

**Record of
The University of
North Carolina
At Chapel Hill**

April 9, 1976



**School of Public Health
1976 - 1977 Issue**

**PUBLISHED BY
THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL.
CHAPEL HILL, N.C.**

**Issued 16 times a year as follows: 1 in August, 2 in December, 3 in January,
2 in February, 3 in March, 3 in April, 1 in May, and 1 in June**

Second-class postage paid at Chapel Hill, N.C. 27514

**Send all Undeliverable Copies and Changes of Address to Deans Office, School
of Public Health, The University of North Carolina at Chapel Hill, Chapel Hill, N.C. 27514**

APRIL 9, 1976

NUMBER 834

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

THE ONE HUNDRED AND
EIGHTY-SECOND SESSION

**SCHOOL OF PUBLIC
HEALTH**

Announcements for the Session 1976-1977

**THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
CHAPEL HILL, N.C.**

THE UNIVERSITY OF NORTH CAROLINA

Sixteen Constituent Institutions

WILLIAM CLYDE FRIDAY, B.S., LL. B., LL.D., President

RAYMOND HOWARD DAWSON, B.A., M.A., Ph.D., Vice President—Academic Affairs

L. FELIX JOYNER, A.B., Vice President—Finance

JOHN L. SANDERS, A.B., J.D., Vice President—Planning

CLEON FRANKLIN THOMPSON, B.S., M.S., Acting Vice President—Student Services
and Special Programs

GEORGE ELDRIDGE BAIR, B.A., M.A., Ph.D., Director of Educational Television

CHARLES RAY COBLE, JR., B.S., M.A., Ph.D., Associate Vice President—Planning

JOHN B. DAVIS, JR., B.S., M.A., Ed.D., Associate Vice President—Institutional
Development and Special Programs

JAMES L. JENKINS, JR., A.B., Assistant to the President

EDGAR WALTON JONES, B.S., M.S., Ph.D., Associate Vice President—Research and
Public Service

JOHN P. KENNEDY, JR., S.B., B.A., M.A., J.D., Secretary of the University

ARNOLD KIMSEY KING, A.B., A.M., Ph.D., Assistant to the President

ROSCOE D. McMILLAN, JR., B.S., Assistant to the President for Governmental Affairs

RICHARD H. ROBINSON, JR., A.B., LL.B., Assistant to the President

ROBERT W. WILLIAMS, A.B., M.A., Ph.D., Associate Vice President—Academic Affairs

The University of North Carolina was chartered in 1789 and opened its doors to students at its Chapel Hill campus in 1795. Throughout most of its history, it has been governed by a Board of Trustees chosen by the Legislature and presided over by the Governor. During the period 1917-1972, the Board consisted of one hundred elected members and a varying number of *ex-officio* members.

By act of the General Assembly of 1931, without change of name, it was merged with The North Carolina College for Women at Greensboro and The North Carolina State College of Agriculture and Engineering at Raleigh to form a multicampus institution designated The University of North Carolina.

In 1963 the General Assembly changed the name of the campus at Chapel Hill to The University of North Carolina at Chapel Hill and that at Greensboro to The University of North Carolina at Greensboro and, in 1965, the name of the campus at Raleigh was changed to North Carolina State University at Raleigh.

Charlotte College was added as The University of North Carolina at Charlotte in 1965, and, in 1969, Asheville-Biltmore College and Wilmington College became The University of North Carolina at Asheville and The University of North Carolina at Wilmington respectively.

A revision of the North Carolina State Constitution adopted in November 1970 included the following: "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. The General Assembly shall provide for the selection of trustees of The University of North Carolina . . ." In slightly different language, this provision had been in the Constitution since 1868.

On October 30, 1971, the General Assembly in special session merged, without changing their names, the remaining ten state-supported senior institutions into the University as follows: 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. This merger, which resulted in a statewide multicampus university of sixteen constituent institutions, became effective on July 1, 1972.

The constitutionally authorized Board of Trustees was designated the Board of Governors, and the number was reduced to thirty-two members elected by the General Assembly, with authority to choose their own chairman and other officers. The Board is "responsible for the general determination, control, supervision, management, and governance of all affairs of the constituent institutions." Each constituent institution, however, has its own board of trustees of thirteen members, eight of whom are appointed by the Board of Governors, four by the Governor, and one of whom, the elected president of the student body, serves *ex officio*. The principal powers of each institutional board are exercised under a delegation from the Board of Governors.

