according to individual needs. *Spring*. King.
- 146 THE STRUCTURE OF MODERN SPANISH (LING 156) (3). Prerequisite, Spanish 50 or equivalent. Introduction to theories of grammar with a detailed analysis of the semantic and syntactic structure of contemporary Spanish. Attention also given to the application of linguistic theory to the teaching of Spanish. *Fall*. King.

Courses for Graduates

- 201 SURVEY OF SPANISH LITERATURE TO 1700 (3). A survey of significant works and movements from the Middle Ages to 1700. *On demand*. Staff.
- 202 SURVEY OF SPANISH LITERATURE SINCE 1700 (3). A survey of significant works and movements from 1700 to present. *On demand*. Staff.
- 203 ADVANCED COMPOSITION FOR GRADUATE STUDENTS (3). Review of advanced grammar. Exercises in translation from English into Spanish of literary and critical materials. Free composition and training in the use of stylistic devices. *Fall*. Staff.
- 205 HISPANIC BIBLIOGRAPHY AND THE METHODOLOGY (3). Designed to aid students in preparing term papers, theses, dissertations, with attention to bibliographical guides, problems, and methods of research and scholarly procedures. *Fall*. (Alternate years.) Salgado, Domínguez.
- 209 NONFICTION PROSE OF THE SIXTEENTH AND SEVENTEENTH CENTURIES (3). Consideration of the histories, chronicles, didactic works of the Renaissance and

- the *Siglo de Oro*, with special emphasis on the literature of exploration. *Fall.* (Alternate years.) Staff.
- 210 NINETEENTH-CENTURY SPANISH NOVEL (3). A study of the development of Romanticism, Costumbrismo, Realism, and Naturalism, principally through the novels of Gil y Carrasco, Pereda, Valera, Pérez Galdós, Pardo Bazán, Clarín, and Blasco Ibañez. *Spring.* (Alternate years.) Casado.
- 211 TWENTIETH-CENTURY SPANISH NOVEL (to 1936) (3). A study of major novelists associated with the Generation of 1898, Modernism, the Generation of 1914, and the Generation of 1927; principally Unamuno, Baroja, Valle-Inclán, Miró, Pérez de Ayala, Gómez de la Serna, Chacel, and Sender. *Fall.* (Alternate years.) Casado.
- 212 SPANISH CONTEMPORARY NOVEL (3). A study of major novelists from the Spanish Civil War of 1936 to the present time, with emphasis on Ayala, Cela, García Hortelano, Goytisolo, Benet, and others. *Spring.* (Alternate years.) Casado.
- 213 MEDIEVAL POETRY (3). Major poetic works from the *Poema del Cid* through Jorge Manrique. *Fall.* (Alternate years.) Bandera, Domínguez.
- 214 GOLDEN AGE POETRY (3). Major poetic works from Garcilaso through Quevedo. *Fall.* (Alternate years.) Domínguez, Pérez.
- 215 POETRY OF ROMANTICISM AND THE GENERATION OF 1898 (3). *Spring.* (Alternate years.) Polo de Bernabé.
- 216 CONTEMPORARY LYRIC POETRY (3). Major poets from the Generation of 1927 to the present. *Spring.* (Alternate years.) Polo de Bernabé.
- 221 OLD SPANISH I (3). *Fall.* Staff.
- 222 OLD SPANISH II (3). *Spring.* (Alternate years.) Staff.
- 224 MEDIEVAL PROSE (3). Major prose works from Alfonso X to López de Ayala. *Spring.* (Alternate years.) Domínguez.
- 225 GOLDEN AGE PROSE (3). The major prose works of the Golden Age, excluding those of Cervantes. *Fall.* (Alternate years.) Staff.
- 229 IDEOLOGICAL FRAMEWORK OF THE GOLDEN AGE (3). An investigation of the phenomena that influenced Golden Age literature: Inquisition, censorship, blood-purity, spiritualism, idea of empire, consciousness of decline, etc. *Spring.* (Alternate years.) Staff.
- 231 LOPE DE VEGA AND HIS CONTEMPORARIES (3). *Fall.* (Alternate years.) Bandera.
- 232 CALDERON AND HIS CONTEMPORARIES (3). *Spring.* (Alternate years.) Bandera.
- 234 DRAMA OF THE NINETEENTH CENTURY (3). A survey of Spanish drama of the nineteenth century, with particular stress on Spanish Romanticism, the realistic theater of the second half of the century, and the Generation of 98. *Fall.* (Alternate years.) Polo de Bernabé.
- 236 SPANISH STYLISTICS (3). A theoretical and practical approach to the study of style. *Spring.* (Alternate years.) Polo de Bernabé.
- 237 LITERARY CRITICISM IN SPAIN (3). A study of literary doctrines from the Renaissance to the present. *Spring.* (Alternate years.) Polo de Bernabé.
- 250 THE EIGHTEENTH CENTURY IN SPAIN (3). Readings from eighteenth-century authors in various genres. *Fall.* (Alternate years.) Casado.
- 330 SEMINAR (3). Staff.
- 340 SPECIAL READINGS (3). Member of the graduate faculty (doctoral students only).
- 393 MASTER'S THESIS (3). Member of the graduate faculty.
- 394 DOCTORAL DISSERTATION (3). Member of the graduate faculty.

SPANISH AMERICAN

Courses for Graduates and Advanced Undergraduates

- 113 COLONIAL AND NINETEENTH-CENTURY SPANISH AMERICAN LITERATURE (3). Prerequisites, Spanish 71, 73. *Fall*. Salgado, Pérez.
 114 MODERNIST AND CONTEMPORARY SPANISH AMERICAN LITERATURE (3). Prerequisites, Spanish 71, 73. *Spring*. Salgado, Pérez.

Courses for Graduates

- 240 THE NOVEL IN SPANISH AMERICA (3). *Fall*. (Alternate years.) Salgado.
 241 SPANISH AMERICAN ESSAYS AND SHORT STORIES (3). *Spring*. (Alternate years.) Pérez.
 242 SPANISH AMERICAN POETRY (3). *Spring*. (Alternate years.) Salgado.
 243 SPANISH AMERICAN THEATRE (3). *Fall*. (Alternate years.) Salgado.
 244 THE AESTHETICS OF THE BAROQUE IN SPANISH AMERICAN LITERATURE (3). The origin, development, and persistence of a baroque aesthetic in Spanish-American literature through an examination of diverse theories of baroque and close readings of representative texts. *Fall or spring*. Perez.
 245 THE VANGUARD IN MODERN SPANISH-AMERICAN LITERATURE (3). A study of the theory and practice of experimental, innovative writing in Spanish-America. Readings from late 19th- and especially 20th-century authors in various genres. *Spring*. (Alternate years). Rivero-Potter.
 335 SEMINAR IN SPANISH AMERICAN LITERATURE (3). *Fall and/or spring*. Staff.

ARABIC

Courses for Graduates and Advanced Undergraduates

- 101 ELEMENTARY ARABIC I (3). *Fall*. Cortés.
 102 ELEMENTARY ARABIC II (3). *Spring*. Cortés.
 141 READINGS IN ARABIC I (3). Classical and/or modern readings in Arabic, according to the students' interest and competence. *Fall*. Cortés.
 142 READINGS IN ARABIC II (3). Classical and/or modern readings in Arabic, according to the students' interest and competence. *Spring*. Cortés.

Courses for Graduates

- 201 ROMANCE-ARABIC STUDIES I (3). *Fall*. Cortés.
 202 ROMANCE-ARABIC STUDIES II (3). A continuation of Arabic 201. *Spring*. Cortés.
 340 SPECIAL READINGS (3). *Fall and spring*. Cortés.

DEPARTMENT OF SLAVIC LANGUAGES

VICTOR A. FRIEDMAN, *Chairman*

Professors

PAUL DEBRECZENY	(2)	Russian Literature
VICTOR A. FRIEDMAN	(7)	Slavic and Balkan Linguistics
MADLINE G. LEVINE	(4)	Russian and Polish Literature
VASA MIHAILOVICH	(5)	Russian and Serbo-Croatian Literature
JEROME P. SEATON	(8)	Chinese Literature
WALTER VICKERY	(6)	Russian Literature

Associate Professor

LAWRENCE FEINBERG	(3)	Slavic Linguistics, Poetics
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Lecturers

ERIC HENRY	Chinese Language, Culture
HAYUMI HIGUCHI	Japanese Language

The Department of Slavic Languages offers graduate work leading to the degrees of Master of Arts and Doctor of Philosophy. The degree programs meet general requirements of the Graduate School plus certain departmental requirements. The Department also offers courses in Japanese and Chinese at the graduate level, but these do not lead to a graduate degree.

Requirements for the M.A. Degree

For the degree of Master of Arts a student may emphasize either Russian literature or Slavic linguistics:

1) A student wishing to emphasize Russian literature must take at least five courses representing Russian literature from its beginning to the present; at least two courses in Slavic linguistics; and must take outside the Department one course on literary criticism (Comparative Literature 242, Modern Literary Criticism, or another suitable course chosen in consultation with the adviser). The student may take one elective course (3 hours). Students will write and defend a thesis (3 hours). In addition the student is required to satisfy a language requirement in either French or German.

2) A student wishing to emphasize Slavic linguistics must take at least three courses in Slavic linguistics; two courses (one year) in a modern Slavic language other than Russian; and at least two courses in Russian or another Slavic literature. He or she must take at least one course outside the Department in linguistics (normally Linguistics 101, Introduction to Historical and Comparative Linguistics, or Linguistics 120, Introduction to Descriptive Linguistics). The student may take one elective course (3 hours). Students will write and defend a thesis (3 hours). In addition, students are required to satisfy a language requirement in either French or German.

In addition to the above requirements, graduate students will normally be expected to take Russian 111, Advanced Conversation and Composition. Students who obviously are not in need of Russian 111 will be excused from the requirement.

The comprehensive examination covering the student's field of study may be *either oral or written*. This is the choice of the candidate. A candidate electing to take a written examination may subsequently, at the discretion of the examination committee, be asked to take an oral examination if the results of his or her written examination indicate to the committee that this would be necessary.

Students are reminded: (1) to acquaint themselves fully with their responsibilities through the reading lists, which are available in the Department; (2) to make sure that thesis topics are acceptable to their examining committee.

Teaching experience is an essential part of professional training. Therefore, teaching assistance instruction equivalent to at least three contact hours a week for one semester is required of all M.A. candidates who are considering a teaching career.

Requirements for the Ph.D. Degree

An admitted candidate must have received an M.A. degree from this University or be able to show that his or her previous studies have provided a knowledge of the Slavic field comparable to that required for the M.A. degree at this University. A student may concentrate in either Russian literature, another Slavic literature, or Slavic linguistics. The candidate in Russian literature must demonstrate a sound knowledge of Russian literature and competence in one other Slavic literature or, in special circumstances, in a non-Slavic European literature. The candidate in a Slavic literature other than Russian must demonstrate a sound knowledge of that literature and competence in Russian literature. The candidate for the doctoral degree with concentration in Slavic linguistics must demonstrate a good working knowledge of Russian, and of one West and one South Slavic language. In addition, all students must satisfy their language requirement in either French or German. All students must write a dissertation based on independent original research.

Teaching experience is an essential part of professional training. Therefore, teaching assistance instruction equivalent to at least three contact hours a week for one semester is required of all Ph.D. candidates.

CZECH

- 101 ELEMENTARY CZECH (3 each). Pronunciation, structure of language, and reading are emphasized. The audio-lingual approach will encourage generating of simple native sentences and thinking in Czech. *Fall and spring*. Staff.
- 102 READINGS IN CZECH LITERATURE (3 each). Prerequisite, Elementary Czech
- 103 101-102 or permission of the instructor. While continuing the study of the language
- 104

started in Elementary Czech 101-102, this course will provide an introduction to outstanding works in Czech literature. *Fall and spring.* Staff.

POLISH

- 101 ELEMENTARY POLISH (3 each). Pronunciation, structure of language, and reading in modern Polish. *Fall and spring.* Levine.
- 103 READINGS IN POLISH LITERATURE (3 each). Prerequisite, Elementary Polish 101-102 or permission of the instructor. While continuing the study of the language started in Elementary Polish 101-102, this course will provide an introduction to outstanding works in Polish literature. *Fall and spring.* Levine.
- 111 POLISH LITERATURE (3). Introduction to Polish literature in English translation, focusing on nineteenth- and twentieth-century writers. Some readings in Polish for students who can use the language. *Fall.* Levine.

RUSSIAN

- 101 THE STRUCTURE OF MODERN RUSSIAN (3). Prerequisite, Russian 31, Synchronic phonology, morphology and syntax. *Spring.* Feinberg, Friedman.
- 101X ELEMENTARY RUSSIAN FOR GRADUATE STUDENTS (0). Designed for preparation for reading knowledge examination for higher degrees. Passing of 102X will certify that this requirement has been satisfied. *Fall and spring.* Staff.
- 102X
- 111 ADVANCED RUSSIAN CONVERSATION AND COMPOSITION (3). Prerequisite, Russian 22 or 32, or permission of the instructor. Designed to develop conversational and writing skills in a variety of situations and subjects. Russian used, except for a minimum of linguistic explanations or comments. Staff.
- 112 ADVANCED READING AND LITERARY THEORY (3). Prerequisite, Russian 50 or equivalent. Readings in nineteenth and twentieth century literature. Designed to improve reading ability and to promote understanding of critical methods. For undergraduates, especially majors, and graduates in need of this experience. *Spring.* Vickery.
- 151 PUSHKIN (3). Study of major works. *Fall.* Vickery.
- 152 LERMONTOV (3). A study of the major works of Lermontov. Vickery.
- 162 RUSSIAN POETRY OF THE NINETEENTH CENTURY (3). Readings and lectures on nineteenth century Russian poetry. Vickery.
- 163 THE RISE OF RUSSIAN PROSE FICTION (3). Prerequisite, Russian 22 or permission of the instructor. Russian prose of the first half of the nineteenth century, especially that of Pushkin, Lermontov, and Gogol. *Spring.* Debreczeny.
- 164 DOSTOEVSKY (3). Study of major works of Dostoevsky and a survey of contemporary authors and literary trends relevant to his creative career. Readings in Russian for majors, in English for non-majors. *Fall.* Debreczeny, Levine.
- 165 CHEKHOV (3). Study of major works of Chekhov and a survey of contemporary authors and literary trends relevant to his creative career. Readings in Russian for majors, in English for non-majors. *Spring.* Debreczeny.
- 168 MASTERPIECES OF SOVIET LITERATURE (3). Prerequisite, Russian 22 or permission of the instructor. A study of outstanding works in Russian literature of the Soviet period, including works by Blok, Zamyatin, Sholokhov, Pasternak, and Solzhenitsyn. Readings in Russian for majors, in English for non-majors. *Fall.* Mihailovich.
- 171 GOGOL (3). Study of major works of N. V. Gogol and a survey of contemporary authors and literary trends relevant to his creative career. Lectures and seminar discussions. Readings in Russian for majors, in English for non-majors. *Fall.* Debreczeny.
- 179 TOLSTOY (3). Study of major works of Tolstoy and a survey of contemporary authors and literary trends relevant to his creative career. Readings in Russian for majors, in English for non-majors. *Spring.* Debreczeny, Levine.

- 192 RUSSIAN VERSIFICATION (3). A study of technical problems and thematic aspects in the development of Russian poetry. *Spring*. Vickery.
- 193 RUSSIAN SHORT STORY (3). Prerequisite, Russian 22 or permission of instructor. Short stories from Pushkin to the present are analyzed both historically and artistically. Readings in Russian. *Spring*. Mihailovich.
- 194 STRUCTURAL ANALYSIS OF RUSSIAN VERSE (3). An examination of how attention to verbal structure can deepen our analysis of poetic texts. Analysis of individual Russian poems, combined with extensive reading in formalist/structuralist theory. *Fall*. Feinberg.
- 259 EARLY RUSSIAN LITERATURE TO ABOUT 1700 (3). Literature from the beginning to the Petrine period. Lectures and interpretation of Old Russian texts. Feinberg, Vickery.
- 260 RUSSIAN LITERATURE OF THE EIGHTEENTH CENTURY (3). A survey of leading writers and works of Russian Classicism and the New Sensibility. *Spring*. Vickery.
- 266 RUSSIAN SYMBOLISM (3). Prerequisite, reading knowledge of Russian or permission of instructor. Introduction to the leading writers and works of the Symbolist movement in Russia. Vickery.
- 267 ACMEISM AND FUTURISM (3). A study of major poetic works of Gumilev, Axmatova, Mandel'stam, Majakovskij, and Xlebnikov. Levine.
- 299 HISTORY OF THE RUSSIAN LANGUAGE (3). Elements of phonology, morphology, syntax; reading of Old Russian texts. Feinberg, Friedman.
- 350 SEMINAR IN RUSSIAN LITERATURE (3). Prerequisite, permission of the instructor. Seminar on selected topics in Russian literature. *Spring*. Staff.
- 393 MASTER'S THESIS (3). *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). *Fall and spring*. Staff.

SERBO-CROATIAN

- 101 ELEMENTARY SERBO-CROATIAN (3 each). Pronunciation, structure of the language, and reading are emphasized. The audio-lingual approach will encourage simple conversation and writing of simple sentences. Mihailovich.
- 102
- 103 READINGS IN SERBO-CROATIAN LITERATURE (3 each). Prerequisite, Serbo-Croatian 101-102 or permission of the instructor. While continuing the study of the language started in Serbo-Croatian 101-102, this course will provide an introduction to outstanding works in Serbo-Croatian literature. *Fall and spring*. Mihailovich.
- 104

SLAVIC

- 105 INTRODUCTION TO SLAVIC LINGUISTICS (3). Introduction to the sound pattern of Slavic languages from the late Indo-European to the split of the Common Slavic linguistic unity. *Spring*. Feinberg, Friedman.
- 107 STRUCTURE OF BALKAN LANGUAGE (Linguistics 107) (3). Study of grammar and readings in selected languages. Choice of language based on student interest: Albanian, Bulgarian, Macedonian, Romany, Turkish; also some adjacent languages: Avar, Georgian and Tadjik. *Fall and spring*. Friedman.
- 108 ADVANCED STRUCTURE OF A BALKAN LANGUAGE (Linguistics 108) (3). Continuation of Slavic 107 at a more advanced level. *Fall and spring*. Friedman.
- 112 SOUTH SLAVIC LITERATURES (3). Introduction to the literatures of the South Slavic peoples (chiefly Serbo-Croatian and Bulgarian), with some consideration of their relations to West European literatures. Mihailovich.
- 115 SLAVIC FOLK LITERATURE (Folklore 115) (3). Development of heroic songs. Folk tales, and ballads in various Slavic areas and their influence on the development of written literature. *Spring*. Friedman.
- 125 TOPICS IN SLAVIC LITERATURES (3). Material not presently covered in any course. The specific topic will be announced in advance. Staff.