Each institution has its own faculty and student body, and each is headed by a chancellor as its chief administrative officer. Unified general policy and appropriate allocation of function are effected by the Board of Governors and by the President with the assistance of other administrative officers of the University. The General Administration office is located in Chapel Hill.

The chancellors of the constituent institutions are responsible to the President as the chief administrative and executive officer of The University of North Carolina.

CALENDAR OF EVENTS 1976-1977

Summer Session

First Term

May 24, Monday

May 25, Tuesday

June 11, Friday

Registration.

Classes begin.

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 August graduation.

June 14, Monday

June 25, Friday

June 28-29, Monday-

Tuesday

Last day to *drop* a course.

Last class day.

Final course examinations.

Second Term

July 6, Tuesday

July 7, Wednesday

July 16, Friday

Registration.

Classes begin.

Doctoral dissertations and master's theses for candidates for the August graduation must be filed in the Graduate School by this date.

July 17, Saturday

Written examinations for master's candidates for the August graduation may not be taken after this date.

July 26, Monday

July 31, Saturday

Last day to *drop* a course.

Last day for final oral examinations for the master's or doctoral degrees for graduation in August.

August 6, Friday

August 9-10, Monday-

Tuesday

Last class day.

Final course examinations.

Fall Semester, 1976

August 23-25, Monday-
Wednesday

August 26, Thursday

August 26, Thursday

Registration.

Classes begin.

Examinations for proficiency and reading knowledge in English given at 5 P.M. in 101 Greenlaw.

September 6, Monday

October 1, Friday

Holiday.

Last day for submitting an application for 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.

November 20, Saturday

Written examinations for master's candidates for the December graduation may not be taken after this date.

November 23, Tuesday

Doctoral dissertations and master's theses for candidates for the December graduation must be filed in the Graduate School by this date.

November 24, Wednesday

November 29, Monday

November 29, Monday

Thanksgiving recess begins at 1 P.M.

Classes resume at 8 A.M.

Last day to *drop* a course.

December 4, Saturday	Last day for the final oral examinations for the master's or doctoral degrees for December graduation.
December 7, Tuesday	Last class day.
December 9-18, Thursday-Saturday, Monday-Saturday	Final course examinations.

Spring Semester, 1977

January 10-11, Monday— Tuesday	Registration.
January 12, Wednesday	Classes begin.
January 21, 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 May Commencement.
March 7, Monday	Spring recess begins at 8 A.M.
March 14, Monday	Classes resume at 8 A.M.
March 18, Friday	Doctoral dissertations and master's theses for candidates for the May Commencement must be filed in the Graduate School by this date.
April 11, Monday	Holiday.
April 16, Saturday	Written examinations for master's candidates for the May Commencement may not be taken after this date.
April 18, Monday	Last day to <i>drop</i> a course.
April 26, Saturday	Last day for final oral examinations for the master's or doctoral degrees for graduation in May.
April 28, Thursday	Last class day.
May 2-11, Monday-Saturday, Monday-Wednesday	Final course examinations.
May 15, Sunday	Commencement.

TABLE OF CONTENTS

Officers of Administration	7
Faculty	8
General Information	17
Admission Policies	19
Application for Admission	19
Tuition and Fees	20
Summer School	20
Residence Status for Tuition Payment	20
Southern Regional Education Board Tuition Contract	25
Registration and Payment of Bills	25
Application Fee and Admission Deposit	26
Automobile Regulations	26
Housing, Food, Laundry and Linen Service	27
Traineeships, Assistantships, Fellowships and Loans	28
The Margaret Blee — Ruth Warwick Hay Scholarship	28
Student Health Service	29
Recreation	29
Libraries	29
Notice on Directory Information	29
Academic Information	31
Grades	31
Delta Omega	31
Degrees Offered	31
Division of Community Health Service	40
Technical Assistance	41
Continuing Education	41
Field Relations	42
Off Campus Degree Programs	42
Area Health Education Centers	43
Division of Health Measurement and Analysis	43
Population Program	44
Biostatistics	46
Environmental Sciences and Engineering	50
Epidemiology	68
Health Administration	72
Health Education	78
Maternal and Child Health	80
Nutrition	84
Parasitology	89
Public Health Nursing	93
Courses of Instruction	98

OFFICERS OF ADMINISTRATION

THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

NELSON FEREBEE TAYLOR, LL.B., Chancellor

SUSAN H. EHRINGHAUS, J.D., Assistant to the Chancellor

JOHN PARKHILL EVANS, Ph.D., Assistant to the Chancellor

SARAH VIRGINIA DUNLAP, B.S., Secretary to the University

C. HUGH HOLMAN, Ph.D., Special Assistant to the Chancellor

DONALD ARTHUR BOULTON, Ed.D., Dean of Student Affairs

WILLIAM WILFRED COBEY, Jr. Director of Athletics

DOUGLASS HUNT, LL.B., Vice Chancellor, Administration

CLAIBORNE STRIBLING JONES, Ph.D., Vice Chancellor, Business and Finance

LYLE VINCENT JONES, Ph.D., Dean of the Graduate School and Vice Chancellor

WILLIAM FREDERICK LITTLE, Ph.D., Vice Chancellor, Development and Public
Service

JOHN CHARLES MORROW III, Ph.D., Provost

CECIL GEORGE SHEPS, M.D., Vice Chancellor, Health Sciences

THE SCHOOL OF PUBLIC HEALTH

BERNARD G. GREENBERG, B.S., Ph.D., Dean of the School

CHARLES L. HARPER, B.A., M.S.P.H., Ph.D., Associate Dean

JOHN EDGAR LARSH, JR., A.B., M.S., Sc.D., Associate Dean

ROBERT B. MOORHEAD, B.A., M.P.A., Associate Dean

ERNEST SCHOENFELD, A.A.S., B.S., Assistant Dean

WILLIAM T. SMALL, B.S., M.S.P.H., Assistant Dean

Administrative Board

REBECCA B. BRYAN, M.S., M.P.H., Associate Professor of Nutrition

HILTON T. GOULSON, A.B., M.S.P.H., Ph.D., Professor of Parasitology and Laboratory
Practice

BERNARD G. GREENBERG, B.S., Ph.D., Dean of the School and Kenan Professor of
Biostatistics

MICHEL A. IBRAHIM, M.D., M.P.H., Ph.D., Professor of Epidemiology

VIRGINIA MARGARET NELSON, B.A., R.N., B.S., M.P.H., Associate Professor of
Public Health Nursing

CECIL GEORGE SHEPS, M.D., Vice Chancellor, Health Sciences

MORRIS A. SHIFFMAN, D.V.M., M.P.H., Docteur-Veterinaire, M.G.A., Ph.D., Professor
of Environmental Health

EARL SIEGEL, B.S., M.D., M.P.H., Professor of Maternal and Child Health

MICHAEL JOSEPH SYMONS, B.A., M.P.H., Ph.D., Assistant Professor of Biostatistics

MORTON I. TEICHER, M.S.W., Ph.D., Professor of Social Work

JAMES E. VENEY, B.A., M.S., Ph.D., Associate Professor of Health Administration

DONALD W. WARREN, D.D.S., M.S., Ph.D., Professor of Dental Ecology

Dean's Cabinet

BERNARD G. GREENBERG, B.S., Ph.D., Dean of the School of Public Health and
Kenan Professor of Biostatistics

RUSSELL F. CHRISTMAN, B.S., M.S., Ph.D., Professor of Environmental Biology

- JOSEPH CHIKE EDOZIEN, D.Sc., M.D., F.R.C.P. (Ed.), F.R.C. Path., Professor of Nutrition
- JAMES ENNIS GRIZZLE, B.S., M.S., Ph.D., Professor of Biostatistics
- CHARLES L. HARPER, B.A., M.S.P.H., Ph.D., Associate Professor of Health Administration and Associate Dean for Community Health Service
- MICHEL A. IBRAHIM, M.D., M.P.H., Ph.D., Professor of Epidemiology
- SAGAR C. JAIN, B.A., M.A., A.M., Ph.D., Professor of Health Administration
- JOHN EDGAR LARSH, JR., B.A., M.S., Sc.D., Professor of Parasitology and Laboratory Practice
- NAOMI M. MORRIS, B.A., M.D., M.P.H., Professor of Maternal and Child Health
- GUY W. STEUART, M.Ed., M.P.H., M.A., Ph.D., Professor of Health Education
- DOROTHY McCOMB TALBOT, B.S.N., M.A., M.P.H., Ph.D., Professor of Public Health Nursing
- MYRNA JEAN AAVEDAL, R.N., B.S., M.A., Student Representative
- DAVID WALTER SCHNARE, B.A., Student Representative