- 207 OLD CHURCH SLAVONIC (3). Elements of phonology, morphology, syntax; reading of Old Slavic texts. *Fall*. Friedman, Feinberg.
- 240 READING COURSE (3 or more). *On demand*. Staff.
- 305 SEMINAR IN SLAVIC LINGUISTICS (3). Selected issues in Slavic synchronic and diachronic linguistics. *On demand*. Staff.
- 393 MASTER'S THESIS (3 or more). Staff.
- 394 DOCTORAL DISSERTATION (3 or more). Staff.
- 400 GENERAL REGISTRATION (0).

CHINESE

- 110 ADVANCED CHINESE (3). Prerequisite, Intermediate Chinese or permission of instructor. Advanced readings in Chinese. Three hours per week. *Fall and spring*. Seaton.
- 111 TOPICS IN CHINESE LITERATURE AND LANGUAGE (3). Prerequisites, Chinese 111 or permission of instructor. Directed readings in Chinese literature and language on topics not covered by scheduled courses. *Fall and spring*. Seaton.
- 120 LITERARY CHINESE (3 each). An introduction to the literary language of the Chinese classics. *Fall and spring*. Seaton.
- 133 CHINESE LITERATURE IN TRANSLATION THROUGH THE T'ANG (3). A survey of Chinese literature from the classical period to the end of the T'ang Dynasty (906 A.D.). *Fall*. Seaton.
- 134 CHINESE LITERATURE IN TRANSLATION SINCE THE SUNG (3). A survey of Chinese literature from the Sung Dynasty to the present. *Spring*. Seaton.
- 144 CHINESE LITERATURE IN TRANSLATION (3). Selected topics in Chinese literature concentrating on one period or one genre.

JAPANESE

- 101 ELEMENTARY JAPANESE (4 each). Introduction to Modern Japanese with text materials. Hiragana and Katakana scripts will be used and a limited number of kanji will be introduced. Four hours per week devoted to grammar and drill. *Fall and spring*. Higuchi.
- 103 INTERMEDIATE JAPANESE (3 each). Prerequisite, Elementary Japanese or permission of instructor. Continued study of grammar and introduction of 400 basic kanji. *Fall and spring*. Higuchi.
- 105 ADVANCED JAPANESE (3). Prerequisite, Japanese 104 or equivalent. Readings in Japanese language and literature for students who learned more than 400 *kanji*. Discussions from readings and other materials and creative writing will also take place. *Fall*. Higuchi.
- 106 ADVANCED JAPANESE (3). Prerequisite, Japanese 105 or equivalent. Readings in Japanese language and literature for students who learned more than 700 basic *kanji*. Discussions from readings and creative writing will also take place. *Spring*. Higuchi.
- 107 LITERARY JAPANESE (3 each). Prerequisite, Japanese 106 or equivalent. Designed to improve reading skills. Students are expected to work individually using original materials written in Japanese. Discussion in Japanese will take place during class hours. *Fall and spring*. Higuchi.
- 115 TOPICS IN JAPANESE LANGUAGES AND LITERATURE (3). Prerequisite, Japanese 103 or equivalent. Readings in Japanese language and literature not covered by existing courses. This course may be taken more than once for credit. Permission of instructor required. *Fall and spring*. Higuchi.

SCHOOL OF SOCIAL WORK

JOHN B. TURNER, *Dean*

Professors

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|----------------------|------|---|
| PHILIP W. COOKE | (5) | Planning and Administration, Training and Organizational Development, Marriage Counseling |
| ANDREW W. DOBELSTEIN | (7) | Local Political Systems, Aging, Social Welfare Policy |
| MAEDA J. GALINSKY | (12) | Social Group Work, Services to Low Income Clients, Theoretical Foundations of Direct Services |
| KERMIT B. NASH | (86) | Social Support Groups, Health |
| JOHN B. TURNER | (33) | Community Organization, Organizational Development, Urban Social Policy |

Associate Professors

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|-------------------------|-------|--|
| S. RACHEL DEDMON | (38) | Psychopathology, Mental Health Practice, Human Behavior |
| H. CARLISLE HENLEY, JR. | (18) | Research Design and Questionnaire Construction, Use of Computers in Social Work, Child Welfare |
| AUDREYE E. JOHNSON | (47) | Social Welfare Policy, Ethnicity, Health |
| GARY M. NELSON | (83) | Social Gerontology, Policy and Planning, Program Evaluation |
| ANN L. OVERBECK | (99) | Mental Health Practice, Research, Psychopathology, Human Behavior |
| JANICE H. SCHOPLER | (31) | Social Group Work, Child Welfare, Social Work Practice Theory |
| GARY L. SHAFFER | (102) | Staff Development, Child Welfare, Labor Organization and Computer Assisted Instruction |
| RICHARD H. UHLIG | (34) | Research, Social Planning, Urban Studies |

Assistant Professors

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|------------------------|-------|--|
| GARY L. BOWEN | (98) | Social Work with Families, Change in Gender Roles, The Military Family, Research and Evaluation |
| DEBORAH D. FRANKS | (19) | Mental Health Policy and Administration, Services to Families of Psychiatrically Disabled People, Economic Research on Costs of Mental Illness |
| ANNE-LINDA FURSTENBERG | (103) | Aging, Health and Health Care, Clinical Social Work |
| ALBERT W. KING | (23) | Family Therapy, Suicidology, Crisis Intervention |
| KATHLEEN A. ROUNDS | (101) | Biopsychosocial Factors in Health and Illness, Health Behavior, Program Evaluation |

Lecturers

DOROTHY N. GAMBLE	(64)	Community Organization, Community Development in a Cross-cultural Perspective, Social Action
ELAINE L. GOOLSBY	(15)	Developmental Disabilities
PATRICIA B. SIPP	(54)	Family and Child Welfare, Staff Training
CAROL WILLIAMS	(93)	Family and Child Welfare

Clinical Assistant Professor

JACK M. RICHMAN	(88)	Marital & Family Therapy, Social Support, Group Work
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Clinical Instructors

FLORENCE G. SOLTYS		Social Gerontology
J. ANN SULLIVAN	(80)	Child Welfare Services, Child Welfare Management, Consultation and Staff Training

Professors Emeriti

ARTHUR E. FINK
 ALBERT L. JOHNSON
 ALAN KEITH-LUCAS
 HORTENSE K. MCCLINTON
 ALSI C. ROBINETTE
 MORTON I. TEICHER

The School of Social Work offers a curriculum leading to the Master of Social Work degree. Students enter and complete the first-year core curriculum which allows them to take classes in a variety of social work areas, i.e. Research, Practice, Policy, Human Behavior, and Field Education. In the second year students choose an area of specialization, i.e.: Health and Medical Care Services, Services to the Aged and their Families, Mental Health Services, Services to Families and Children, and Public Welfare Administration Services. The student then completes a program of study preparing for practice in the chosen area of specialization. Within each specialization the student may focus course work toward Direct or Indirect practice. The educational plan of each student includes classroom and practicum experience.

Admission is based on an evaluation of the applicant's transcripts, references, written statement of interests in the field, Graduate Record Examination scores, and readiness to undertake graduate professional education. A personal interview may be required. The applicant must have received a bachelor's degree from a college or university, preferably with substantial preparation in the social sciences and humanities. The student deficient in these requirements may be required to remove the deficiencies before being eligible for admission to the School.

The School operates a Field-Based Program, offered at selected sites within the state, in which the first year of graduate professional education may be taken on a part-time basis over two successive academic years. Admission to this program is granted on the same basis as admission for on-campus study. Upon completion of the Field-Based Program, the student attends the on-campus program to complete the degree as a full-time student.

The normal time period for degree completion is four semesters of full-time study. However, graduates of undergraduate social work programs which are accredited by the Council on Social Work Education, who meet specific course requirements, and who graduated no more than three years prior to the initial registration in the School of Social Work are eligible to apply for a limited number of advanced standing positions. The undergraduate major course work is considered approximately equivalent to the first year of graduate study.

Further information in a separate bulletin may be secured from the School of Social Work.

Courses for Graduates and Advanced Undergraduates

- 101 SOCIAL WELFARE POLICY (3). This course offers an introduction to public welfare policy through lecture and discussion of the purposes public welfare serves, and a description of the most important programs created by those policies.
- 102 INTRODUCTION TO RESEARCH METHODOLOGY (3). Introduces students to the overall scientific approach, from ethical issues and problem formulation through hypotheses, casualty, research designs, conceptualization, operationalization measurement, data collection, and analysis.
- 103 HUMAN BEHAVIOR: A LIFE CYCLE PERSPECTIVE (3). Study of the life cycle from prenatal to old age, examining the influences of biological, social, psychological and cultural systems on human behavior and the implications for social service interventions.
- 105 CURRENT ISSUES AND ADVANCES IN DEVELOPMENTAL DISABILITIES (Maternal and Child Health 105) (3). Permission required. Seminar that will enable students and experts in developmental disabilities to exchange ideas and explore controversial topics. Seminar will address current research and policies which affect service delivery for persons who have developmental disabilities. *Three seminar hours per week, fall, spring.* Staff.
- 106 RACISM: IMPLICATIONS FOR HUMAN SERVICES (3). The organizing focus for this course will be how to work with minority groups, especially African-Americans. The conceptual framework will be directed toward relationship building to enhance service delivery.

Courses for Graduates

- 202 THE ANALYSIS AND PRESENTATION OF DATA (3). Designed to explore basic principles and to provide advanced instruction in data analysis, including the construction and analysis of tables, statistical tests, and use of computer programs.
- 203 THE NATURE AND ETIOLOGY OF INSTITUTIONALIZED DISCRIMINATION (3). The nature and etiology of institutionalized discrimination and its implications for social work are examined. Particular attention is paid to issues relating to race and gender.

- 220 SOCIAL WORK PRACTICUM I (4). Students learn beginning practice skills through experimental opportunities, apply core knowledge to direct (individuals, families, groups) and indirect (organizations, communities) social work practice two days per week in an agency setting.
- 221 SOCIAL WORK PRACTICUM II (4). This is a continuation of SoWo 220 providing opportunities for students to demonstrate increased ability to assess, plan, administer and evaluate appropriate social work practice interventions.
- 222 SOCIAL WORK PRACTICUM III (6). The student applies specialized knowledge to social work practice at an advanced level with individuals, families, small groups, organizations and/or communities in an agency of their specialized field.
- 223 SOCIAL WORK PRACTICUM IV (6). A continuation of SoWo 222 providing opportunities for the students to demonstrate increased ability to assess, plan, administer and evaluate appropriate social work interventions in a specialized field of practice.
- 224 SOCIAL WORK PRACTICE WITH WORK GROUPS, ORGANIZATIONS, AND COMMUNITIES (3). This course engages students in an exploration and validation of those processes, principles, and technologies involved in helping work groups, organizations, and communities.
- 225 HUMAN SERVICE ORGANIZATION MANAGEMENT (3). Introduces basic functions and methodologies of administration and selected theories of administrative behavior. The course is taught from the perspective of human service agencies and the role of the administrator.
- 226 FAMILY CENTERED SOCIAL WORK PRACTICE (3). Seminar introduces students to family-centered social work practice. Course provides a theoretical base for developing direct practice skills in the treatment of the family as a unit.
- 227 SOCIAL WORK SERVICES WITH INDIVIDUALS (3). Course provides the foundation for social work practice with individuals, within the context of social welfare organizations. Basic knowledge, analytic and practice skills, and values necessary for practice are emphasized.
- 228 SOCIAL WORK PRACTICE WITH GROUPS (3). Course designed to enable students to become more knowledgeable and skillful as social group workers. Phases of group development and worker tasks in each phase provide the course framework.
- 230 ADULT PSYCHOPATHOLOGY (3). An examination of individual adult functioning considered disordered in today's American society, introduced by an ego psychology framework for understanding adaptation.
- 232 SMALL GROUP AND ORGANIZATIONAL DYNAMICS (3). Drawing upon an interdisciplinary research and practice experience, this course examines those factors which define and influence small group and organizational behavior.
- 233 FAMILY STRESS: COPING AND SOCIAL SUPPORT (3). A review of theories and research on family stress, coping and social support; an examination of family resources and adaptation associated with life cycle transitions, environmental situations and catastrophic events.
- 234 CHILD AND ADOLESCENT PSYCHOPATHOLOGY (3). A review of expected, age-related behavior in infants, children, and adolescents (ICA) with a focus on psychological maladjustment commonly seen in these populations.
- 236 HUMAN BEHAVIOR OF AGING (3). Course presents major biological, psychological, and sociological theories used to understand normal aging process. Course also surveys pathologies and functional disorders associated with aging. Special emphasis given to disadvantaged populations.
- 237 BIOLOGICAL PROCESSES AND INTERVENTIVE STRATEGIES (3). This course follows human development, both biological and psychological, throughout the life cycle. Erikson's conception of psychological development is used as the primary model of psychosocial development.

- 239 POLITICAL ECONOMY OF PUBLIC WELFARE ADMINISTRATION (3). This course explores the political and economic environment for the development and administration of Public Welfare policies and programs.
- 243 MARRIAGE COUNSELING (3). A clinical seminar which analyzes the operations and character of marriage counseling as a human service technique.
- 244 SOCIAL WORK WITH THE DEVELOPMENTALLY DISABLED (3). This course provides an overview of primary developmental handicaps that adversely affect normal human development. It considers etiology, prevalence, incidence, prognosis and social work services with the person and family.
- 245 MENTAL HEALTH METHODS WITH ADULTS (3). This seminar, designed for students specializing in clinical mental health practice, builds on the knowledge base of methods with individuals and examines from a psychosocial perspective work with adult clients.
- 246 SOCIAL WORK PRACTICE WITH THE ELDERLY (3). Course addresses social work practice with elderly in areas of individual and family treatment, group work, case management, supervision, consultation and training and beginning skills in program planning and administration.
- 247 SOCIAL WORK PRACTICE IN HEALTH SETTINGS (3). This course provides students with a knowledge base for practice in health settings. The context of practice, the issues and dilemmas, the multiple roles, and the psychosocial ramifications are examined.
- 248 MENTAL HEALTH METHODS WITH CHILDREN AND ADOLESCENTS (3). This methods course for clinical social work with children and adolescents covers assessment, choice of intervention, specific techniques, and prevention information.
- 249 SOCIAL WORK PRACTICE IN PUBLIC WELFARE (3). This course examines the social work task of translating and administering public welfare policies into individualized programs and services. Specific public welfare programs are analyzed regarding policy origins, programmatic structure and practice methodology.
- 251 CITIZEN PARTICIPATION AND VOLUNTEER INVOLVEMENT (3). This practice course examines methods of citizen participation with a focus on human services planning, volunteer involvement with a focus on professional partnerships, and grassroots organization.
- 253 SOCIAL WORK PRACTICE WITH CHILDREN (3). Course is designed to develop the knowledge and skill required for effective assessment and intervention with children and youth experiencing stress. Environment, culture, family, coping styles and developmental influences are examined.
- 262 AGENCY SERVICES TO FAMILIES AND CHILDREN (3). This course examines the history, problems and issues, policies and practices of public and voluntary sector agencies that provide family and children's services.
- 263 MENTAL HEALTH POLICY (3). This course provides information on current policies affecting national and state mental health services. It examines historical trends, factors influencing policy, and strategies for policy change.
- 264 FAMILY POLICY (3). Policies impacting American families with children will be examined as well as the family policy provisions in other western nations in order to develop a broad understanding of policy alternatives.
- 266 SOCIAL POLICY IN AGING (3). Course provides knowledge in social service, health, and income policy with the aged. Issues pertaining to informal support system and disadvantaged groups are explored in the context of aging policy.
- 269 ADMINISTRATIVE POLICY (3). This course is designed as a seminar to provide the opportunities to study the processes of administrative policy making and to apply knowledge of policy making to specialization policy issues and problems.
- 273 ROLE AND ROLE RELATIONSHIPS IN HEALTH AND MENTAL HEALTH SETTINGS (3). This course examines social work in relation to others on the team. The focus is on the collaborative process.

- 274 HUMAN SERVICES PLANNING IN LOCAL COMMUNITIES (3). An examination of community planning at the local level in one or more human service fields. Planning as a process and a methodology. The role and function of the planner.
- 277 SOCIAL WORK SUPERVISION (3). This course examines the orientations, personal tasks, and organization technologies inherent in the supervision of human service personnel, programs, and/or work units.
- 278 TRAINING AND ORGANIZATIONAL DEVELOPMENT (3). Drawing upon the fields of "training" and "organizational development," this course examines the construction, implementation, and evaluation of developmental efforts of personnel and organizations.
- 279 PLANNING HUMAN SERVICES PROGRAMS (3). Drawing upon a reference base of "planning" as a professional activity, this course examines the tools and technology of planning human service programs.
- 282 THE NATURE, DYNAMICS AND TREATMENT OF FAMILY VIOLENCE (3). This course provides an in-depth analysis of the etiology, effects, and dynamics of family violence as well as the identification of appropriate assessment and treatment strategies.
- 292 EVALUATION OF SOCIAL WORK PRACTICE (3). Provides the student with a knowledge of the purposes of evaluation research, the technology and the methodology necessary to evaluate social work practice.
- 300 SEMINAR: STUDIES IN SOCIAL WORK PROCESS (3). The completion of a substantial study, professional in content and manner of presentation, in which the student examines some service problem or area of practice in which there has been personal engagement, such as in field practice, and for which personal learning, experience, and practice can be applied in support of findings.
- 320 INDIVIDUALIZED FIELD PRACTICUM (3, 3). A field placement allowing a student to take an extra practicum or extend an existing practicum when such is recommended. May repeat once.
- 330 SEMINAR IN HUMAN BEHAVIOR AND SOCIAL ENVIRONMENT (3, 3). Special seminar on varying topics of Human Behavior; taught on a temporary basis. May repeat once.
- 340 SEMINAR IN DIRECT PRACTICE (3, 3). Special seminar on varying topics of Direct Social Work Practice; taught on a temporary basis. May repeat once.
- 350 SEMINAR IN SPECIALIZED PRACTICE (3, 3). Special seminar on varying topics of Practice which might be direct or indirect or which might cover multiple fields; taught on a temporary basis. May repeat once.
- 360 SEMINAR IN SOCIAL POLICY (3, 3). Special seminar on varying Social Policy issues; taught on a temporary basis. May repeat once.
- 370 SEMINAR IN INDIRECT PRACTICE (3, 3). Special seminar on varying topics of Indirect Social Work Practice; taught on a temporary basis. May repeat once.
- 380 SPECIAL TOPICS IN SOCIAL WORK (1-6). Directed individual study in the general field of Social Work or special classes in the general field taught on a temporary basis. May repeat until maximum credit earned.
- 381 SPECIAL TOPICS IN HUMAN BEHAVIOR AND SOCIAL ENVIRONMENT (1-6). Directed individual study in Human Behavior or special classes in Human Behavior taught on a temporary basis. May repeat until maximum credit earned.
- 382 SPECIAL TOPICS IN PRACTICE (1-6). Directed individual study in the broad field of Social Work Practice or special classes in Practice taught on a temporary basis. May repeat until maximum credit earned.
- 383 SPECIAL TOPICS IN POLICY (1-6). Directed individual study in social policy or special classes in policy taught on a temporary basis. May repeat until maximum credit earned.