Faculty

- JAMES RALPH ABERNATHY, B.S., M.S.P.H., Ph.D., Professor of Biostatistics
- LIBERO AJELLO, A.B., M.A., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- JAMES E. ALLEN, B.A., S.T.B., Ph.D., M.S.P.H., Associate Professor of Health Administration
- AUBREY P. ALTSHULLER, B.S., M.S., Ph.D., Adjunct Professor of Air Chemistry
- JOHN J. B. ANDERSON, M.A., Ph.D., Associate Professor of Nutrition
- RICHMOND K. ANDERSON, B.A., M.S., Ph.D., M.D., M.P.H., Dr.Sc. (Hon), Adjunct Professor of Nutrition
- DRAGANO ANDJELKOVIC, M.S., M.P.H., Dr.P.H., Assistant Professor of Epidemiology
- LEONARD AURAND, B.S., M.S., Ph.D., Adjunct Professor of Nutrition
- ¹HERMAN GLENN BAITY, A.B., B.S., M.S., Sc.D., LL.D., Professor of Sanitary Engineering, Emeritus
- GEORGE ERIC BARNES, B.S.C.E., C.E. (hon), M.A., Professor of Sanitary Engineering, Emeritus
- GRAHAM BARNES, S.T.B., M.A., Lecturer in Health Administration
- HOWARD BARNHILL, B.S., M.S.P.H., Associate Professor of Health Education
- HARRIET HYLTON BARR, A.B., M.P.H., Assistant Professor of Health Education
- PATRICIA Z. BARRY, B.A., M.A., Dr.P.H., Assistant Professor of Health Administration
- MARIO C. BATTIGELLI, M.D., M.P.H., Professor of Occupational Health
- KARL E. BAUMAN, A.B., M.A., Ph.D., Associate Professor of Maternal and Child Health
- TERRY L. BAZZARRE, M.S., Ph.D., Instructor in Nutrition
- DAN EDWARD BEAUCHAMP, B.A., M.A., Ph.D., Assistant Professor of Health Administration
- CAROLINE BECKER, A.B., M.D., Assistant Professor of Epidemiology
- RICHARD E. BILSBORROW, B.A., M.A., Ph.D., Assistant Professor of Biostatistics
- MARTHA E. BLAKE, B.S., M.A., Lecturer in Biostatistics
- MARGARET BLEE, R.N., B.S., M.Ed., Professor of Public Health Nursing, Emeritus
- RALPH HENRY BOATMAN, JR., B.Ed., M.P.H., Ph.D., Professor of Health Education