- 384 SPECIAL TOPICS IN RESEARCH (1-6). Directed individual study on a research topic or special classes in research taught on a temporary basis. May repeat until maximum credit earned.
- 385 SPECIAL TOPICS IN AGING (1-6). Directed individual study in Aging or special classes in the Aging Specialization taught on a temporary basis. May repeat until maximum credit earned.
- 386 SPECIAL TOPICS IN FAMILY AND CHILDREN (1-6). Directed individual study in Family and Children or special classes in the Family and Children Specialization taught on a temporary basis. May repeat until maximum credit earned.
- 387 SPECIAL TOPICS IN HEALTH (1-6). Directed individual study in Health or special classes in the Health Specialization taught on a temporary basis. May repeat until maximum credit earned.
- 388 SPECIAL TOPICS IN MENTAL HEALTH (1-6). Directed individual study in Mental Health or special classes in the Mental Health Specialization taught on a temporary basis. May repeat until maximum credit earned.
- 389 SPECIAL TOPICS IN PUBLIC WELFARE ADMINISTRATION (1-6). Directed individual study in Public Welfare or special classes in the Public Welfare Administration Specialization taught on a temporary basis. May repeat until maximum credit earned.
- 390 SEMINAR IN RESEARCH (3, 3). Special seminar on varying topics of research; taught on a temporary basis. May repeat once.

DEPARTMENT OF SOCIOLOGY

JOHN D. KASARDA, *Chairman*

Professors

HOWARD E. ALDRICH	(42)	Formal Organizations, Human Ecology, Inequality
GLEN H. ELDER	(46)	Life Course, Human Development, Family
ARNE L. KALLEBERG	(49)	Work, Economy and Society
JOHN D. KASARDA	(32)	Human Ecology, Urban Sociology, Public Policy
HENRY A. LANDSBERGER	(11)	Welfare State Problems, Modernization, Social Movements
GERHARD LENSKI	(12)	Societal Evolution, Technology and Social Change, Stratification
DUNCAN MACRAE, JR.	(13)	Public Policy Analysis, Applied Sociology
ANTHONY OBERSCHALL	(39)	Social Movements, Social Change, Development
JOHN SHELTON REED	(27)	Regional, Survey Methods, Public Opinion
RONALD R. RINDFUSS	(34)	Demography, Social Epidemiology
RICHARD L. SIMPSON	(18)	Occupations, Work, Organizations
J. RICHARD UDRY	(19)	Demography, Family
ROBERT N. WILSON	(24)	Health, Art and Literature

Associate Professors

KENNETH A. BOLLEN	(47)	Development, Statistics
CRAIG J. CALHOUN	(35)	Theory, Historical, Political
M. RICHARD CRAMER	(2)	Race Relations, Social Psychology
SHERRYL KLEINMAN	(38)	Social Psychology, Symbolic Interaction, Field Research Methods
RACHEL A. ROSENFELD	(40)	Social Stratification, Education, Quantitative Methodology
PETER UHLENBERG	(20)	Demography, Family, Aging
JAMES A. WIGGINS	(22)	Social Psychology, Family, Sport

Assistant Professors

PETER BEARMAN	(50)	Comparative and Historical, Social Theory, Networks
BARBARA ENTWISLE	(48)	Demography, Methods, Family
ERIC LEIFER	(45)	Economic Sociology, Organizations, Social Action
FRANCOIS D. NIELSEN	(43)	Ethnicity, Human Ecology, Mathematical Sociology
MICHAEL J. POWELL	(44)	Law and Society, Social Theory

Lecturer

BARBARA STENROSS	(37)	Law, Economic Development, Social Change
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Professors Emeriti

BRUCE K. ECKLAND
 AMOS H. HAWLEY
 GUY BENTON JOHNSON
 HARVEY L. SMITH
 EVERETT K. WILSON

The Department offers the Master of Arts and Doctor of Philosophy degrees in Sociology. Students receive training that will equip them for careers in both teaching and research. All sociology students take basic work in sociological theory, research methods and statistics, and substantive areas. The program emphasizes balanced training and the integration of theory, method, and substantive knowledge. Detailed information on graduate degree procedures is given in information brochures available from the Department. For further information, including information about financial aid available to students, inquiries should be directed to the Department's Director of Graduate Studies.

The Department's main concentration of faculty research interest and graduate training are in comparative social organization and societal change, demography and human ecology, social psychology, research methods and social statistics, labor force, stratification and complex organizations.

A large proportion of first-year, as well as more advanced, students receive financial assistance. Sources of aid include: Teaching Assistantships, Research Assistantships, and a few nonservice fellowships.

The Department works closely with the Carolina Population Center, the Institute for Research in Social Science and with the University Computation Center. The Institute maintains a Statistical Laboratory with modern processing equipment for training and research. Computer programming assistance, consultation, and computing services are available without charge for student research. The Department sponsors and edits *Social Forces*, a national sociological journal.

Courses for Graduates and Advanced Undergraduates

- 100 AMERICAN SOCIETY (3). Introduction to institutional sociology with special emphasis on the social organization and culture of the United States. The society as a whole and its different subgroups and institutional spheres are analyzed. Simpson; staff.
- 101 HUMAN SOCIETIES (3). Introduction to comparative sociology. The major types of society that have existed or now exist are analyzed, together with major patterns of social change. Lenski; staff.
- 102 SOCIAL INTERACTION (3). The individual in society. An examination of how people conduct their interactions with others in different kinds of social relationships. Emphasis on the social psychological causes and consequences of such conduct. Wiggins; staff.
- 110 FORMAL ORGANIZATIONS AND BUREAUCRACY (3). Varieties of organizational forms, their structures and processes; creation, persistence, transformation, and demise

- of organizational forms; role of organizations in contemporary society. Aldrich, Leifer, Powell, Simpson.
- 111 SOCIAL MOVEMENTS AND COLLECTIVE BEHAVIOR (3). Study of nonroutine collective actions such as demonstrations, strikes, riots, social movements and revolutions, with an emphasis on recent and contemporary movements. Landsberger, Oberschall, Nielsen, Bearman.
- 112 SOCIAL STRATIFICATION (3). Analysis of social structure and stratification in terms of class, status, prestige, and rank. Attention to social roles of elites, professionals, the middle class, the working class and to comparative topics. Aldrich, Rosenfeld, Lenski.
- 113 SOCIAL ORGANIZATION IN ECOLOGICAL PERSPECTIVE (3). Examination of how human groups become functionally organized in adapting to changing environmental opportunities and constraints. Special attention is given to the interrelationships among population, social system, technology and environment. Kasarda, Nielsen.
- 114 THE CITY AND URBANIZATION (3). The city as a social, spatial, and political-economic phenomenon in the modern world. Analysis of urban demographic trends, spatial characteristics and economic functions. Substantive topics include segregation, social turmoil, unemployment, fiscal problems, suburbanization and urban public policy. Kasarda.
- 115 ECONOMY AND SOCIETY (3). Examination of the structure and operation of institutions where economy and society intersect and interact, such as education, industrial organization, on-the-job training, labor markets, and professional associations. Emphasis on the contemporary U.S., with selected comparisons to Western Europe and Japan. Oberschall, Calhoun, Leifer.
- 120 THE STATE AND SOCIETY (3). Analysis of the reciprocal influences of state and social organizations upon each other; the social bases of political authority and stability, of revolution and counter-revolution. Calhoun.
- 121 RELIGION AND SOCIETY (Religion 190) (3). Sociological analysis of group beliefs and practices—both traditionally religious and secular—through which fundamental life experiences are given coherence and meaning. Powell, Reed.
- 122 SOCIOLOGY OF HEALTH (3). A sociological analysis of (1) the social processes affecting conditions of health and disease and (2) the cluster of social relationships and organizations that comprise the institution of medicine. Wilson.
- 123 EDUCATION AND STRATIFICATION (3). A study of theory and research on the educational institution, with emphasis upon the multiple and changing effects of formal education in industrial societies. Staff.
- 124 LAW AND SOCIETY (3). An analysis of the interconnections between law and society. Topics may include definitions and origins of law, legal institutions, dispute resolution, legal impact, and the role of law in social change. Powell.
- 125 FAMILY AND SOCIETY (3). Comparative analysis of kinship systems and family relations. Courtship, marriage, and parent-child relationships viewed within a life-cycle framework. Rindfuss, Udry, Uhlenberg, Wiggins.
- 126 LITERATURE AND SOCIETY (3). An examination of selected modern literary works as social process and aesthetic object. Topics discussed include literary creativity, the writer's social role, and social psychological approaches to the contents of literature. Wilson.
- 127 THE LABOR FORCE (3). Supply and characteristics of labor and of jobs, including industrial and occupational changes, education and mobility of labor, and changing demography of the workforce. Entwisle, Kalleberg, Kasarda, Rosenfeld.
- 130 SOCIOLOGICAL CRIMINOLOGY (3). An analysis of the social construction of crime and delinquency as legal categories, perspectives on causation, and the consequences of variable social reactions to crime and delinquency. Staff.
- 131 AGING (3). The process of aging from birth to death, with a concentration on the later years of life, examined from a broad perspective. Topics include individual change

- over the life-course, the social context of aging, and the aging of American society. Uhlenberg.
- 132 POPULATION PROBLEMS (Genetics 186) (3). Social and economic causes of population structure and change. Illustrations drawn from developing countries and the less developed regions and sections of the United States. Rindfuss, Uhlenberg.
- 133 SCIENCE AND POLICY (Political Science 179) (3). Problems of using expert knowledge in democratic policy formation. Questions of communication within scientific disciplines; scientists' values; and use of scientific information and personnel in decision-making. MacRae.
- 134 RACE AND SOCIAL POLICY (3). Explores the links between race relations, economic and social subordination of racial groups, and governmental policy for the U.S. and other multiracial societies. Emphasis on reciprocal relations of legal and governmental institutions and other social institutions. Staff.
- 140 SOCIALIZATION (3). Examines how persons become members of groups, communities and organizations. Emphasis on general social psychological principles and concepts of socialization. Kleinman.
- 141 SOCIAL DEVIANCE (3). Examines how people initiate, continue, and end stigmatized behavior; social construction of deviant categories, identities, and careers; the social psychology of labelling deviants. Kleinman.
- 142 OPINIONS, ATTITUDES, AND VALUES (3). The interrelations of ideology, information, attitudes, and behavior. Use of sample surveys in social psychological research and polling. Cramer. Reed.
- 143 CONFLICT AND BARGAINING (3). Conflict and conflict-resolution behavior. Application to labor-management relations, family, sports, community politics, international relations. Cramer, Oberschall, Wiggins.
- 144 SOCIAL PROCESS IN EDUCATION (3). Examines social influences (e.g., community, school, family, peers) affecting academic performance and attitudes, with particular emphasis on the disadvantaged and the dropout. Staff.
- 150 THEORY AND PROBLEMS OF DEVELOPING SOCIETIES (3). Theories concerning the development process (motivational vs. institutional, economic vs. political and social development; similarity of sequential stages and outcomes) will be related to policy problems facing the developing nations. Landsberger, Bollen.
- 151 WESTERN EUROPEAN SOCIETIES (3). Changes in the social structures of the United Kingdom, West Germany, and France; the growth of the welfare state; the handling of issues such as industrial relations, health, education, income maintenance, environmental protection, and urbanization. Landsberger, Oberschall.
- 152 SOVIET SOCIETY (3). Development of social structure in the USSR since 1917. Study of contemporary social groups and institutions, and of the implications of the Soviet experience for theories of modernization. Staff.
- 153 SOCIAL CHANGE IN LATIN AMERICA (3). Introduction to Latin American ideologies and values; economic and demographic changes; major pressure groups (old elites, entrepreneurs, peasants and working classes, military and intellectuals); and relations with the United States. Landsberger.
- 154 AFRICAN SOCIETY (3). Process of change and modernization in Black Africa, especially since World War II. Topics include the European penetration, nationalist movements, immigration and urbanization, economic changes, new forms of stratification, civil strife, and problems of development and state formation. Case studies of selected countries. Oberschall.
- 155 SOCIETY AND CHANGE IN MODERN INDIA (3). A range of developmental issues: population change, agrarian reform, labor-intensive productive technology, income distribution, status of women, urbanization, unemployment and underemployment. Careful attention to Indian data. Focus on explanations of slow rates of improvement. Not offered 1988-89.

- 158 COMPARATIVE MINORITY RELATIONS (3). A comparative analysis of dominant-minority group relations. Includes both cultural and racial minorities. Cramer, Nielsen.
- 159 REGIONALISM IN THE MODERN WORLD (3). Overview of "regional sociology" as practiced at the University of North Carolina in the 1930s and 1940s. Contemporary approaches to the sociological study of regions: center and periphery, ethnic/nationalist, cultural geography. Special attention to the United States and the American South, some comparative material. Reed.
- 160 CONTEMPORARY SOCIAL THEORY (3). Prerequisite, Sociology 50. Analysis of current problems in general social theory; action and structure, justice and equity, social change and reproduction. Contrast and evaluation of leading approaches to solutions. Calhoun.
- 171 URBAN PUBLIC POLICY (PUPA 171) (3). Defining and clarifying urban concerns and policies; emphasis on programs to revitalize cities. Issues include migration of people and jobs, housing, unemployment, poverty, crime, fiscal strain, linkages among settlement patterns, economic development strategies, energy and environmental objectives. Kasarda.
- 175 METHODS FOR POLICY ANALYSIS AND EVALUATION (Political Science 175) (3). Introduction to selected techniques such as multiple regression, decision theory, research design, experiments, and quasi-experiments, and program evaluation, as well as policy-related models. MacRae.

Courses for Graduates

- 200 HISTORY OF SOCIAL THOUGHT (3). Prerequisite, graduate standing in Sociology, or written permission of instructor. Historic social ideas of western culture considered against a background of general cultural analysis in terms of systematic theory. Required of all graduate degree candidates in Sociology. Calhoun, Powell.
- 201 CONSTRUCTION OF SOCIAL THEORIES AND MODELS (3). Introduction to principles of theorizing, specification of models, and elementary aspects of empirical testing. Survey of diverse research designs and modes of assembling empirical data relevant to a theory. Nielsen.
- 202 MAJOR SOCIOLOGICAL THEORIES (2-3). Examination of selected writing, concepts and issues of some major sociological theory or theoretical approach. Staff.
- 203 CURRENT ISSUES IN SOCIAL THEORY (3). An examination of selected recent work of general significance in sociology. Themes will vary. Calhoun; staff.
- 207 MEASUREMENT AND DATA COLLECTION (Political Science 207) (3). Provides an introduction to measurement theory and a review of various methods of data-gathering. Gaining experience with a variety of techniques of measurement and preparing a pretested research proposal are required for all students. Wiggins.
- 208 STATISTICS FOR SOCIOLOGISTS (3). Provides an introduction to probability theory, descriptive statistics, inferential statistics, and the algebra of expectations. Emphasis is on elements useful to research sociologists including bivariate regression and correlation. Reed, Rosenfeld, Nielson.
- 209 STRUCTURAL EQUATION MODELS (3). Prerequisite, Sociology 208 and permission of instructor. Specification, identification, and estimation of structural models. Attention to regression analysis and its extensions, multiequation modeling, and models with unobserved variables and measurement error. Exploratory and confirmatory factor analysis. Nielsen, Bollen, Leifer.
- 211 ANALYSIS OF CATEGORICAL DATA (3). Prerequisite, permission of instructor. Introduction to techniques and programs for analyzing categorical variables and non-linear models. Special attention is given to decomposition of complex contingency tables, discriminant function analysis. Markov chains, and nonmetric multidimensional scaling. Staff.

- 212 DEMOGRAPHY: THEORY, SUBSTANCE, TECHNIQUES, PART I (3). A basic introduction to the discipline of demography. Materials covered include: population history; data sources; mortality and fertility trends and differentials and techniques of analysis. Rindfuss, Uhlenberg, Entwisle.
- 213 DEMOGRAPHY: THEORY, SUBSTANCE, TECHNIQUES, PART II (3). A continuation of Sociology 212. Materials covered include: population growth, stable population theory; migration and distribution; population policy; population estimates and projections. Rindfuss, Uhlenberg, Entwisle.
- 214 MARX AND MARXISM (2). Brief exposition and evaluation of Marx's theory of human nature, societal change and evolution, class, the state, family, and other institutions. Summary of dependency theory and critical theory. Calhoun, Landsberger.
- 215 EVOLUTIONARY THEORY (3). Introduction to the new evolutionary theory and associated research. Lenski.
- 216 STRUCTURAL-FUNCTIONALISM (3). Fundamentals of structural-functional analysis. Merits and defects of this mode of conceptualizing social process. Survey of empirical research based on this approach. Wilson.
- 217 SOCIAL PSYCHOLOGICAL THEORY (3). Introduction to basic theoretical approaches in social psychology, including social learning, social exchange, symbolic interaction, cognitive consistency, and affect control. Kleinman, Wiggins.
- 218 HUMAN ECOLOGY (3). Examination of how human populations adapt to their environments. Emphasis on linkages among population, organization, environment, and technology. Research applications of this approach to urban communities and organizations. Kasarda, Nielsen.
- 223 SOCIAL ATTITUDES (3). Basic theories and methods in attitude research with special attention to attitude dynamics and social relations. Reed.
- 229 SOCIAL STRUCTURE AND PERSONALITY (3). The generic processes by which individuals become members of a society, with emphasis on the influence of social structure on socialization and the patterning of personality. Kleinman, Elder.
- 230 SOCIAL STRATIFICATION (3). Prerequisite, Sociology 120 or equivalent. Analysis of major theories of and approaches to the study of social inequality, with attention to how the various theories and approaches are operationalized. Focus on recent research in labor markets and world-wide inequality. Rosenfeld.
- 231 SOCIOLOGY OF GENDER (3). Reviews theory on variation in men's and women's gender roles, with emphasis on industrialized societies and women's roles. Rosenfeld, Udry.
- 234 SOCIAL MOVEMENTS (3). The structure and dynamics of social movements and their societal environment, with special reference to socio-political movements of minority and low status groups in industrialized and third world societies. Landsberger, Nielsen, Oberschall.
- 245 SOCIOLOGY OF ORGANIZATIONS (3). Prerequisite, permission of instructor. Structural features of organizations. Behavior in organizations. Organizational career patterns. Comparative analysis of structure, behavior, and careers in different types of organizations. Interorganization and organization-environment relations. Aldrich, Simpson.
- 246 OCCUPATIONS AND WORK (3). The changing occupational system. Structural types of labor markets. Occupational organization, role sets, power relations, careers, and satisfaction in different types of labor markets and occupations. Simpson, Kalleberg.
- 253 EXPERIMENTAL DESIGN IN SOCIOLOGY (3). Prerequisite, permission of instructor. Statistical aspects of experimental designs with emphasis on applied problems involved in executing a statistically sound design. *On demand.* Staff.
- 254 SURVEY SAMPLING (3). Prerequisite, permission of instructor. The different sampling techniques are discussed. Major emphasis on planning of large scale sample surveys rather than on statistical theory. *On demand.* Staff.

- 260 HEALTH ORGANIZATIONS AND OCCUPATIONS (3). Considers various treatment settings, socialization and job performance of health workers, patienthood, the relation between organizational structure and effectiveness, and professional self-regulation. Wilson.
- 261 SOCIAL EPIDEMIOLOGY OF CHRONIC AND MENTAL DISEASE (3). Considers differential distribution of health states in population groups, assessment of social psychological precursors of illness, etiology of chronic physical and psychological disorders, and implications of differential risk for preventive strategies in social medicine. Wilson.
- 262 COMMUNITY ORGANIZATION AND HEALTH CARE DELIVERY (3). Study of community health care delivery systems, to include the supply and distribution and medical personnel and facilities, mechanisms of health care financing, role of the consumer in policy formulation, and community power and analysis. Wilson.
- 263 SOCIAL GERONTOLOGY (3). Prerequisite, permission of instructor. The study of the aged in our society. Uhlenberg.
- 269 EXPERIMENTAL ANALYSIS OF INTERPERSONAL BEHAVIOR (3). Analysis of social behavior from the perspective of exchange theory and experimental methods. Evaluation of laboratory and field experiments pertaining to interaction, power, conformity, cooperation, aggression, delinquency, education. Design and pretest of experiments. Wiggins.
- 270 THE LIFE COURSE (3). Provides an intense introduction to the life course as a theoretical orientation and methodology (logic of inquiry). Elder.
- 274 SEMINAR IN URBAN SOCIOLOGY (3). Theory and research in the study of the location and growth of urban areas, the effect urban areas have upon behavior, and the study of social behavior in different urban subareas. Each member of the seminar will complete a project interrelating theory and research. Kasarda, Bearman.
- 287 MIGRATION AND POPULATION DISTRIBUTION (3). Prerequisite, Sociology 186. Treats migration trends, patterns, and differentials and their effects on population distribution in continental and regional areas. Attention is given to theoretical and methodological problems in the study of population movement. *On demand.* Uhlenberg.
- 289 SOCIO-ECONOMIC FACTORS IN FERTILITY (3). Prerequisite, Sociology 186. Fertility differentials by social and economic factors, changes therein over time, the manner in which these factors affect fertility and the implications thereof for fertility control programs will be studied. *On demand.* Rindfuss, Entwisle.
- 300 TRAINING PROGRAM SEMINARS (1). Continuing seminars in selected topics. Staff.
- 301 READING AND RESEARCH (3 each semester). Registration permission of instructor.
- 302 Advanced reading. Library research or field research on a selected topic under guidance of the instructor. Staff.
- 307 SEMINAR ON POLICY ANALYSIS (Political Science 307) (3). Common normative, political, and behavior aspects of policy choice in diverse fields; e.g., urban, education, health, welfare, population, and foreign policy. Public policies may modify or replace the market. MacRae.
- 308 SEMINAR IN COMPARATIVE AND HISTORICAL SOCIOLOGY (3). Prerequisite, graduate standing in Sociology or permission of the instructor. Examination of issues involved in societal comparison, with an emphasis upon comparative and historical analysis of substantive issues at the macro-societal level. Special attention will be given to methodological problems. Landsberger, Calhoun; staff.
- 309 SEMINAR IN THE ANALYSIS OF SOCIALIST SOCIAL SYSTEMS (3). An analysis of special problems in the study of societies governed by a communist party. Stress is on major social institutions and on the course and sources of structural change. Lenski.
- 311 SEMINAR IN POLITICAL SOCIOLOGY (Political Science 311) (3). The relationships between social structure and political decisions. Regimes and social structure;

- bureaucracies, political associations, and professions; science and politics; closed and open politics; political movements and change. Calhoun, MacRae.
- 312 SEMINAR ON SOCIAL NETWORKS (3). Prerequisite, second year graduate standing. Anthropological, social structure, and sociometric approaches to the analysis of interaction networks. Small groups, communities, and interorganizational relations. *On demand*. Calhoun, Bearman.
- 314 SEMINAR IN SOCIAL CONTROL AND DEVIANCE (3). Registration by permission of the instructor. The relation of social norms to conforming and deviant behavior. Types of social and personal controls. Theoretical and research problems are reviewed. *On demand*. Staff.
- 315 READING AND RESEARCH IN METHODOLOGY (3 each semester). Registration by permission of the instructor. Special work on selected problems of research methodology. Staff.
- 320 SYSTEMATIC METHODS OF QUALITATIVE RESEARCH (3). Course designed to teach methods of data collection and analysis for qualitative research. Kleinman.
- 321 FIELD RESEARCH (3 each semester). Registration by permission of the instructor.
- 326 SEMINAR IN SELECTED TOPICS (1-3). Course description for particular semester is available in Department Office. Registration by permission of the instructor. Staff.
- 329 SEMINAR IN SOCIALIZATION AND GROUP PROCESS (3). Prerequisite, permission of instructor. Analysis of theoretical issues and empirical research relevant to socialization. Special emphasis upon group process effects on the evolution of the social self, the "fit" between personality and role, and other issues. Kleinman.
- 333 SEMINAR IN MARRIAGE AND THE FAMILY (3). *On demand*. Uhlenberg.
- 380 SEMINAR ON THE TEACHING OF SOCIOLOGY (3). Prerequisite, doctoral candidacy in Sociology or permission of instructor. Examines teacher's role and teaching process; planning a course, constructing syllabi, testing for teaching or grading, evaluating teacher performance, needs of different student populations. Cramer, Aldrich.
- 393 MASTER'S THESIS (3 or more). Individual research in a selected field under the direction of a member of the Department. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). Individual research in a selected field under the direction of a member of the Department. Staff.
- 400 GENERAL REGISTRATION (0).

DIVISION OF SPEECH AND HEARING SCIENCES

THOMAS L. LAYTON, *Director*

Professors

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| ROBERT W. PETERS | (9) | Psychoacoustics, Speech Perception, Stuttering |
| DAVID E. YODER | (47) | Child Language Disorders |

Associate Professors

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|--------------------|------|--|
| THOMAS L. LAYTON | (25) | Language, Language/Learning Disabilities, Autism |
| ROBERT B. MAHAFFEY | (7) | Aphasia; Anatomy, Physiology and Neurology of Speech and Hearing |
| PATRICIA B. PORTER | (31) | Communication Disorders of the Severely/ Profoundly and Multiply Handicapped |

Assistant Professor

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| ELIZABETH CRAIS | (48) | Child Language Development, Language Disorders, Language/Learning Disabilities |
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Clinical Professor

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| F. CALVIN KNOBELOCH | (5) | Developmental Aspects of Language, Speech, and Hearing; Disorders of Language, Speech and Hearing in Children |
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Clinical Associate Professors

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| RODGER DALSTON | (39) | Speech/Language Disorders in Patients with Cranio-Facial Anomalies |
| JOSEPH HALL | (53) | Audiology, Chief of Audiology, Hearing and Speech Center, NCMH |
| STANLEY MARTINKOSKY | (52) | Alaryngeal speech and aphasia, Director and Chief of Speech Pathology, Hearing and Speech Center, NCMH |
| W. GRADY THOMAS | (11) | Audiology, Auditory Physiology and Psychoacoustics |

Clinical Assistant Professors

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|-----------------|------|--|
| THOMAS CAMERON | (54) | Clinical Audiology; Children and Adults, Clinical Supervision |
| MELODY HARRISON | (40) | Language Development, Language and Communication Disorders of the Hearing Impaired, American Sign Language |
| CELIA HOOPER | (55) | Director, Division of Speech and Hearing Sciences Clinic, Voice, Aphasia, Supervision |

BOBBIE LUBKER	(51)	Language Development, Epidemiology of Communication Disorders
JOANNE ROBERTS	(50)	Language intervention in naturalistic settings, otitis media, children's phonological development

Clinical Instructors

ELIZABETH D. BALLARD	(48)	Clinical Supervision, Language Disabilities
HOLLY HARRIS	(41)	Language, Articulation, Voice and Stuttering Disorders in Children
JANE LUDINGTON	(56)	Speech and language, aural rehabilitation
KATHLEEN McDONALD	(57)	Aural rehab, American sign language
SHARON RINGWALT	(42)	Language Development, Language Programming for Severely and Profoundly Handicapped, Oral-motor Skills, Articulation, Aphasia
VALERIE STAHL	(58)	Language development and disorders, learning disabilities, information processing, phonology

Adjunct Associate Professor

ROBERT G. PAUL	(8)	Clinical Audiology
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The Division of Speech and Hearing Sciences in the Department of Medical Allied Health Professions, School of Medicine, provides academic and professional training for speech and language pathologists and audiologists at the master's level. The study of speech and hearing concerns knowledge and practices pertaining to both normal and abnormal speech, hearing and language. The Speech and Hearing Curriculum provides an environment where learning can be based on laboratory, both clinical and experimental, experiences. Four major tracks of study are possible within the master's curriculum: Audiology, Speech Pathology, Language and Language Disorders and Speech and Hearing Sciences. The program is interdisciplinary in that personnel and clinical and research activities of other University departments and institutions as well as the Division of Speech and Hearing Sciences are involved in the educational program.

The entrance, academic and residence requirements for the master's degree correspond to those of the Graduate School. All students following professional tracks are prepared to meet licensure and certification requirements necessary for the practice of speech and language pathology and/or audiology. More complete information describing the graduate training can be obtained by writing to the Division of Speech and Hearing Sciences, Department of Medical Allied Health Professions, School of Medicine.

Courses for Graduates and Advanced Undergraduates

- 100 MANUAL COMMUNICATION I A, B and C (1). May be repeated for credit. Basic course in finger spelling and language of signs. Special emphasis placed on excessive and receptive use of manual communication, various systems employed (SEE¹, SEE², ASL, LVE), historical and philosophical aspect of manual communication as a viable language. *As demand warrants.* Staff.
- 101 MANUAL COMMUNICATION II A, B and C (1). May be repeated for credit. Advanced course in finger spelling and sign language. Emphasis will be placed on developing skills in both expressive and reverse interpreting. A major emphasis will be in the syntax of AMESLAN. *As demand warrants.* Staff.
- 120 MANUAL COMMUNICATIONS III (2). Advanced course in finger spelling and sign language. Emphasis will be placed on developing skills in both expressive and reverse interpreting, various systems employed, historical and philosophical aspects of manual communication as a viable language. *Fall.* Harrison.
- 121 MANUAL COMMUNICATIONS IV (2). Emphasis will be placed on developing advanced skill in both expressive and reverse interpreting, various systems employed, historical and philosophical aspects of manual communication as a viable language. *Spring.* Harrison.
- 123 AUDIOLOGY I (Education 243) (3). Theory and practice of the measurement of hearing, causative factors in hearing loss, evaluation of audiometric results, demonstration and participation in clinical program in audiology. *Fall.* Staff.
- 130 INTRODUCTION TO PHONETICS (Speech 158) (3). A detailed study of the International Phonetic Alphabet with emphasis on the sound system of American English. Application of Phonetics to problems of pronunciation and articulation. *Fall.* Mahaffey.
- 140 ADVANCED PHONETICS (Speech 157) (3). *Spring.* Peters.
- 162 LANGUAGE ACQUISITION (3). Theories of language learning; stages of language development; and relevant literature, including semantics, syntax, pragmatic, nonverbal, dialects and psycholinguistics. *Fall.* Layton.
- 163 LANGUAGE ASSESSMENT AND MANAGEMENT (3). Prerequisite, SPHS 162. A two course offering in analysis and measurement (assessment), modification of behaviors, education and re-educative processes (all modalities) and breakdown of process in language disorders. *Fall.* Crais.
- 170 ANATOMY AND PHYSIOLOGY OF THE SPEECH AND HEARING MECHANISMS (Speech 150) (3). Anatomy and physiology of the speech producing and aural mechanisms. *Fall.* Mahaffey.
- 180 HABILITATION AND REHABILITATION OF THE HEARING IMPAIRED (3). Prerequisite, SPHS 123 or permission of instructor. Course deals with speechreading, auditory training, speech production, sensory processing, communication methodologies, clinical organization, educational placement and other current issues relevant to the hearing impaired. *Spring.* Harrison.
- 183 INTRODUCTION TO COMMUNICATION DISORDERS (Education 143) (3). *Fall, spring, summer.* Lubker.
- 184 FOUNDATIONS OF PHONOLOGICAL AND VOICE DEVIATIONS (Education 144) (3). Prerequisite, SPHS 130 and SPHS 170. One component of a two course offering in evaluation, analysis and measurement (assessment), modification of behaviors, breakdown of processes in speech disorders with emphasis on voice and articulation disorders. *Spring.* Crais.
- 185 INTRODUCTION TO THE STUDY OF COMMUNICATIVE DISORDERS (3). Basic processes and disorders of speech, hearing and language. *As demand warrants.* Staff.
- 186 NONVERBAL COMMUNICATION FOR THE HANDICAPPED (3). Prerequisite, SPHS 162, SPHS 194. Discussion of the various nonverbal communication techniques available to the mentally and motor-impaired handicapped individual. *Spring.* Porter.

- 194 FOUNDATIONS OF NEUROLOGICAL AND FLUENCY DEVIATIONS (Education 244) (3). Prerequisites, SPHS 130, SPHS 170. Second component of a two-course offering as described under 184 with emphasis on stuttering and organic disorders of speech. *As demand warrants*. Staff.

Courses for Graduates

- 201 INTRODUCTION TO RESEARCH IN SPEECH AND HEARING. (3). Prerequisite, Introductory Statistics Course. Experimental and descriptive research designs in speech and hearing sciences including criteria for the evaluation of research articles. *Spring*. Peters.
- 202 STATISTICAL APPLICATIONS IN SPEECH AND HEARING SCIENCES (3). Study and application of parametric and non-parametric methods to research in speech, hearing and language. Particular attention given to statistical treatments appropriate for clinical research. *Fall*. Peters.
- 203 METHODS OF TEACHING SPEECH TO THE HEARING IMPAIRED (2). Prerequisite, SPHS 180. Course is to review general principles of speech development, the underlying problems in speech acquisition by moderate to profoundly hearing-impaired individuals, deviant spoken language, practical and theoretical aspects of evaluating and establishing speech. *Fall*. Harrison.
- 204 ADVANCED REHABILITATION OF THE HEARING IMPAIRED (2). Prerequisite, SPHS 180 or equivalent. This course is designed to cover recent technological advances in the area of instrumentation designed for the hearing impaired. Additionally, communication strategies for the hearing impaired population will be covered. Techniques for facilitating listening skills in the hearing impaired through the use of auditory, visual and contextual cues. Use of amplification will also be explored. *Spring*. Harrison.
- 206 SPEECH PROCESSES (3). The nature of speaking behaviors, respiration, phonation, resonance, articulation and non-auditory feedback mechanisms and acoustic phonetics. *As demand warrants*. Staff.
- 207 LANGUAGE PROCESSES (2). The study of speech processing with reference to input, storage, retrieval, transformation, output, chunking and analysis by synthesis and synthetic speech and memory. *As demand warrants*. Staff.
- 221 BIOLOGICAL PROCESSES IN HEARING (2). Prerequisite, SPHS 123 or equivalent. Neuroanatomy and neurophysiology of the auditory system, peripheral and central, dynamics of the cochlea, electrophysiological data in various levels of the auditory system. *Fall*. Staff.
- 224 AUDIOLOGY II (3). Prerequisite, SPHS 123 or its equivalent. Emphasis on special tests, diagnostic evaluations, use of hearing aids, hearing conservation and instrumentation. Demonstration and participation in clinical program in audiology. *As demand warrants*. Staff.
- 225 DISORDERS OF AUDITION (3). Prerequisite, SPHS 123 or equivalent. Breakdown of processes in audition and their management. *Fall*. Cameron.
- 241 BIOLOGICAL PROCESSES IN LANGUAGE AND SPEECH (3). Neurophysiology anatomy, speech processes with reference to both normal and abnormal, neuropathologies, and linguistic, psychological and neurological integration of speech. *As demand warrants*. Staff.
- 264 LANGUAGE IMPAIRMENTS OF CHILDREN (3). Prerequisites, SPHS 162, SPHS 163. Second part of two course offering described in 163. *Spring*. Yoder.
- 281 PSYCHOLOGICAL ACOUSTICS (3). Prerequisites, SPHS 130, SPHS 140. A course designed to provide knowledge in auditory perception as a background for understanding processes of assessment and treatment of persons with clinical speech and hearing problems. Auditory perception is broadly interpreted to include psychological and physiological acoustics, physical acoustics, speech auditory pattern and object perception and methods to depict auditory phenomena. *As demand warrants*. Staff.

- 282 SPEECH SCIENCE (3). Speech analysis, synthesis, perception, observable phenomena of speech behaviors and models and procedures utilized in the understanding of speech behaviors. *As demand warrants*. Staff.
- 302 PROBLEMS IN SPEECH AND HEARING SCIENCES (1-3). May be repeated for credit. *Fall, spring and summer*. Staff.
- 303 CLINICAL PRACTICUM OBSERVATION IN SPEECH PATHOLOGY (1-3). Prerequisite, SPHS 185 or equivalent. Supervised clinical observation. May be repeated for credit. *Fall, spring and summer*. Harris.
- 304 CLINICAL PRACTICUM IN SPEECH PATHOLOGY (1-3). Permission of Practicum Coordinator. Supervised clinical experience. May be repeated for credit. *Fall, spring, summer*. Harris.
- 305 CLINICAL PRACTICUM OBSERVATION IN AUDIOLOGY (1-3). Prerequisite, SPHS 185 or equivalent. Supervised observation in clinical experience. May be repeated for credit. *Fall, spring, summer*. Cameron.
- 306 CLINICAL PRACTICUM IN AUDIOLOGY (1-3). Prerequisite permission of Practicum Coordinator. Supervised clinical experience. May be repeated for credit. *Fall, spring, summer*. Cameron.
- 310 AUDIOLOGIC EVALUATION I (3). Prerequisite, SPHS 123 or equivalent. Clinical audiology techniques including speech audiometry and special auditory tests. Masking covered in depth and consolidation of clinical skills for diagnostic and rehabilitative purposes. *Fall*. Staff.
- 311 AUDIOLOGIC EVALUATION II (3). Prerequisite, SPHS 310 or equivalent. Clinical audiology techniques including special auditory tests for pseudohypoacusis and central auditory processing. Emphasis on management of the patient and the relationship between the audiologist and the physician. *Spring*. Staff.
- 312 HEARING AID CHARACTERISTICS (2). Prerequisites, SPHS 123, SPHS 180 or equivalent. Academic and practical handling of hearing aids including electroacoustic analysis, acoustic modification and basic concepts in the physical design, assessment and use of amplification for remediation of hearing loss. *Fall*. Staff.
- 313 HEARING AID FITTING AND DISPENSING (2). Prerequisite, SPHS 312 or equivalent. Academic and practical handling of hearing aids including methods for fitting the hearing aid, managing inventory and dispensing hearing aids and assistive listening devices as part of a professional practice in clinical audiology. *Spring*. Staff.
- 314 ELECTROPHYSIOLOGIC AUDIOMETRY (2). Prerequisites, SPHS 221, SPHS 310. This course explores the field of electrophysiologic responses within the auditory and vestibular systems. Auditory brainstem response (ABR), electrocochleography (ECoG), electroencephalography (EEG), and electronystagmography (ENG) will be covered. *Spring*. Staff.
- 315 AUDIOLOGY FOR SPECIAL POPULATIONS (3). Prerequisite, SPHS 123 or equivalent. Designed to give a firm understanding of pediatric audiology and language intervention strategies for hearing-impaired. Procedures for intervention and case management up to the point of mainstream educational placement. *Spring*. Cameron.
- 316 INDUSTRIAL AUDIOLOGY AND HEARING CONSERVATION (2). Prerequisite, SPHS 123 or equivalent. Military and industrial audiology and hearing conservation, including physiological and psychological factors. *Fall*. Staff.
- 317 PROFESSIONAL CONSIDERATIONS IN SPEECH AND HEARING (2). Prerequisite, SPHS 123 or equivalent. To provide the graduate major with information on establishment and operation of a professional practice. Attention to small business practices, accounting, business law, professional licensure, ethical guidelines and other topics relevant to professional practice. *Fall*. Staff.
- 321 SEMINAR IN AUDIOLOGY, (1-3). Special topics and significant literature in the field of audiology. *On demand*. Staff.