¹ Died April 6, 1975

- MARION ELIZABETH BRANNON, B.S., M.S., Assistant Professor of Nutrition
- DON J. BRENNER, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- KENNETH BRIDBORD, M.D., M.P.H., Adjunct Assistant Professor of Epidemiology
- MARION M. BROOKE, A.B., M.A., Sc.D., Adjunct Associate Professor of Laboratory Practice (field)
- JOHN B. BROOKS, B.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- JAMES CLEMENT BROWN, B.S.C.E., M.S.S.E., Associate Professor of Sanitary Engineering
- NORMAN DEPAUL BROWN, B.S., M.S., Instructor of Public Health Nursing
- REBECCA B. BRYAN, B.S., M.S., M.P.H., Associate Professor of Nutrition
- B. J. CAMPBELL, B.A., M.A., Ph.D., Adjunct Associate Professor of Health Administration
- JOHN CHARLES CASSEL, B.S., M.B., B.Ch., M.P.H., Alumni Distinguished Professor of Epidemiology, Emeritus
- ELMER F. CHAFFEE, B.S., M.S.P.H., Ph.D., Associate Professor of Parasitology and Laboratory Practice
- EMIL THEODORE CHANLETT, B.S., M.S.P.H., M.S.S.E. Professor of Sanitary Engineering
- WILLIAM BAILEY CHERRY, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- SIDNEY SHAW CHIPMAN, B.A., M.D., M.P.H., Professor of Maternal and Child Health, Emeritus
- RUSSELL F. CHRISTMAN, B.S., M.S., Ph.D., Professor of Environmental Sciences and Engineering
- EVA CLAYTON, B.S., M.S., Adjunct Assistant Professor of Health Education
- NORA FRANCES CLINE, R.N., B.S., M.L., Associate Professor of Mental Health
- WARREN A. COOK, A.B., Adjunct Professor of Industrial Health
- JOAN CLAIRE CORNONI, B.A., M.P.H., Ph.D., Associate Professor of Epidemiology
- ²IRENE D. COURTENAY, R.N., B.S., M.P.H., (I.H.) Assistant Professor of Occupational Health Nursing
- ELIZABETH JACKSON COULTER, A.B., A.M., Ph.D., Professor of Biostatistics
- DONALD R. DANCY, B.S., M.P.H., Adjunct Assistant Professor of Health Education
- GRACE H. DANIEL, A.B., M.S.P.H., Adjunct Assistant Professor of Health Education
- ERWIN M. DANZIGER, B.S., M.B.A., Lecturer in Health Administration
- ABRAHAM S. DAVID, B.S., M.S., Ph.D., M.S.P.H., Adjunct Associate Professor of Health Administration
- CLARENCE E. DAVIS, B.A., M.S., Ph.D., Assistant Professor of Biostatistics
- LEONARD H. DAWSON, A.B., M.S.P.H., Assistant Professor of Health Education
- DAVID DEUBNER, M.D., M.P.H., Adjunct Assistant Professor of Epidemiology
- CHESTER W. DOUGLASS, D.D.S., M.P.H., Assistant Professor of Health Administration
- WALTER DOWDLE, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- VULUS RAYMOND DOWELL, JR., B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- GEORGE GRUNDY DUDNEY, B.S., D.D.S., M.P.H., Adjunct Assistant Professor of Health Administration
- JOANNE EARP, B.A., Sc.D., Assistant Professor of Health Education
- ELIZABETH M. EDMANDS, R.N., B.S.P.H.N., M.A., Associate Professor of Public Health Nursing and Maternal and Child Health

²Resigned August 11, 1975

- JOSEPH C. EDOZIEN, D.Sc., M.D., F.R.C.P. (Ed.), F.R.C. Path., Professor of Nutrition
- REGINA CECYLIA ELANDT-JOHNSON, M.S., Ph.D., Professor of Biostatistics
- ROBERT CLAUDE ELSTON, B.A., Dip. Ag., M.A., Ph.D., Professor of Biostatistics
- JOHN J. FARMER, III, B.S., Ph.D., Adjunct Associate Professor of Laboratory Practice
(field)
- JOHN C. FEELEY, A.B., Ph.D., Adjunct Associate Professor of Laboratory Practice
(field)
- MERREL D. FLAIR, B.S., M.S., Ph.D., Associate Professor of Health Education
- WILLIAM SHOEMAKER FLASH, A.B., M.P.A., Ph.D., Associate Professor of Health
Administration
- JOHN E. FORNEY, B.A., M.A., Ph.D., Adjunct Associate Professor of Laboratory
Practice (field)
- JOHN W. FOSTER, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory
Practice (field)
- DONALD L. FOX, B.S., Ph.D., Assistant Professor of Air Hygiene
- MILDRED E. FRANCIS, B.S., M.S., Sc.D., Assistant Professor of Biostatistics
- DONALD E. FRANCISCO, B.A., M.A., Ph.D., Lecturer in Environmental Biology
- DAVID ALLISON FRASER, B.A., M.S., D.Sc., Professor of Industrial Health
- MOYE WICKS FREYMAN, B.S., M.D., M.P.H., Dr.P.H., Professor of Health
Administration
- JOHN THOMAS FULTON, D.D.S., Professor of Dental Epidemiology, Emeritus
- MICHAEL L. FURCOLOW, B.A., M.D., M.A., Adjunct Associate Professor of Labora-
tory Practice (field)
- HAMED ABOU GAMRAH, B.A., Dip. Stat., Ph.D., Visiting Assistant Professor of
Biostatistics
- STEPHEN H. GEHLBACH, B.A., M.D., M.P.H., Adjunct Assistant Professor of
Epidemiology
- ROSE GERALDINE GEORGE, R.N., B.S., M.S., Assistant Professor of Public Health
Nursing
- DENNIS B. GILLINGS, B.Sc., Dip. Math. Stat., Ph.D., Assistant Professor of
Biostatistics
- LEONARD J. GOLDWATER, A.B., M.D., M.Sc.D., M.S.P.H., Adjunct Professor of
Occupational Medicine
- LAUREL F. GOOCH, B.A., M.A., Instructor in Health Administration
- HILTON THOMAS GOULSON, A.B., M.S.P.H., Ph.D., Professor of Parasitology and
Laboratory Practice
- GERALDINE GOURLEY, B.S., Ph.B., M.S.W., Associate Professor of Maternal and
Child Health
- BERNARD GEORGE GREENBERG, B.S., Ph.D., Kenan Professor of Biostatistics
- ROBERT A. GREENBERG, A.B., M.D., Lecturer in Maternal and Child Health
- JAMES ENNIS GRIZZLE, B.S., M.S., Ph.D., Professor of Biostatistics
- PRISCILLA A. GUILD, B.S., M.S.P.H., Adjunct Instructor in Biostatistics
- LILLIAN GURALNICK, B.A., M.Sc., Adjunct Professor of Biostatistics
- PATRICIA GUSTAVESON, A.B., M.S.W., Lecturer in Maternal and Child Health
- THOMAS L. HALL, M.D., M.P.H., Dr.P.H., Professor of Health Administration and
Director, Carolina Population Center