- 330 INDEPENDENT STUDY (1-6). This course gives enrolled graduate students in the Curriculum an opportunity to pursue research supervised by one or more faculty members culminating in a written report as an option to writing a thesis. *Fall, spring, and summer*. Staff.
- 341 SEMINAR IN SPEECH PATHOLOGY (3). Special topics and significant literature in the field of speech pathology. *On demand*. Staff.
- 342 APHASIA (3). Prerequisites, SPHS 170, SPHS 194. Discussion of aphasic and apraxic manifestations, diagnosis prognoses and therapy procedures; combined lectures and seminars. *Spring*. Hooper.
- 343 PHONOLOGICAL DEVIATIONS: ASSESSMENT AND MANAGEMENT (3). Prerequisites SPHS 130, SPHS 170, SPHS 184. Course deals specifically with the major diagnostic tests of articulation and the specific management programs associated with each. Thorough examination of the research supporting each test and treatment plan is included. *Fall*. Crais.
- 344 ORGANIZATION AND ADMINISTRATION OF SPEECH AND HEARING PROGRAMS (3). Historical review of organization and management models; administrative procedures associated with speech and language pathology and audiology service delivery systems; issues and implications of recent legislation. *As demand warrants*. Staff.
- 345 DIAGNOSTIC PRINCIPLES AND METHODS (3). Prerequisites, SPHS 130, SPHS 140, SPHS 163, SPHS 170, SPHS 184. Diagnostic tests and methods in speech and language pathology, including interview, counseling, and report writing procedures. *Spring*. Crais.
- 346 STUTTERING (3). Prerequisites, SPHS 170, SPHS 194. Major theories, treatment, identification and diagnosis with respect to child and adult stuttering. *Fall*. Peters.
- 347 NEUROPATHOLOGIES (3). Prerequisites, SPHS 170, SPHS 194. Multidisciplinary approach to diagnosis and treatment of childhood neuropathological disorders. *Fall*. Porter.
- 348 VOICE DISORDERS (3). Prerequisites, SPHS 130, SPHS 140, SPHS 170 and SPHS 184. Assessment and management of children and adults with voice disorders and laryngectomy. *Fall*. Hooper.
- 349 DIAGNOSIS AND CLINICAL MANAGEMENT OF PERSONS WITH ORAL-FACIAL ANOMALIES (3). Prerequisites, SPHS 130, SPHS 140, SPHS 170 and SPHS 184. In-depth analysis of the embryologic and physiologic bases of oral-facial anomalies and the team approach to assessment and habilitation. Particular emphasis placed upon the following specialties: genetics, plastic surgery, prosthodontics, orthodontics, otolaryngology and speech/language pathology. *Spring*. Dalston.
- 361 SEMINAR IN LANGUAGE AND LANGUAGE DISORDERS (1-3). May be repeated for credit. Special topics and significant literature in the field of language and language disorders. *On demand*. Layton.
- 362 LANGUAGE AND LEARNING DISORDERS (3). Prerequisite, SPHS 162 or equivalent. Course in normal and abnormal learning from a language perspective. Emphasis on evaluation and treatment from a neuro-psycholinguistic model. *Summer*. Layton.
- 381 SEMINAR IN HEARING SCIENCE (1-3). May be repeated for credit. Advanced special topics and current research in hearing science. *As demand warrants*. Staff.
- 382 SEMINAR IN SPEECH SCIENCE (1-3). May be repeated for credit. Advanced special topics and current research in speech science. *As demand warrants*. Staff.
- 383 LABORATORY IN SPEECH AND HEARING SCIENCES (1-3). May be repeated for credit. Practical experience in various areas involving laboratory usage. *Spring*. Peters. *As demand warrants*. Staff.
- 393 MASTER'S THESIS (3 or more). *Fall, spring and summer*. Staff.

DEPARTMENT OF SPEECH COMMUNICATION

MARTHA NELL HARDY, *Chairperson*

Professors

PAUL D. BRANDES	(2)	Communication Theory, Rhetoric and Public Address
MARTHA NELL HARDY	(7)	Interpretation of Literature, Directing Group Performance
BEVERLY WHITAKER LONG	(11)	Performance of Literature, Performance Criticism, Recent American Poetry
LAWRENCE B. ROSENFELD	(15)	Small Group and Interpersonal Communication, Empirical Research Methodology

Associate Professors

V. WILLIAM BALTHROP	(12)	Rhetoric and Public Address, Argumentation
CHARLES R. CONRAD	(13)	Organizational Communication, Rhetorical Theory and Criticism
J. ROBERT COX	(5)	Rhetoric and Public Address, Argumentation
HOWARD D. DOLL	(6)	Interpretation of Literature, Reader's Theatre
JAMES W. PENCE, JR.	(8)	Rhetoric and Public Address, Instructional Communication
JULIA T. WOOD	(4)	Interpersonal Communication, Gender and Communication

Assistant Professors

PAUL H. FERGUSON	(17)	Performance of Literature, Reader's Theatre, Performance Criticism
DELLA POLLOCK	(18)	Performance of Literature, Performance Theory and Criticism
CRAIG ALLEN SMITH	(14)	Political Communication

The Department of Speech Communication offers graduate work leading to the degree of Master of Arts. Areas of emphasis are four: communication studies, oral interpretation, rhetorical studies, and criticism and public discourse. The M.A. degree offers preparation for teaching positions at several levels, and for training and development, administrative, and staff positions in public and private organizations. Research and practical experience are emphasized. The thesis is a concise research task of high quality.

Requirements include satisfactory completion of thirty semester hours, mastery of a research tool, a comprehensive examination covering the student's program of study, a thesis, and an oral defense of the thesis. A minor may be selected outside the department, but the graduate program must constitute a coherent, unified totality.

Courses for Graduates and Advanced Undergraduates

- 111 THE RHETORIC OF THE SOPHISTS, PLATO AND ARISTOTLE (Classics/Comparative Literature 111) (3). Detailed study of the conceptualization of rhetoric in Greece, the sophistic movement. Plato's *Gorgias* and *Phaedrus*, and Aristotle's *Rhetoric*. *Fall*. Kennedy.
- 112 CLASSICAL, CHRISTIAN, AND POST-CLASSICAL RHETORICS (Classics/Comparative Literature 112) (3). Prerequisites, Classics/Comparative Literature/Speech Communication 111 or permission of instructor. Study of the classical tradition in rhetoric and reactions against it from the fourth century B.C. to the 18th century of the Christian era. Special attention to Cicero, Quintilian, Augustine, the humanists, Ramus, and British rhetoricians of the 18th century. *Spring*. Kennedy.
- 131 CRITICAL PERSPECTIVES TOWARD SYMBOLIC ACTION (3). This course, assuming all humans are critics, explores theories of criticism and symbolic action through readings, lecture, and practical criticism of literature, film, discourse and other symbolic acts. *Fall*. Balthrop, Conrad.
- 134 CONTEMPORARY RHETORICAL THEORIES (3). Prerequisite, Speech 51 or 61 or 63. Investigates contemporary theories of purposive symbolic behavior; focus is upon rational, psychological, and dramatistic explanations of human behavior. *Fall or spring*.
- 136 DELIBERATION AND THE DECISION-MAKING PROCESS (3). Prerequisite, Speech 35 or 53 or permission of instructor. Analyzes arguments in 20th century decisions in attempt to understand bases of "justification." Topics include a deliberation about values, the logic of prediction, and the criterion of "reasonableness" in selection of a policy alternative. *Fall or spring*.
- 138 THE RHETORIC OF LEADERSHIP (3). Prerequisite, Speech 55. Designed to examine the phenomenon of leading as a communicative function which varies according to the situations in which it is implemented. Focuses on the factors (events) which influence and are influenced by leading communication. *Fall or spring*.
- 141 READER'S THEATRE (4). Prerequisite, Speech 41 or equivalent. Preparation for and participation in oral interpretation activities in both individual and group forms. Preparation will include detailed analysis of novels, plays, and poems and their adaptation to being read aloud. *Fall or spring*.
- 143 ORAL INTERPRETATION OF POETRY (3). Prerequisite, Speech 41. Textual and dramatic approaches to the analysis and oral interpretation of narrative, lyric, dramatic, and didactic poetry of English and American poets. Emphasis on the oral reading techniques of communicating the meanings and emotions of poetry. *Fall or spring*.
- 144 ORAL INTERPRETATION OF DRAMATIC LITERATURE (3). Prerequisite, Speech 41 or English 26. A study and performance of poetic drama. The relationships between poetry and dramatic action are considered through discussions, papers, and performances. *Fall or spring*.
- 145 ORAL INTERPRETATION OF PROSE (3). Prerequisite, Speech 41. Approaches to the analysis of oral interpretation of prose, with emphasis on narrative fiction. In depth study of selected prose periods, styles, and forms, in preparation for oral presentation. *Fall or spring*.
- 150 VOICE AND ITS PRODUCTION (3). Anatomy and physiology of the speech-producing and aural mechanisms. *Fall or spring*.
- 151 TOPICS IN COMMUNICATION THEORY (3). Prerequisite, Speech 51. Designed for advanced students, course provides in-depth examination of particular theories of human communication. Course focus varies. *Fall or spring*.
- 152 INTERPERSONAL COMMUNICATION (3). Intensive study of the theory of interpersonal communication and of the ways in which communication affects individuals in relationships. *Fall or spring*.

- 153 SOCIAL DIALECTS (3). An examination of dialects in North Carolina and a survey of the scholarship on culturally disadvantaged speech. *Fall or spring.*
- 154 PERSUASION (3). Fusion of classical canons of rhetoric with contemporary persuasion theory. One day speaking in field, collecting data. Results computerized for term report. *Fall or spring.*
- 155 PSYCHOLOGY OF SPEECH (3). An investigation of psychological aspects of speech, such as oral humor, stage fright, speech snobbery, the oral lie, and the relationships between speech and personality. *Fall or spring.*
- 156 COMMUNICATION DEVELOPMENT IN CHILDREN (3). An investigation of the acquisition and development of communication in the normal child. Study of strategies that enhance communication development. *Fall or spring.*
- 157 APPLIED PHONETICS (3). Prerequisite, Speech 158 or equivalent. A study of the acoustic, articulatory, auditory and physiological aspects of the production of speech.
- 158 INTRODUCTION TO PHONETICS (3). Prerequisite, Speech 31 or equivalent. A detailed study of the International Phonetic Alphabet with emphasis on the sound system of American English. Application of Phonetics to problems of pronunciation and articulation. *Fall or spring.*
- 159 PRINCIPLES OF SPEECH CORRECTION (EDSP 143) (3). An introduction to communication disorders. *Fall or spring.*
- 161 THE AMERICAN EXPERIENCE IN RHETORIC (3). Prerequisite, Speech 61, 63, or equivalent. Examines public discourse in America from several perspectives: situations, personalities, movements, controlling ideas. Special attention to the relationship of discourse to other events. *Fall or spring.*
- 163 PRESIDENTIAL RHETORIC (3). An examination of presidential leadership and influence through the analysis of significant addresses, debates, campaigns, and crises; with particular emphasis on the administration of presidents since Franklin D. Roosevelt. *Fall or spring.*
- 165 SPEECHWRITING (3). Prerequisite, Speech 33 or 35 or 53. Introduces the student to the principles of speech writing with special attention to features of oral style. *Fall or spring.*
- 171 SPECIAL TOPICS IN ORAL INTERPRETATION (3). Prerequisite, Speech 41 or 143. This course is an in-depth study of a literary movement, group of writers, single writers, periods, or forms of poetry, prose fiction, dramatic literature, or non-fiction. Topics vary through performance, discussion, and reports. *Fall or spring.*
- 181 INTRODUCTION TO QUANTITATIVE RESEARCH (3). Basics of data collection, measurement instrument development, and data analytic approaches to communication research are presented the student. Emphasis is placed on practical application of research. *Fall or spring.*
- 185 COMMUNICATION IN ORGANIZATIONS (3). Examines internal and external systems of communication; information flow; public, small group, and interpersonal communication. *Fall and spring.*

Courses for Graduates

NOTE: Courses are offered *on demand* except as otherwise noted.

- 231 RHETORICAL CRITICISM (3). Prerequisite, Speech 111, 112 or 134. This course investigates the function of rhetorical criticism, the critical method and a variety of approaches to the performance of rhetorical criticism.
- 241 STUDIES IN LITERARY CRITICISM (English 241) (3). The classical tradition in criticism.
- 243 LITERARY AND PERFORMANCE CRITICISM (3). Prerequisites, Speech 141 and one course from among 143, 145, 171, or permission of instructor. This course deals with the key methods of describing and evaluating literature and literature in performance.

- 245 DIRECTING GROUP PERFORMANCE (3). Prerequisite, 141 or equivalent. Examines in depth the theories and techniques of preparing group performances.
- 256 SMALL GROUP COMMUNICATION VARIABLES (3). Prerequisite, Speech 55 or permission of instructor. An in-depth study of the variables involved in oral communication in small groups. Includes a critical review and synthesis of recent research findings.
- 281 DESIGN AND INTERPRETATION OF QUANTITATIVE RESEARCH IN COMMUNICATION (3). Prerequisite, Speech 181. The designs and analysis of communication data gathered in lab and field settings are reviewed. The specific emphasis of the course centers on multivariate data analytic techniques and their interpretation.
- 297 INTRODUCTION TO RESEARCH AND THEORY IN SPEECH COMMUNICATION (3). Prerequisite, admission to graduate program or permission of chairperson. This course is designed to introduce students to the historical development and recurrent research emphases of the discipline of speech communication. Required of all graduate students. *Fall*. Conrad, Long.
- 298 BIBLIOGRAPHY AND METHODOLOGY (3). Introduction to research methods and materials in Speech Communication. *Fall or spring*.
- 331 SEMINAR IN RHETORICAL STUDIES (3). Prerequisites, 231 and one course from among 111, 134, 136, 161, 163. Special problems in rhetoric.
- 341 SEMINAR IN ORAL INTERPRETATIONAL/READER'S THEATRE (3). Prerequisite, permission of instructor. Special problems in oral interpretation/reader's theatre.
- 351 SEMINAR IN COMMUNICATION STUDIES (3). Prerequisite, Speech 151, 181, and one course from among 152, 154, 183, 185, 281. Special problems in communication studies.
- 391 PRACTICUM IN SPEECH COMMUNICATION (3). Prerequisite, permission of departmental coordinator of internships. Individualized practical experience supervised by a faculty advisor and by the departmental coordinator of internships. May be repeated once with approval of the departmental faculty.
- 393 MASTER'S THESIS (3 or more). Prerequisite, graduate standing in speech. Individual supervision of theses. *Fall and spring*.
- 395 DIRECTED RESEARCH (3). Prerequisite, permission of the graduate faculty member involved. Individual research on a problem defined by the graduate student and a graduate faculty member in conference. May be repeated once with the permission of the departmental graduate faculty.

DEPARTMENT OF STATISTICS

STAMATIS CAMBANIS, *Chairman*

Professors

CHARLES R. BAKER	(1)	Statistical Communication Theory, Probability, Stochastic Process
STAMATIS CAMBANIS	(2)	Statistical Communication Theory, Stochastic Processes
RAYMOND J. CARROLL	(12)	Errors in Variables, Weighted Methods, Transformations
INDRA M. CHAKRAVARTI	(3)	Design of Experiments, Combinatorics, Information and Coding Theory
GOPINATH KALLIANPUR	(20)	Statistics, Probability and Stochastic Processes, Filtering and Control Theory
DOUGLAS G. KELLY	(6)	Probability, Combinatorics, Operations Research
MALCOLM ROSS LEADBETTER	(7)	Probability, Stochastic Processes
GORDON D. SIMONS	(8)	Statistical Inference, Probability
WALTER L. SMITH	(10)	Probability, Stochastic Processes

Assistant Professors

EDWARD CARLSTEIN	(25)	Stochastic Processes, Nonparametric Inference
JAMES STEPHEN MARRON	(24)	Nonparametric Inference, Asymptotic Theory

Adjunct Professors

BARRY MARGOLIN	(18)	Design of Experiments, Categorical Data, Genetic Toxicology
PRANAB KUMAR SEN	(22)	Nonparametric Methods, Multivariate Analysis, Large Sample Theory, Clinical Trials

Adjunct Associate Professor

ROBERT RODRIGUEZ	(19)	Statistical Quality Control, Statistical Computer Graphics
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Professors Emeriti

WASSILY HOFFDING
NORMAN L. JOHNSON

Courses for Graduate Students Not Majoring in Statistics

The offerings of the Department of Statistics include a variety of courses of potential value to students majoring in other disciplines. The basic ideas

of statistics are taught in Statistics 101 and 102. Somewhat more theoretical and mathematical than 101 and 102 are Statistics 126 and 127.

In addition to these basic courses, the Department offers courses in statistical methods (105, 160, 200), stochastic models (180) and processes (129), time series analysis (133), and combinatorics (156, 158).