- JEROME BOYD HALLAN, B.S., M.S.P.H., Dr.P.H., Adjunct Associate Professor of Health Administration
- MICHAEL HAMILTON, B.M., M.D., M.P.H., Adjunct Assistant Professor of Epidemiology
- DOUGLAS I. HAMMER, M.D., M.P.H., Adjunct Assistant Professor of Epidemiology
- CHARLES L. HARPER, B.A., M.S.P.H., Ph.D., Associate Professor of Health Administration and Associate Dean for Community Health Service
- ROBERT L. HARRIS, B.S.Ch.E., M.S., Ph.D., Associate Professor of Environmental Engineering
- JAMES P. HASS, B.A., Ph.D., Adjunct Assistant Professor of Environmental Chemistry and Biology
- JOHN WESLEY HATCH, B.A., M.S.W., Dr.P.H., Associate Professor of Health Education
- CARL GROOVER HAYES, B.S., M.P.H., Ph.D., Adjunct Assistant Professor of Epidemiology
- MILTON SYDNEY HEATH, JR., A.B., LL.B., Professor of Water Resources
- RONALD W. HELMS, B.A., M.A., Ph.D., Associate Professor of Biostatistics
- JAMES RICHARD HENDRICKS, B.S., M.S., Ph.D., Associate Professor of Parasitology and Laboratory Practice
- WILLIAM THEODORE HERZOG, B.A., M.S.P.H., Assistant Professor of Health Administration and Director of Off-Campus Programs
- MARION E. HIGHRITER, B.A., M.N., R.N., M.P.H., S.D. in Hyg., Associate Professor of Public Health Nursing
- MARTIN PATTERSON HINES, D.V.M., M.P.H., Adjunct Associate Professor of Health Administration
- GODFREY M. HOCHBAUM, B.A., M.A., Ph.D., Professor of Health Education
- DAVID G. HOEL, B.A., Ph.D., Adjunct Associate Professor of Biostatistics
- MICHAEL HOGAN, M.S., M.P.H., Ph.D., Adjunct Assistant Professor of Epidemiology
- CAROL R. HOGUE, A.B., M.P.H., Ph.D., Assistant Professor of Biostatistics
- ELIZABETH STEPHENS HOLLEY, B.A., R.N., M.A., Adjunct Associate Professor of Public Health Nursing
- LYDIA SAY HOLLEY, A.B., R.P.T., M.P.H., Associate Professor of Health Administration
- WILLIAM G. HOLLISTER, A.B., B.S., M.D., M.P.H., Research Professor of Health Administration
- DANIEL G. HORVITZ, B.S., Ph.D., Adjunct Professor of Biostatistics
- JAMES HOUSE, Ph.D., Adjunct Assistant Professor of Epidemiology
- DAVID H. HOWELLS, B.S.C.E., M.S.S.E., Professor of Environmental Engineering
- MAYNARD MICHAEL HUFSCHMIDT, B.S., M.P.A., D.P.A., Professor of Regional and Environmental Planning
- JOHN THOMAS HUGHES, B.S., D.D.S., M.P.H., Dr.P.H., Professor of Health Administration and Director, Continuing Education
- BARBARA SORENSON HULKA, B.A., M.S., M.D., M.P.H., Associate Professor of Epidemiology
- JAROSLAV FABIAN HULKA, B.S., M.D., Associate Professor of Maternal and Child Health
- MICHEL AYOUB IBRAHIM, M.D., M.P.H., Ph.D., Professor of Epidemiology
- SAGAR C. JAIN, B.A., M.S., Ph.D., Professor of Health Administration
- SHERMAN A. JAMES, A.B., Ph.D., Assistant Professor of Epidemiology
- HARVEY E. JEFFRIES, B.S., M.S.P.H., Ph.D., Assistant Professor of Air Hygiene
- CYNTHIA B. JENKINS, B.A., M.S.W., M.P.H., Instructor in Maternal and Child Health
- MABEL S. JOHANSSON, R.N., B.S., M.P.H., Adjunct Assistant Professor of Public Health Nursing