Graduate Program in Statistics

The Department of Statistics offers both M.S. and Ph.D. programs in statistics. Students who plan to teach statistics or to engage in research of any kind should work for the degree of Doctor of Philosophy. This requires at least three years of full-time graduate work, predicated upon a substantial undergraduate mathematical preparation. Research is an important part of the work of candidates for the doctorate. Those interested in obtaining an understanding of the fundamental notions of statistical theory and practice are directed into the Master of Science degree program. This degree may be obtained with or without the writing of a thesis, and normally requires three semesters for completion.

Doctoral students not holding an M.S. degree in statistics complete the M.S. program without delay of their Ph.D. work.

The philosophy of the Department is that its Ph.D. graduates should be broadly based in statistical theory and practice, and at the same time be able to conduct basic research in some special area. The typical first year program is Statistics 105, 112, 129, 134 in the fall semester and 111, 132, 135, 150 in the spring. In the second and third years a student taking advanced courses may specialize in an area of interest. Five main areas of specialization are currently recognized: Inference, Design of Experiments, Multivariate Analysis, Probability and Stochastic Processes, and Statistical Communication Theory. Students may also take courses offered by other departments such as the Departments of Biostatistics, Mathematics, and Operations Research, on the Chapel Hill Campus, and by various departments of North Carolina State University in Raleigh and of Duke University in Durham.

The Department is located in Phillips Hall, together with the Departments of Mathematics and Physics. The department has several microcomputers as well as terminals connected to the University's mainframe computer, for student and faculty use. The Mathematics-Physics-Statistics Library, located in Phillips Hall, maintains an extensive collection of books and journals pertaining to statistics.

Short series of lectures on specific topics in statistics by distinguished authorities and visiting scholars are arranged on a regular basis, and a statistics colloquium meets on alternate weeks for the presentation of the latest research developments. In addition, the department's Center for Stochastic Processes funds a number of visiting scholars for longer lengths of time, and maintains an active research seminar.

The graduate curriculum in the Department of Statistics places strong emphasis on the mathematical theory of probability and statistics. A sound mathematical preparation is thus an essential prerequisite for admission to the department. An applicant's mathematical background should include a one year course in advanced (multivariable) calculus or real analysis, at least a one semester course in matrix algebra, and calculus-based courses in probability and statistics.

Application forms for admission and/or financial aid may be obtained by writing either to the Graduate School or to the Department of Statistics. Applicants are strongly urged to submit scores for both the Aptitude and Advanced Mathematics portions of the Graduate Record Examinations in support of their application, and a supplementary sheet providing brief course descriptions, including text title where applicable, or previous undergraduate and graduate courses in mathematics and statistics.

Applicants for financial aid are considered for assistantships within the Department and also for various fellowships and limited service awards provided on a competitive university-wide basis by the Graduate School. Assistants perform academically-related duties, such as teaching, which typically require not more than ten hours service per week. Other awards include Limited Service Assistantships, University Graduate and Alumni Fellowships, George E. Nicholson, Jr., Fellowships, Pogue Fellowships, and Morehead Fellowships. Stipends range from \$6,800 to \$9,400 for the academic year, with tuition included with Fellowship awards.

Application for admission and financial aid may be made simultaneously simply by indicating on the admission application form a desire to be considered for financial aid.

More detailed information about the Department of Statistics is available in the Department's separate catalogue. Requests for this publication and specific inquiries should be addressed to the Director of Graduate Admissions, Department of Statistics.

Courses for Graduates and Advanced Undergraduates¹

- 101 STATISTICAL METHODS I (Biostatistics 150) (3). Prerequisite, integral calculus. Basic probability; descriptive statistics; introduction to statistical inference, including estimation, hypothesis testing, simple linear regression, nonparametric tests, contingency tables. Use of statistical computer packages. *Fall and spring*. Chakravarti, Marron.
- 102 STATISTICAL METHODS II (3). Prerequisite, Statistics 101. Linear regression; experimental designs; multivariate analysis; statistical computer packages. *Spring*. Chakravarti.
- 104 SAMPLE SURVEY METHODOLOGY (Biostatistics 164) (3). Prerequisite, Statistics 101 or equivalent. Fundamental principles and methods associated with survey sampling, giving primary attention to as nonmathematical as possible a treatment of simple random sampling, stratified sampling, and cluster sampling. Also, techniques of questionnaire design, the problems of nonresponse, and sources of nonsampling errors. Practical experience in the applied aspects of sampling is provided by student participation in the design, execution, and analysis of an actual survey. *Spring*. Kalsbeek.

1. Advanced courses are taught in alternate years depending on demand.

- 105 ELEMENTS OF STATISTICAL ANALYSIS (3). Prerequisite, permission of instructor. Various topics in statistical methods, including applied regression analysis, analysis of simple experimental designs, data analysis, discrete multivariate data. *Fall*. Carlstein.
- 107 LIFE CONTINGENCIES (Mathematics 167) (3). Prerequisite, Mathematics 32. (Previous knowledge of the material in Math 165 is strongly recommended.) A detailed study of various actuarial functions. Single-life functions, multiple-life functions, and some population problems. *Fall*. Dunn.
- 111 METHODS OF MATHEMATICAL STATISTICS (3). Prerequisite, advanced calculus. Introductory treatment of special mathematical techniques of particular importance in probability and statistics, including complex variables. Fourier and Laplace transforms, elements of finite difference equations. *Spring*. Smith.
- 112 MEASURE AND INTEGRATION (3). Prerequisite, advanced calculus. Lebesgue and abstract measure and integration, convergence theorems, differentiation, Radon-Nikodym theorem, product measures, Fubini theorems, L_p spaces. *Fall*. Baker, Cambanis, Kallianpur, Leadbetter.
- 126 INTRODUCTION TO PROBABILITY (Mathematics 146) (3). Prerequisite, Mathematics 34. Introduction to mathematical theory of probability covering random variables, moments, binomial, Poisson, normal and related distributions, generating functions, sums and sequences of random variables, and statistical applications. *Fall and spring*. Baker, Cambanis, Marron.
- 127 MATHEMATICAL STATISTICS (3). Prerequisite, Statistics 126 or equivalent. Functions of random samples and their probability distributions; introductory theory of point and interval estimation, and of hypothesis testing; elementary decision theory. *Fall and spring*. Carroll, Kelly.
- 129 INTRODUCTION TO STOCHASTIC PROCESSES (3). Prerequisite, Statistics 126. Elementary theory and application of random process models; recurrent events, random walks. Markov chains. Poisson processes, birth-and-death processes, queueing processes, branching processes, Brownian motion, stationary processes. *Fall*. Kelly, Leadbetter, Simons, Smith.
- 132 INTERMEDIATE PROBABILITY (Mathematics 195) (3). Prerequisite, Statistics 112 or permission of instructor. Foundations of probability. Basic classical theorems. Modes of probabilistic convergence. Central limit problem. Generating functions, characteristic functions. Conditional probability and expectation. *Spring*. Cambanis, Kelly, Leadbetter.
- 133 INTRODUCTION TO TIME SERIES ANALYSIS (3). Prerequisite, Statistics 126. Topics chosen from: Time series data analysis. Fitting parametric models, such as regression-autoregression models to time series. Spectrum analysis. Filtering. *Spring*. Leadbetter.
- 134 INTERMEDIATE STATISTICAL THEORY I (3). Prerequisite, two semesters of advanced calculus. Fundamentals of probability and distribution theory including axiomatic treatment of probability, independence, random variables, characteristic functions, convergence and approximation, common distributions. *Fall*. Kelly, Simons.
- 135 INTERMEDIATE STATISTICAL THEORY (3). Prerequisite, Statistics 134 or equivalent. Fundamentals of statistical inference including: sufficient statistics, estimation, hypothesis testing, decision theory, various classical tests, Linear estimation; analysis of variance and regression are largely excluded (see Statistics 150). *Spring*. Carroll, Chakravarti, Marron, Simons.
- 140 LINEAR SYSTEMS (3). Prerequisites, advanced calculus, elements of Fourier transform theory; linear algebra and Lebesgue integration helpful. Introduction to linear spaces, including basic results on normed linear spaces. Hilbert space geometry, bounded linear operators. Linear system theory, including signal representations, impulse response, transfer functions, dynamical systems, state variable methods, elementary modern control theory. *Fall*. Cambanis, Leadbetter.
- 141 LINEAR OPERATORS AND OPTIMIZATION (3). Prerequisite, Statistics 140 or a knowledge of the basic theory of normed linear spaces and linear operators. Basic

- properties of compact operators. Dual spaces. Optimization in linear spaces, especially algorithmic methods. Optimization of functions and constrained optimization. *Spring*. Baker.
- 142 INTRODUCTION TO ESTIMATION AND DETECTION THEORY (3). Prerequisites, Statistics 129, 134 and 140. The Wiener-Kolmogorov and the Kalman-Bucy filtering theories. Modulation theory. Basic problems of detection theory. *Spring*. Cambanis.
- 150 ANALYSIS OF VARIANCE WITH APPLICATION TO EXPERIMENTAL DESIGNS (3). Corequisite, Statistics 135. Linear estimation. Gauss-Markov theorem. Sums of squares. Analysis of variance and simple factorial designs. Intrablock analysis of incomplete block designs. Balanced, lattice and Latin square designs. *Spring*. Chakravarti, Marron.
- 156 COMBINATORIAL MATHEMATICS (Mathematics 148) (3). Prerequisite, Math 81 or equivalent, or permission of instructor. Topics chosen from: generating functions, Polya's theory of counting, partial orderings and incidence algebras, principle of inclusion-exclusion, Moebius inversion, combinatorial problems in physics and other branches of science. *Fall*. Brylawski.
- 158 INTRODUCTION TO GRAPH THEORY (Mathematics 149) (3). Prerequisite, Math 116, 137, or 147. Basic concepts of directed and undirected graphs, partitions and distances in graphs. Planar and nonplanar graphs. Matrix representation of graphs, network flows, applications of graph theory. *Spring of odd numbered years*. Staff.
- 160 APPLIED MULTIVARIATE ANALYSIS I (Biostatistics 166) (3). Prerequisite, Biostatistics 163 or equivalent. Application of multivariate techniques, with emphasis on the use of computer programs. Multivariate analysis of variance, multivariate multiple regression, weighted least squares, principal component analysis, canonical correlation and related techniques. *Spring*. Muller.
- 170 ORDER STATISTICS (3). Prerequisite, Statistics 127. Distribution of moments of order statistics. Estimation of location and scale parameters, censoring, Robust estimation. Shortcut procedures. Treatment of outliers. Extreme value theory. *Spring*. Carroll.
- 171 INTRODUCTION TO NONPARAMETRIC STATISTICS (Biostatistics 256) (3). Prerequisite, Biostatistics 160 or equivalent. Theory and application of nonparametric methods for various problems in statistical analysis. Includes procedures based on randomization, ranks, and U-statistics. A knowledge of elementary computer programming is assumed. *Fall*. Bangdiwala.
- 180 STOCHASTIC MODELS (Operations Research 180) (3). Prerequisite, Statistics 126. Introduction to queueing theory (substantial), Markovian sequential decision process, inventory theory and topics from stochastic linear programming, simulations, scheduling, game theory. Applications. *Spring*. Simons, Smith.
- 181 DETERMINISTIC MODELS IN OPERATIONS RESEARCH (MATH 151, ORSA 181) (3). Prerequisite, Mathematics 147. Linear, integer, nonlinear and dynamic programming, classical optimization problems, network theory. *Fall and spring*. Kelly, Provan, Smith.
- 200 APPLIED MULTIVARIATE ANALYSIS II (2). Prerequisite, Statistics 105 or 135. Relations between multiple regression, analysis of variance, multivariate analysis and factor analysis. Principal components. Discriminant analysis. Canonical analysis. Scaling methods. Classification problems. Cluster analysis. *Spring*. Staff.
- 210 DESIGN AND ANALYSIS OF EXPERIMENTS (3). Prerequisites, Statistics 102 and 150. The principles of the design and analysis of experiments. Randomized blocks, Latin and Graeco-Latin squares, factorial experiments. Confounding, fractional factorials, split plots, missing plots. Interblock analysis. Covariance analysis. Response surfaces. *Fall or spring*. Chakravarti.
- 220 THEORY OF ESTIMATION AND HYPOTHESIS TESTING (3). Prerequisites, Statistics 132, 135. Bayes procedures for estimation and testing. Minimax procedures. Un-

- biased estimators. Unbiased tests and similar tests. Invariant procedures. Sufficient statistics. Confidence sets. *Fall*. Simons.
- 221 SEQUENTIAL ANALYSIS (3). Prerequisites, Statistics 132 and 135. Hypothesis testing and estimation when sample size depends on the observations. Sequential probability ratio tests. Sequential design of experiments. Optimal stopping. Stochastic approximation. *Spring*. Simons.
- 222 NONPARAMETRIC INFERENCE (3). Prerequisites, Statistics 132, 135 and 112. Estimation and testing when the functional form of the population distribution is unknown. Density estimation. Rank, sign, and permutation tests. Optimum nonparametric tests and estimators. Robust procedures. *Spring*. Staff.
- 223 STATISTICAL LARGE-SAMPLE THEORY (3). Prerequisites, Statistics 132 and 135. Asymptotically efficient estimators; maximum likelihood estimators; maximum probability estimators. Asymptotically optimal tests; likelihood ratio test. *Spring*. Staff.
- 231 ADVANCED PROBABILITY (3). Prerequisites, Statistics 132, 112. Advanced theoretic course, covering topics selected from: weak convergence theory, central limit theorems, laws of large numbers, stable laws, infinitely divisible laws, random walks, martingales. *Spring*. Kallianpur, Simons, Smith.
- 232 GENERAL THEORY OF STATISTICAL DECISION (3). Prerequisites, Statistics 135 and 112. Selected topics in the general theory of statistical decision, based on the work of Abraham Wald. *Spring*. Staff.
- 235 STOCHASTIC PROCESSES (3). Prerequisites, Statistics 112 and 132. Advanced theoretic course including topics selected from: foundations of stochastic processes, renewal processes, stationary processes, Markov processes, martingales, point process. *Fall*. Baker, Cambanis, Leadbetter.
- 237 TIME SERIES ANALYSIS (3). Prerequisites, Statistics 112, 132. Analysis of time series data by means of particular models such as autogressive and moving average schemes. Spectral theory for stationary processes and associated methods for inference. Stationarity testing. *Spring*. Leadbetter.
- 242 PROBABILITY IN LINEAR SPACES (3). Prerequisites, Statistics 112, elements of theory of normed linear spaces. Results from linear topology. Borel structures. Probability measures on Borel sets of separable Banach spaces. Characteristic functionals. Extension of cylinder set measures. Gaussian measures. Orthogonality and equivalence of measures. *Spring*. Baker.
- 245 ADVANCED TOPICS IN STATISTICAL COMMUNICATION THEORY (3). Prerequisite, Statistics 242. Applications of probability in linear spaces to problems in information theory, signal detection, and sample path analysis of stochastic processes. *Fall*. Baker.
- 251 COMBINATORIAL PROBLEMS OF THE DESIGN OF EXPERIMENTS (3). Prerequisite, Statistics 150. Finite fields and finite geometries. Construction of orthogonal Latin squares and balanced incomplete block designs. Difference sets. *Fall*. Chakravarti.
- 252 INFORMATION THEORY (3). Prerequisite, Statistics 134. Transmission of information, entropy, message ensembles, discrete sources, transmission channels, channel encoding and decoding for discrete channels. *Spring*. Chakravarti.
- 253 ERROR CORRECTING CODES (3). Prerequisite, Statistics 251, or permission of instructor. Linear codes and their error-correcting capabilities. Hamming codes. Reed-Muller codes, Cyclic codes, BCH/Goppa codes. Burst error corrections. Majority logic decoding. *Spring*. Chakravarti.
- 254 SPECIAL TOPICS IN DESIGN OF EXPERIMENTS I (3). Prerequisite, Statistics 150. Factorial experiments. Confounding, construction and analysis of symmetrical and fractional factorial designs. Orthogonal arrays. Asymmetrical factorial designs. Response surface designs, second and third order rotatable designs. Mixture design. Recent developments. *Fall*. Chakravarti.
- 255 SPECIAL TOPICS IN THE DESIGN OF EXPERIMENTS II (3). Prerequisite, Statistics 251. Combinatorial properties and construction of balanced, group divisible

- and partially balanced designs. Impossibility proofs. Orthogonal Latin squares of non-prime power orders. Orthogonal arrays. Asymmetrical fractionally replicated designs. Recent developments. *Spring*. Chakravarti.
- 260 MULTIVARIATE ANALYSIS (3). Prerequisites, Statistics 135 and Introduction to Matrix Theory, Multivariate normal distributions. Related distributions. Tests and confidence intervals. Multivariate analysis of variance, covariance and regression. Association between subsets of a multivariate normal set. Theory of discriminant, canonical and factor analysis. *Fall*. Chakravarti.
- 261 ADVANCED PARAMETRIC MULTIVARIATE ANALYSIS (3). Prerequisite, Statistics 260. Distribution problems involved in the normal theory analysis of general multivariate linear models including the growth curves. Roy's union intersection principle and its role in multivariate analysis. An introduction to zonal polynomials and orthogonal groups. *Spring*. Chakravarti, Sen.
- 262 INTRODUCTORY NONPARAMETRIC MULTIVARIATE ANALYSIS (3). The problem of symmetry in the multivariate case. Nonparametric MANOVA is one-way classifications. Robust rank order estimation in MANOVA. Large sample properties of the tests and estimates. Tests for independence. *Fall*. Sen.
- 263 ADVANCED NONPARAMETRIC MULTIVARIATE ANALYSIS (3). Prerequisite, Statistics 262. Nonparametric inference in multifactor multiresponse experiments. Robust procedures in general linear models including the growth curves. Nonparametric classification problems. *Spring*. Sen.
- 280 ADVANCED STOCHASTIC METHODS OF OPERATIONS RESEARCH (3). Prerequisites, Statistics 132 and 180. Topics chosen from: renewal theory; queues with random arrivals; inequalities for queues; priority systems; theory of reservoirs; stochastic inventory problems. *Spring*. Smith.
- 300 SEMINAR IN STATISTICAL LITERATURE (1 each). Prerequisite, Statistics 135. *Fall and spring*. Staff.
- 302 SEMINAR IN STATISTICAL DATA ANALYSIS (1-3). Prerequisite, Statistics 105. *Spring*. Staff.
- 310 SEMINAR IN THEORETICAL STATISTICS (1-3). Prerequisite, Statistics 135. *Fall and spring*. Staff.
- 321 SPECIAL PROBLEMS (1-3). Prerequisite, permission of instructor. *Fall and spring*.
- 322 Staff.
- 331 ADVANCED RESEARCH (1-3). Prerequisite, permission of instructor. *Fall and spring*.
- 332 Staff.
- 393 MASTER'S THESIS (3 or more). Prerequisite, permission of the student's adviser. *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). Prerequisite, permission of the student's adviser. *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION.

CURRICULUM IN TOXICOLOGY

TOM S. MIYA, *Chairman*

Professors

KENNETH H. DUDLEY	(14)	Drug Metabolism; Stereochemical Aspects of Biotransformation Reactions; Analytical Methods for Drugs and Metabolites
JOHN T. GATZY, JR.	(15)	Cellular Toxicology of Heavy Metals; Lung Permeability
AVRAM GOLD	(29)	Structure-Reactivity Relationships in Metabolism and Mutagenicity of Polycyclic Aromatic Hydrocarbons
JOE W. GRISHAM	(4)	DNA Replication and Repair in Cellular Pathology; Environmental Pathology; Liver Disease
IRIS H. HALL	(17)	Hypolipidemic, Antifertility, Anti-inflammatory, and Antineoplastic Drugs
DAVID G. KAUFMAN	(20)	DNA Replication; Chemical Carcinogenesis
JOHN J. LEMASTERS	(70)	Structure and Function of Liver; Hypoxic Stress; Mitochondrial Bioenergetics
ARTHUR J. MCBAY	(8)	Analytical and Forensic Toxicology
TOM S. MIYA	(9)	Pharmacodynamics and Biochemical Pharmacology and Toxicology
CARL M. SHY	(11)	Environmental Epidemiology; Cancer Epidemiology
WALTER E. STUMPF	(13)	Neuroendocrinology and Neuropharmacology, Autoradiography, Immunocytochemistry
RONALD G. THURMAN	(26)	Drug and Alcohol Metabolism
ALVIS G. TURNER, JR.	(27)	Environmental Health, Aerobiology

Associate Professors

STEPHEN G. CHANEY	(52)	Molecular Biology, RNA Metabolism, Protein Synthesis, Antineoplastic Agents
MITCHELL FRIEDMAN	(28)	Pulmonary Microcirculation; Airways Function
MICHAEL D. TOPAL	(82)	Mutagenesis, Carcinogenesis
BARRY GOZ	(16)	Virus and Cancer Chemotherapy
CURTIS HARPER	(18)	Biochemical Toxicology
DAVID J. HOLBROOK, JR.	(19)	Nucleic Acid and Protein Metabolism, Xenobiotic Metabolism
RICHARD B. MAILMAN	(46)	Neurotoxicology and Neuropharmacology of the Central Nervous System

Assistant Professors

LOUISE M. BALL	(76)	Metabolism and Genotoxicity of Environmental Xenobiotics
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| KIM ROWSE BROUWER | (77) | Pharmacokinetics; Hepatic Uptake, Metabolism and Excretion of Xenobiotics |
| MARILA CORDEIRO-STONE | (62) | DNA Replication in Eukaryotic Cells and Chemical Carcinogenesis |
| WILLIAM K. KAUFMANN | (73) | Tumor Pathology, DNA & Chromosomal Repair |
| JAMES H. MAGUIRE | (53) | Drug Toxicity, Stereochemistry of Xenobiotic Metabolism |
| GARY M. POLLACK | (78) | Pharmacokinetics and Pharmacodynamics of Therapeutic and Toxic Agents |
| GARY J. SMITH | (79) | Molecular Toxicology; In Vitro Mutagenesis and Transformation |
| THEA D. TLSTY | (74) | Chemical Carcinogenesis |

Research Associate Professor

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| MILAN J. HAZUCHA | (30) | Air Pollutants; Human Studies |
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Research Assistant Professor

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| MARK H. LEWIS | (81) | Neurochemical Basis of Behavior |
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Adjunct Professors

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|-------------------|------|---|
| JOHN W. DRAKE | (33) | Mutagenesis |
| JAMES R. FOUTS | (35) | Drug Metabolism, Developmental Pharmacology |
| JAMES E. GIBSON | (55) | Biochemical Mechanisms of Toxicity; Risk Assessment; Biometry |
| GARY E. R. HOOK | (48) | Lung Biochemistry and General Toxicology |
| EDWARD J. MASSARO | (64) | Inhalation Toxicology; Toxicology of Metals |
| PAUL NETTESHEIM | (37) | Pulmonary Function and Toxicology |
| MICHAEL D. WATERS | (39) | Bioassay Systems for Toxic Substances; Genetic Toxicology |

Adjunct Associate Professors

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| JAMES W. ALLEN | (60) | Cytogenetics: Sister Chromatid Exchanges Chromosome Aberrations, Meiosis |
| J. CARL BARRETT | (71) | Mutagenesis and Carcinogenesis |
| LINDA S. BIRNBAUM | (68) | Chemical Disposition of Xenobiotics |
| ARNOLD R. BRODY | (75) | Cellular and Biochemical Mechanisms of Asbestos-Induced Pulmonary Disease |
| M. ROBERT BLUM | (40) | Basic and Clinical Pharmacokinetics and Biopharmaceutics |
| JAMES S. BUS | (63) | Biochemical Mechanisms of Toxicity |
| THOMAS E. ELING | (49) | Prostaglandins; Carcinogenesis; Metabolism by Prostaglandin Synthetase |
| HENRY D'A. HECK | (57) | Biochemical and Inhalation Toxicology |
| JAU-SHYONG HONG | (65) | Neuropeptides and Neurotransmitters; Neurotoxicology, Neuropharmacology, and Neurochemistry |

GEORGE W. LUCIER	(41)	Biochemical Indicators of Organ-Specific Toxicity; Metabolism and Binding of Chemicals in Developing Systems
RONALD P. MASON	(58)	Free-Radical Intermediates in the Metabolism of Toxic Chemicals
RICHARD M. PHILPOT	(80)	Biochemistry of Drug Metabolism
LAWRENCE W. REITER	(43)	Behavioral Toxicology of Environmental Pollutants
DOUGLAS E. RICKERT	(66)	Xenobiotic Metabolism; Mechanisms of Toxicology
CARL W. SIGEL	(72)	Methodology in Drug Metabolism Studies
HUGH A. TILSON, JR.	(61)	Behavioral Toxicology, Developmental Neurotoxicology
WILLIAM A. WARGIN	(45)	Pharmacokinetics, Drug Analysis in Biological Fluids
RICHARD M. WELCH	(42)	Role of Metabolism in Drug Toxicity
FRANK WELSCH	(59)	Mechanisms of Teratogenesis

The Curriculum

The Curriculum in Toxicology administers degree programs leading to the award of the Ph.D. in Toxicology and the M.S. in Toxicology. The Curriculum is an interdisciplinary program, and its faculty is drawn from various administrative units of the Schools of Medicine, Pharmacy, and Public Health. The research interests of the faculty are directed primarily at the biochemical and physiological mechanisms of action in mammalian systems. The interests include most areas of toxicology but major emphases are directed towards: biochemical toxicology including xenobiotic metabolism; heavy metal toxicology; neurotoxicology including behavioral toxicology; pulmonary and inhalation toxicology; and carcinogenesis and mutagenesis. The faculty generally does not conduct research in the areas of aquatic toxicology, forensic toxicology, the ecological aspects of toxicology, or studies in invertebrate systems. The research activities of the Curriculum in Toxicology are conducted in the laboratory facilities assigned to each faculty member by a participating administrative unit.

Applications

Applications for predoctoral studies are considered from students who have received or expect to receive a B.S./B.A. or M.S. degree in a scientific discipline. A desirable background includes courses in biological sciences (including histology, and animal physiology), in chemistry (including analytical, organic and physical), and mathematics through calculus, although all of these are not absolutely essential. A strong course in general biochemistry accelerates the student's progress. Applicants are evaluated on the basis of undergraduate (and graduate) academic performance, Graduate Record Examination scores (General Test, and Subject Test if the latter

is given in the field of the undergraduate major), and letters of recommendation. Students are accepted on the basis of their achievement and potential. Special circumstances, including prior research experience and publications, are considered in individual cases in the assessment of qualifications for admission. The Curriculum will offer a program leading to the M.S. degree only under special circumstances.

Requirements for the Ph.D. Degree

The selection of a predoctoral student's graduate courses is influenced by that student's prior academic background. The minimum academic courses which we consider to be desirable for graduate training in toxicology constitute approximately 38 credit hours in didactic courses including biochemistry (two courses), biostatistics, epidemiology, histology, pathology, pharmacology (two courses), physiology, toxicology (special problems) and three elective courses. In addition, each predoctoral student is expected to participate in a minimum of 12 credit hours of non-didactic training activities; i.e., two semesters of laboratory research experience prior to the doctoral research and four seminars. The satisfactory completion of appropriate courses during the prior academic career permits a student to have a greater latitude in the selection of courses.

A major requirement for the Ph.D. degree is a doctoral dissertation based on the student's independent laboratory research. Written and oral examinations are required in the fields of general toxicology and the major research interest.

Financial Aid

The Curriculum seeks to fund a limited number of predoctoral students each year. All applicants are considered for financial-aid awards. For the maximum consideration for financial-aid awards, applications for admission for the Fall Semester should be completed by early February and for the Spring Semester by early October.

Courses for Graduates and Advanced Undergraduates

- 123 DEVELOPMENTAL TOXICOLOGY AND TERATOLOGY (Anatomy 123) (2). Review of aspects of development which are particularly susceptible to teratogenic insults; mechanisms by which teratogens affect development. *Two lecture hours per week, spring.* (1988 and alternate years). Anatomy: Sulik (Course Director).
- 142 BIOCHEMICAL TOXICOLOGY (Biochemistry 142) (3). Prerequisite, Biochemistry 100, and one additional biochemistry course (or permission of Course Director). Biochemical actions of toxicants, and assessment of cellular damage by biochemical measurements. Course intended primarily for graduate students. *Three lecture hours per week, spring.* Biochemistry: Holbrook (Course Director).
- 170 MUTAGENESIS AND GENETIC TOXICOLOGY (Genetics 170) (2). Prerequisite, course in general genetics and general biochemistry. A survey of basic mechanisms of mutagenesis, its impact on population, mutagenicity screening systems and their development. *Two lecture hours per week.*

Courses for Graduates

- 202 PRINCIPLES OF PHARMACOLOGY AND TOXICOLOGY (Pharmacology 202) (5). Prerequisites, Biochemistry 100, Physiology 140, or their equivalents, and permission of the instructor. Introduces the major areas of pharmacology and toxicology and serves as a basis for more advanced courses. *Five lecture hours per week, spring.* Pharmacology: Goz (Course Director).
- 207 RECENT ADVANCES IN TOXICOLOGY (Pharmacology 207) (2). Prerequisites, Pharmacology 202 or permission of instructor. Recent advances in food additives, cardio-, hepato-, and pulmonary toxicology and the mode of action of radionuclides, heavy metals, toxins from plants and animals, solvents and propellants, insecticides, and halogenated hydrocarbons. *Two lecture hours per week, fall.* Pharmacology: Gatzky (Course Director).
- 209 BIOTRANSFORMATION OF XENOBIOTICS (Pharmacology 209) (2). Prerequisites, Biochemistry 100 or equivalent or Pharmacology 202 or permission of instructor. Recent advances in the mechanisms by which drugs and other foreign chemicals are metabolized to active and/or inactive products. The importance of metabolic pathways to therapy/toxicity. *Two lecture hours per week, fall.* Pharmacology: Harper, Dudley, Thurman.
- 215 INTRODUCTION TO TOXICOLOGICAL RESEARCH (4). Prerequisite, permission of course director for nonmajors. Introductory laboratory experience from research projects of limited scope to acquaint students with the experimental approaches, techniques and equipment of current research in toxicology. *May be repeated. Twelve laboratory hours per week, fall, spring and summer.* Toxicology Faculty.
- 219 SPECIAL PROBLEMS IN TOXICOLOGY (N.C. State University, Toxicology 590A) (2). Orientation to the principles of toxicology (including methodology, risk assessment, and aspects of regulation and socio-economic issues) as encountered in research institutes, governmental regulatory agencies and industry. Presented at Research Triangle Park by senior scientific staff from Burroughs Wellcome Company, Chemical Industry Institute of Toxicology, Environmental Protection Agency, and National Institute of Environmental Health Sciences. *Three hours per week for 12 weeks, summer. (1989 and alternate years).*
- 221 SEMINAR IN TOXICOLOGY (1). Prerequisite, permission of course director for nonmajors. Student-conducted presentations and discussions of recent advances in toxicology; emphasis on critical evaluation of published investigations and on organization and oral delivery of presentations. *May be repeated up to six times. One hour per week, fall and spring.* Toxicology Faculty.
- 292 SEMINAR IN CARCINOGENESIS (Pathology 292) (2). Prerequisite, permission of instructor. Survey of classical and current literature on selected critical issues in carcinogenesis. Discussions consider experimental methods and observations as well as theories and generalizations. *Two seminar hours per week, fall. (1988 and alternate years.)* Pathology: Kaufman (Course Director).
- 301 RESEARCH IN TOXICOLOGY (3-9). *May be repeated for credit. Hours and credits to be arranged. Fall, spring and summer.* Toxicology faculty.
- 393 MASTER'S THESIS (0-9). *May be repeated. Hours and credits to be arranged. Fall, spring and summer.* Toxicology Faculty.
- 394 DOCTORAL DISSERTATION (0-9). *May be repeated. Hours and credits to be arranged. Fall, spring and summer.* Toxicology Faculty.
- 400 GENERAL REGISTRATION (0).

Registration for the following course is through Inter-Institutional Registration.

GENERAL PATHOLOGY FOR TOXICOLOGISTS (Duke University, Pathology 382)
(3). General principles of pathology and pathobiology for graduate students in toxicology who do not have a background in medicine. Principles of cell injury, inflammation, circulatory disturbances, and neoplasia using toxicological principles and models. Prerequisites, biochemistry, physiology, microbiology and histology or by permission of the course director. Presented jointly by faculty members from both Duke University and this University. *Lecture and laboratory hours, fall.* (1989 and alternate years.) D. Graham (Duke) (Course Director).

THE UNIVERSITY OF NORTH CAROLINA

Sixteen Constituent Institutions

C. D. SPANGLER JR., B.S., M.B.A., D.H.L., LL.D., *President*

RAYMOND H. DAWSON, B.A., M.A., Ph.D., *Vice President—Academic Affairs*

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WYNDHAM ROBERTSON, A.B., *Vice President—Communications*

JAY M. ROBINSON, B.S., M.A., Ed.D., *Vice President—Public Affairs*

DAVID G. MARTIN, JR., B.A., LL.B., *Secretary of the University*

RICHARD H. ROBINSON, JR., A.B., LL.B., *Assistant to the President*

JOHN W. DUNLOP, B.A., *Director, The University of North Carolina Center for Public Television*

History of the University

The University of North Carolina is comprised of all the public institutions of higher education in North Carolina that confer degrees at the baccalaureate level or higher. The University was authorized by the State Constitution in 1776, and it was chartered in 1789 by the General Assembly.

The University of North Carolina opened its doors to students at Chapel Hill in 1795. Thereafter, beginning in the latter part of the nineteenth century, the General Assembly of North Carolina has established and supported fifteen other public senior institutions in keeping with Article IX, Section 8, of the Constitution of North Carolina which provides that the "General Assembly shall maintain a public system of higher education, comprising The University of North Carolina and such other institutions of higher education as the General Assembly may deem wise."

By 1969 The University of North Carolina included six constituent institutions, governed by a single Board of Trustees. The multicampus University had its beginnings in legislation enacted in 1931 that defined The University of North Carolina to include The University of North Carolina at Chapel Hill, North Carolina State University at Raleigh, and The University of North Carolina at Greensboro. In the 1960s three additional campuses were added: The University of North Carolina at Charlotte, The University of North Carolina at Asheville, and The University of North Carolina at Wilmington.

Beginning in 1877, the General Assembly of North Carolina established or acquired ten additional separately governed state-supported senior institutions of higher education. They are: Appalachian State University, East Carolina University, Elizabeth City State University, Fayetteville State University, North Carolina Agricultural and Technical State University, North Carolina Central University, North Carolina School of the Arts,

Pembroke State University, Western Carolina University, and Winston-Salem State University. Then, in 1971, the General Assembly redefined The University of North Carolina, and under the terms of that legislation all sixteen public senior institutions became constituent institutions of The University of North Carolina.

The constitutionally authorized Board of Trustees of the six-campus University of North Carolina was designated the Board of Governors and this body is by law The University of North Carolina. The Board of Governors consists of thirty-two members elected by the General Assembly, and it is charged with "the general determination, control, supervision, management, and governance of all affairs of the constituent institutions." The chief executive officer of the University is the President.

Each constituent institution of the University has its own faculty and student body. The chief administrative officer of each institution is the chancellor, and the chancellors are responsible to the President.

Each constituent institution also has a board of trustees composed of thirteen members: eight elected by the Board of Governors, four appointed by the Governor, and the elected president of the student body *ex officio*. (The School of the Arts has two additional *ex officio* trustees.) The principal powers of these institutional boards are exercised under a delegation of authority from the Board of Governors.

Appendix A

RESIDENCE STATUS FOR TUITION PURPOSES¹

The following sections summarize important aspects of the residency law. A complete explanation of the Statute and the procedures under the Statute is contained in *A Manual to Assist the Public Higher Education Institutions of North Carolina in the Matter of Student Residence Classification for Tuition Purposes*. This *Manual* and other information concerning the application of this law are available for inspection in the Admissions Offices of the University. Copies of the *Manual* are also on reserve at the Robert B. House Undergraduate Library. All students are responsible for knowledge of the contents of the Statute and the *Manual*.

Every applicant for admission is required to make a statement as to his or her length of residence in North Carolina. A person who qualifies as a resident for tuition purposes under North Carolina law pays a lower rate of tuition than a nonresident. To qualify for in-state tuition, a legal resident must have been domiciled in North Carolina for at least twelve months immediately prior to the beginning of the term for which classification as a resident for tuition purposes is sought. The student must also establish that his or her presence in the State during such twelve-month period was for purposes of maintaining a bona fide domicile rather than for purposes of maintaining a mere temporary residence incident to enrollment in an institution of higher education. "Domicile" means one's permanent dwelling place of indefinite duration, as distinguished from a temporary place of abode; it is synonymous with "legal residence."

Procedural Information

General. A student admitted to initial enrollment in an institution (or permitted to re-enroll following an absence from the institutional program which involved a formal withdrawal from enrollment) is classified by the admitting institution either as a resident or as a nonresident for tuition purposes prior to actual matriculation. In the absence of a current and final determination of the student's residence prior to matriculation, the student is classified a nonresident for tuition purposes. The institution will thereafter reach a final determination of the student's residence status. Unless a person supplies enough information to allow the admissions officer to classify him or her as a resident for tuition purposes, the person will be classified a nonresident for tuition purposes. A residence classification once assigned (and confirmed pursuant to any appellate process invoked) may be changed thereafter (with a corresponding change in billing rates) only at intervals corresponding with the established primary divisions of the academic calendar.

Transfer Students. When a student transfers from one North Carolina public institution of higher education to another, he or she is required to be treated as a new student by the institution to which he or she is transferring and must be assigned an initial residence classification for tuition purposes. The residence classification of a student by one institution is not binding on another institution. The North Carolina institutions of higher education will assist each other by supplying residency information and classification records concerning a student to another classifying institution upon request.