- ALBERT L. JOHNSON, B.A., M.A., M.P.H., Ph.D., Associate Professor of Health Administration
- J. DONALD JOHNSON, B.S., Ph.D., Professor of Environmental Chemistry
- RITA JOHNSON, A.A., B.A., M.A., Ed.D., Associate Professor of Health Education
- RICHARD E. JOHNSTON, B.S., M.S., Ph.D., Adjunct Associate Professor of Radiological Hygiene
- WILLIAM BURNS JONES, B.S., M.D., M.P.H., Adjunct Associate Professor of Health Administration
- DANIEL C. JONES, M.E., E.E., J.D., Lecturer in Health Administration
- ARNOLD DANIEL KALUZNY, B.A., M.H.A., Ph.D., Professor of Health Administration
- BERTON H. KAPLAN, B.S., M.S., Ph.D., Professor of Epidemiology
- ELLEN B. KAPLAN, B.S., M.A., Instructor (part-time) in Biostatistics
- WILLIAM KAPLAN, B.S., M.P.H., D.V.M., Adjunct Associate Professor of Laboratory Practice (field)
- LEO KAUFMAN, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- FLORENCE KAVALER, B.A., M.D., M.S., M.P.H., Adjunct Associate Professor of Health Administration
- ROSEMARY MAY KENT, B.A., M.A., Ph.D., Associate Professor of Health Education, Emeritus
- JOHN C. KEY, B.S., M.S.P.H., M.S.W., Ph.D., Adjunct Assistant Professor of Health Education
- JEROME KIRK, B.A., Ph.D., Adjunct Associate Professor of Health Education
- JUDY CLEM KLAAS, B.A., M.P.H., Ph.D., Assistant Professor of Parasitology
- DAVID G. KLEINBAUM, A.B., A.M., Ph.D., Assistant Professor of Biostatistics
- LYNN K. KNAUFF, B.A., M.S.P.H., Assistant Professor of Maternal and Child Health
- EDNA H. KNOTT, B.S., M.P.H., Adjunct Instructor in Laboratory Practice
- GARY KOCH, B.S., M.S., Ph.D., Associate Professor of Biostatistics
- JACOB KOOMEN, B.S., M.D., M.P.H., Adjunct Professor of Health Administration
- HANS E. KRUSA, B.A., M.S., M.S.P.H., Ph.D., Lecturer in Health Administration
- ROY R. KUEBLER, JR., A.B., M.A., Ph.D., Professor of Biostatistics
- EDWARD J. KUENZLER, B.S., M.S., Ph.D., Professor of Environmental Biology
- LAWRENCE L. KUPPER, B.S., M.S., Ph.D., Assistant Professor of Biostatistics
- PETER A. LACHENBRUCH, B.A., M.S., Ph.D., Professor of Biostatistics
- JAMES C. LAMB III, B.S.C.E., M.S., S.E., Sc.D., Professor of Sanitary Engineering
- CHARLES H. LANGLEY, B.A., Ph.D., Adjunct Assistant Professor of Biostatistics
- JOHN EDGAR LARSH, JR., B.A., M.S., Sc.D., Professor of Parasitology and Laboratory Practice, and Associate Dean for Academic Affairs
- DONALD T. LAURIA, B.C.E., M.S.S.E., Ph.D., Associate Professor of Environmental Engineering
- KERRY L. LEE, B.S., M.S., Ph.D., Adjunct Assistant Professor in Biostatistics
- DOROTHEA CROSS LEIGHTON, A.B., M.D., Professor, Emeritus
- SUSAN LIEBERMAN, B.A., M.C.P., Ph.D., Adjunct Assistant Professor of Health Education
- FORREST E. LINDER, B.A., M.A., Ph.D., Professor of Biostatistics and Director of Laboratories for Population Statistics
- JOAN W. LINGNER, B.S., M.S., Ph.D., Assistant Professor of Biostatistics
- LINDA WEST LITTLE, B.A., M.S.P.H., Ph.D., Associate Professor of Environmental Biology