The transfer into or admission to a different component of the same institution (e.g., from an undergraduate to a graduate or professional program) is not construed as a transfer from one institution to another and thus does not by itself require a reclassification inquiry unless (1) the affected student requests a reclassification inquiry or (2) the transfer or enrollment occurs following the lapse of more than one quarter, semester, or term during which the individual was not enrolled as a student.

Responsibility of Students and Prospective Students. Any student or prospective student in doubt concerning his or her residence status bears the responsibility for securing a ruling by completing an application for resident status and filing it with the admissions officer. The student who, due to subsequent events, becomes eligible for a change in classification, whether from out-of-state to in-state or the reverse, has the responsibility of immediately informing the Office of Admissions of these circumstances in writing. Failure to give complete and correct information regarding residence constitutes grounds for disciplinary action.

¹The information in this section comes from three sources: (i) North Carolina General Statutes, §116-143.1, (ii) *A Manual to Assist the Public Higher Education Institutions of North Carolina in the Matter of Student Residence Classification for Tuition Purposes*, Revised September 1985, (iii) Chancellor's Rules and Procedures for Residence Classification of Students for Tuition Purposes.

Application Process. A person may obtain an application for resident status from his or her admissions office. Applicants for admission who claim eligibility for the in-state tuition rate customarily complete a two-page residency application as a part of the admissions application packet. Some applicants for admission will thereafter be required to complete a further, four-page, residency application. Enrolled students seeking a change from nonresident to resident status are required to complete a four-page residency application. All applications for resident status must be filed with the proper admissions office before the end of the term for which resident status for tuition purposes is sought. The last day of the final examination period is considered the last day of the term.

After filing a resident status application, a person may receive a letter from his or her admissions office requesting more information in connection with that application. When a student receives such a request before the end of the term for which classification is sought, he or she must respond to that request no later than three weeks after the end of the term. If the student receives the request for supplemental information after the end of the term in question, he or she must supply the requested information within three weeks after receipt of the request. Failure to supply the requested information within the specified time limit will result in a continuation of the student's nonresident classification unless good cause is shown for such failure.

The admissions office may require an applicant for admission to file a residency application, or respond to a request for more information, more quickly when residence status is a factor in the admissions decision.

The pamphlet "Information About Resident Status for Tuition Purposes" contains more details about the residency application process and is available at all admissions offices.

Fraudulent Applications. If a student is classified a resident for tuition purposes after submitting falsified residency information or after knowingly withholding residency information, the student's application for in-state tuition status is fraudulent. The institution may re-examine any application suspected of being fraudulent and, if warranted, will change the student's residence status retroactively to the beginning of the term with respect to which the student originally made the fraudulent application. If this occurs the student must pay the out-of-state tuition differential for all the enrolled terms intervening between the fraudulent application and its discovery. Further, knowing falsification of responses on a resident status application may subject the applicant to disciplinary consequences, including dismissal from the institution.

Burden of Proof and Statutory Prima Facie Evidence. A person has the burden of establishing facts which justify his or her classification as a resident for tuition purposes. The balancing of all the evidence must produce a preponderance of evidence supporting the assertion of in-state residence. Under the Statute proof of resident status is controlled initially by one of two evidentiary beginning points which are stated in terms of prima facie evidence.

a. Even if the person is an adult, if his or her parents (or court-appointed guardian in the case of some minors) are not legal residents of North Carolina, this is prima facie evidence that the person is not a legal resident of North Carolina unless he or she has lived in this state the five consecutive years prior to enrolling or re-registering. To overcome this prima facie showing of nonresidence, a person must produce evidence that he or she is a North Carolina domiciliary despite the parents' nonresident status.

b. Conversely, if the person's parents are domiciliaries of North Carolina under the Statute, this fact constitutes prima facie evidence that the person is a domiciliary of North Carolina. This prima facie showing may also be overcome by other evidence to the contrary. If a person has neither living parents nor legal guardian, the prescribed prima facie evidence rule cannot and does not apply.

Erroneous Notices Concerning Classification. If a student, who has been found to be a nonresident for tuition purposes, receives an erroneous notice from an institutional officer identifying the student as a resident for tuition purposes, the student is not responsible for paying the out-of-state tuition differential for any enrolled term beginning before the classifying institution notifies the student that the prior notice was erroneous.

Grace Period. If a student has been properly classified as a North Carolina resident for tuition purposes and, thereafter, his or her state of legal residence changes while he or she is enrolled in a North Carolina public institution of higher education, the statute provides for a grace period during which the student is allowed to pay tuition at the in-state rate despite the fact that the student is no longer a North Carolina legal resident. This grace period extends for a minimum of twelve months from the date of change in legal residence, and if the twelve-month period ends during a semester or academic term in which the student is enrolled, the grace period extends also to the end of that semester or academic term.

Reacquisition of Resident Tuition Status. The prescribed twelve-month period of legal residence may be shortened if the person seeking to be classified as a resident for tuition purposes was formerly classified a North Carolina resident for tuition purposes, abandoned North Carolina domicile, and reestablished

North Carolina domicile within twelve months after abandoning it. Interested persons should consult their admissions offices for a detailed explanation of the conditions which must be met to qualify under this section.

Appeals. A student appeal of a classification decision made by any admissions officer must be in writing and signed by the student and must be filed by the student with that officer within fifteen working days after the student receives notice of the classification decision. The appeal is transmitted to the Residence Status Committee by that officer, who does not vote in that Committee on the disposition of such appeal. The student is notified of the date set for consideration of the appeal, and, on request of the student, he or she is afforded the opportunity to appear and be heard by the Committee. Any student desiring to appeal a decision of the Residence Status Committee must give notice in writing of that fact, within ten days of receipt by the student of the Committee's decision, to the Chairman of the Residence Status Committee, and the Chairman promptly processes the appeal for transmittal to the State Residence Committee.

It is the responsibility of the student to pay tuition at the rate charged and billed while an appeal is pending. In effect, the student who is classified a nonresident at the time of tuition billing pays the nonresident rate. Conversely, if a student is classified as a resident at the time of billing, he or she pays the resident rate. Any necessary adjustments in the rate paid will be made at the conclusion of the appeal.

Application of the Law to Specific Situations

Aliens. Aliens who are permanent residents of the U.S., or who hold a visa which will permit eventual permanent residence in the U.S., are subject to the same considerations with respect to determination of legal residence as citizens. An alien abiding in the U.S. under a visa conditioned at least in part upon intent not to abandon a foreign domicile (B, F, H, and J visas) cannot be classified a resident. An alien abiding in the U.S. under a visa issued for a purpose which is so restricted as to be fundamentally incompatible with an assertion by the alien of bona fide intent to establish a legal residence (C, D, and M visas) cannot be classified a resident.

Possession of certain other immigration documents may also allow an alien to be considered for in-state tuition status. For more details aliens should consult their admissions offices and the *Manual*. Aliens must file a Residence Status Supplemental Form in addition to the forms normally required of applicants for resident status for tuition purposes.

Married Persons. The domicile of a married person, irrespective of sex, is determined by reference to all relevant evidence of domiciliary intent. No person is precluded, solely by reason of marriage to a person domiciled outside of North Carolina, from establishing or maintaining legal residence in North Carolina. No person is deemed, solely by reason of marriage to a person domiciled in North Carolina, to have established or maintained a legal residence in North Carolina. The fact of marriage and the place of the domicile of his or her spouse are deemed relevant evidence to be considered in ascertaining domiciliary intent.

If a person otherwise can demonstrate compliance with the fundamental statutory requirement that he or she be a legal resident of North Carolina before the beginning of the term for which resident status is sought, the second statutory requirement relating to duration of residence may be satisfied derivatively, in less than twelve months, by reference to the length of the legal residence of the person's spouse, if the spouse has been a legal resident of the State for the requisite twelve-month period.

Military Personnel. The domicile of a person employed by the Federal government is not necessarily affected by assignment in or reassignment out of North Carolina. Such a person may establish domicile by the usual requirements of residential act plus intent. No person loses his or her in-state resident status solely by serving in the armed forces outside of the State of North Carolina.

Minors. A minor is any person who has not reached the age of eighteen years. The domicile of a minor is presumed under the common law to be that of the father, subject to rebutting evidence. If the father is deceased, the domicile of the minor is that of the surviving mother. If the parents are divorced or legally separated, the domicile of the minor is that of the parent having custody by virtue of a court order; or, if no custody has been granted by virtue of court order, the domicile of the minor is that of the parent with whom he or she lives; or, if the minor lives with neither parent, in the absence of a custody award, the domicile of the minor is presumed to remain that of the father. If the minor lives for part of the year with each parent, in the absence of a custody award, the minor's domicile is presumed to remain that of the father. These common law presumptions control even if the minor has lived in North Carolina for five years as set forth above in **Burden of Proof and Statutory Prima Facie Evidence**, subsection a.

In determining residence status for tuition purposes, there are three exceptions to the above provisions:

1. If a minor's parents are divorced, separated, or otherwise living apart and one parent is a legal resident of North Carolina, during the time period when that parent is entitled to claim, and does claim, the minor as a dependent on the North Carolina individual income tax return, the minor is deemed to be a legal resident of North Carolina for tuition purposes, notwithstanding any judicially determined custody award with respect to the minor.

If, immediately prior to his or her eighteenth birthday, a person would have been deemed to be a North Carolina legal resident under this provision but he or she achieves majority before enrolling in an institution of higher education, that person will not lose the benefit of this provision if the following conditions are met:

- a. Upon achieving majority the person must act, as much as possible, in a manner consistent with bona fide legal residence in North Carolina; and
- b. The person must begin enrollment at an institution of higher education not later than the fall academic term next following completion of education prerequisite to admission at the institution.

2. If, immediately prior to beginning an enrolled term, the minor has lived in North Carolina for five or more consecutive years in the home of an adult relative (other than a parent) who is a legal resident of North Carolina, and if the adult relative, during those years, has functioned as a de facto guardian of the minor, then the minor is considered a legal resident of North Carolina for tuition purposes. If a minor qualified for resident status for tuition purposes under this provision immediately prior to his or her eighteenth birthday, then, upon becoming eighteen, he or she will be deemed to be a legal resident of North Carolina of at least twelve months' duration.

3. Even though a person is a minor, under certain circumstances the person may be treated by the law as being sufficiently independent from his or her parents as to enjoy a species of adulthood for legal purposes. If the minor marries or obtains a judicial decree of emancipation under N.C. Gen. Stat. §7A-717, *et seq.*, he or she is emancipated. The consequence, for present purposes, of such emancipation is that the affected person is presumed to be capable of establishing a domicile independent of that of the parents; it remains for that person to demonstrate that a separate domicile has, in fact, been established.

Prisoners. There are special provisions concerning domicile of prisoners. For more information, persons to whom these provisions may apply should consult the *Manual*.

Property and Taxes. Ownership of property in or payment of taxes to the State of North Carolina apart from legal residence will not qualify one for the in-state tuition rate.

Students or prospective students who believe that they are entitled to be classified residents for tuition purposes should be aware that the processing of requests and appeals can take a considerable amount of time and that applications for classification should not be delayed until registration, when the number of applications makes accelerated handling impossible.

MILITARY TUITION BENEFIT¹

Certain members of the Armed Services, and their dependent relatives, who are not residents for tuition purposes may become eligible to be charged less than the out-of-state tuition rate under N.C. Gen. Stat. §116-143.3, the military tuition benefit provision. Any person seeking the military tuition benefit must qualify for admission to UNC-CH and must file an application for the benefit with his or her admissions office before the first day of classes of the term for which he or she initially seeks the benefit. To remain eligible to receive the military tuition benefit, he or she must file another application for the benefit before the first day of classes of the first term in which he or she is enrolled in each academic year. The burden of proving eligibility for the military tuition benefit lies with the applicant for the benefit, and the application and all required supporting affidavits must be complete and in proper order before the first day of classes of the term in question. Because of the time involved in securing the necessary affidavits from the appropriate military authorities, prospective applicants for the military tuition benefit are urged to secure application forms from their admissions offices and begin the application process several weeks before the first day of classes of the term for which they seek the benefit.

Eligibility of Members of the Armed Services. Eligible members of the Armed Services pay a rate of tuition computed by applying a statutory formula which is dependent, in part, on the amount of money payable by their Service employer to them or to the institution by reason of their enrollment. Application of the statutory formula yields the following results: if the service member's education is being fully funded by the Service employer, the amount of tuition owed is equal to out-of-state tuition; if the member's education is not being funded by his or her Service employer, he or she pays an amount equal to in-state tuition; and if the Service employer is providing partial educational funding, the amount of tuition owed depends on the amount of funding contributed by the Service employer.

To be eligible for this military tuition benefit, the individual must

- a. be a member of the United States Air Force, Army, Coast Guard, Marine Corps, Navy, North Carolina National Guard, or a reserve component of one of these services; and
- b. be abiding in North Carolina incident to active military duty which is performed at or from a duty station in North Carolina.

Eligibility of Dependent Relatives of Service Members. If the service member meets the conditions set forth above, his or her dependent relatives may be eligible to pay the in-state tuition rate if they share the service member's North Carolina abode and if they have complied with the requirements of the Selective Service System, if applicable.

If the service member voluntarily ceases to live in North Carolina or is involuntarily absent from the state on military orders (other than absences on routine maneuvers and temporary assignments), he or she is deemed to have moved his or her abode from North Carolina. If a dependent relative of a service member has become eligible for the military tuition benefit and, after the beginning of the term of eligibility, the service member moves his or her abode from North Carolina, the dependent relative will continue to be eligible for the military tuition benefit only for the remainder of that academic year. An academic year runs from the first day of classes of the fall semester through the last day of exams of the following summer session, second term.

For a detailed explanation of the military tuition benefit provision (including an explanation of the formula used to compute the tuition rate for service members), a complete list of categories of persons who are considered "dependent relatives" for purposes of establishing eligibility for the military tuition benefit, and information about the registration requirements of the Selective Service System, applicants should consult *A Manual to Assist the Public Higher Education Institutions of North Carolina in the Matter of Student Residence Classification for Tuition Purposes* (as amended September 1985). This *Manual* is available for inspection in the Admissions Offices of the University. Copies of the *Manual* are also on reserve at the Robert B. House Undergraduate Library.

¹The information in this section comes from three sources: (i) North Carolina General Statutes, §116-143.3, (ii) *A Manual to Assist the Public Higher Education Institutions of North Carolina in the Matter of Student Residence Classification for Tuition Purposes*, Revised September 1985, (iii) Chancellor's Rules and Procedures for Residence Classification of Students for Tuition Purposes and Determination of Eligibility for the Special Military Tuition Benefit.

Appeals of Eligibility Determinations of Admissions Officers. A student appeal of an eligibility determination made by any admissions officer must be in writing and signed by the student and must be filed by the student with that officer within fifteen working days after the student receives notice of the eligibility determination. The appeal is transmitted to the Residence Status Committee by that officer, who does not vote in that Committee on the disposition of such appeal. The student is notified of the date set for consideration of the appeal, and, on request of the student, he or she is afforded an opportunity to appear and be heard by the Committee.

Any student desiring to appeal a determination of the Residence Status Committee must give notice in writing of that fact to the Chairman of the Residence Status Committee within ten days of receipt by the student of the Committee's decision. The Chairman will promptly process the appeal for transmittal to the State Residence Committee.

THE FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT

As a general rule, under the federal Family Educational Rights and Privacy Act (FERPA), personally identifiable information may not be released from a student's education records without his or her prior written consent. Exceptions to this rule are set out in the FERPA regulations and the FERPA policy of The University of North Carolina at Chapel Hill.

UNC-CH will disclose personally identifiable information from education records, without the student's prior written consent, to officials of another school or school system in which the student seeks or intends to enroll.

UNC-CH also makes public certain information that has been designated as "directory information": the student's name, address, telephone listing, date and place of birth, major field of study, class, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, and the most recent previous educational agency or institution attended by the student. Examples of ways in which some of this information is made public include: names of students who receive honors and awards, who make the Dean's List, who hold offices, or who are members of athletic teams. The annual commencement program publishes the names of degree recipients. The University also publishes the *Campus Directory* annually, and some professional and graduate student groups publish directories of students in their departments or schools.

Students who do not wish to have any or all "directory information" made public without their prior consent, must send the Office of the University Registrar (105 Hanes Hall, The University of North Carolina at Chapel Hill) a signed and dated notice specifying items that are not to be published. To ensure that a listing for the student will not appear in the *Campus Directory*, this notice must be received by the Office of the University Registrar by the end of the registration period for the semester or session of first enrollment or, after an absence, of reenrollment. Such a notice will be honored until the student graduates, ceases to attend, or withdraws from the University unless the student notifies the Office of the University Registrar to the contrary in writing.

Students also have the right to inspect their "education records" as defined in the FERPA regulations. They may not inspect financial records and statements of their parents; confidential letters of recommendation placed in their education records before January 1, 1975 (with some exceptions); or confidential letters of recommendation placed in their education records after January 1, 1975, if they have waived their rights to inspect and review such letters.

A student who believes that information in his or her education records is inaccurate or misleading or violates his or her privacy or other rights may request that the institution amend the records, and if the request is denied, he or she has the right to a hearing. If, after the hearing, the institution decides that the information is not inaccurate, misleading, or violative of privacy or other rights, the student has a right to place a statement in those records commenting on the information in question or giving the student's reasons for disagreeing with the institutional decision. The student may also place such a statement in his or her records in lieu of requesting a hearing. Complaints alleging violations of FERPA rights may also be filed with the U.S. Department of Education.

Questions about FERPA should be addressed to the Legal Adviser to the Special Assistant to the Chancellor, 01 South Building. The text of FERPA and its regulations and the University's FERPA policy are also available for inspection in 01 South Building.

FIREARMS AND OTHER WEAPONS

The possession of any gun, rifle, pistol, dynamite cartridge, bomb, grenade, mine, explosive, bowie knife, dirk, dagger, slingshot, leaded cane, switchblade knife, blackjack, metallic knuckles, or any other weapons of like kind upon any University campus or in any University owned or operated facility is unlawful and contrary to University policy. Violation of this prohibition is a misdemeanor punishable by a fine not to exceed \$500 and/or six months' imprisonment, and may constitute a violation of the Campus Code.

IMMUNIZATION REQUIREMENT

Effective July 1, 1986, North Carolina State law requires that no person shall attend a college or university in North Carolina unless a certificate of immunization indicating that the person has received the immunizations required by the law is presented to the college or university on or before the first day of matriculation. Students enrolled at UNC-CH on July 1, 1986 are exempt from this requirement.

If the UNC-CH Medical History Form containing the certificate of immunization is not in the possession of the UNC-CH Student Health Service ten (10) days prior to the registration date, the University shall present a notice of deficiency to the person. The person shall have 30 calendar days from the first day of attendance to obtain the required immunizations. Those persons who have not complied with the immunization requirements by the end of 30 calendar days will be *administratively withdrawn* from the University.

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