- FRANK ALOYSIUS LODA, B.A., M.D., Lecturer in Maternal and Child Health
- ROBERT A. LODDENGGAARD, B.E.E., M.S.P.H., Lecturer in Health Administration
- G. J. LOVE, B.S., M.P.H., D.Sc., Adjunct Assistant Professor of Epidemiology
- ANDERS S. LUNDE, B.A., M.A., Ph.D., Adjunct Professor of Biostatistics
- DONALD L. MADISON, B.M.E., M.D., Associate Professor of Health Administration
- LYNN GRAY MADDRY, B.S., M.S.P.H., Ph.D., Adjunct Associate Professor of Laboratory Practice
- JEAN F. MARTIN, M.D., M.S.P.H., Lecturer in Maternal and Child Health
- EUGENE S. MAYER, B.S., M.D., M.P.H., Adjunct Assistant Professor of Epidemiology
- WILLIAM FRED MAYES, B.S., M.D., M.P.H., Professor Emeritus of Health Administration, Dean Emeritus
- MARIE J. McINTYRE, R.N., B.S., M.S., Hyg., Associate Professor of Public Health Nursing
- ³FREDERICK E. McJUNKIN, B.C.E., M.S.S.E., Associate Professor of Environmental Engineering
- MARY HELEN McLACHLAN, M.A., Visiting Lecturer, Nutrition
- ANTHONY McMICHAEL, B.S., M.D., Ph.D., Assistant Professor of Epidemiology
- C. ARDEN MILLER, M.D., Professor of Maternal and Child Health
- FOREST O. MIXON, B.S., M.S., Ph.D., Adjunct Professor of Environmental Engineering
- BEATRICE BELL MONGEAU, B.S.P.H.N., M.P.H., Ph.D., Assistant Professor of Public Health Nursing
- MAX D. MOODY, A.B., M.A., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- ROBERT BURNS MOORHEAD, B.A., M.P.A., Lecturer in Health Administration, and Associate Dean for Administration
- DAVID H. MOREAU, B.S., M.S. (E.) Ph.D., Associate Professor, Systems Analysis
- LUCY SHIELDS MORGAN, A.B., M.A., M.S., Ph.D., Professor of Health Education, Emeritus
- ROBERT M. MORONEY, A.B., M.S.W., M.P.H., Ph.D., Associate Professor of Health Administration
- NAOMI MINNER MORRIS, B.A., M.D., M.P.H., Professor of Maternal and Child Health
- SARAH TAYLOR MORROW, B.S., M.D., M.P.H., Adjunct Professor of Maternal and Child Health
- CLAUDE WAYNE MOSS, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- VIRGINIA MARGARET NELSON, B.A., R.N., B.S., M.P.H., Associate Professor of Public Health Nursing
- WILLIAM C. NELSON, B.S., M.S., Ph.D., Adjunct Associate Professor of Biostatistics
- JANIS P. NEWTON, B.F.A., M.F.A., M.Ed., Lecturer in Health Education
- FREDERIC NORDSIEK, M.S., Ph.D., Adjunct Professor of Nutrition
- JOHN F. OBIJESKI, B.A., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- DANIEL A. OKUN, B.S.C.E., M.S., Sc.D., Kenan Professor of Environmental Engineering
- CHARLES R. O'MELIA, B.C.E., M.S.E., Ph.D., Professor of Environmental Sciences and Engineering
- ABDEL R. OMRAN, M.D., D.P.H., M.P.H., Dr.P.H., Professor of Epidemiology
- JAMES W. OSBERG, M.D., Adjunct Professor of Health Administration

³Resigned July 31, 1975

- ERSKINE L. PALMER, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- JAMES J. PALMERSHEIM, A.A., B.S., M.S., Ph.D., Adjunct Assistant Professor of Biostatistics
- RALPH CLINTON PATRICK, JR., A.B., A.M., Ph.D., Associate Professor of Epidemiology
- ERNEST A. PEARSON, JR., A.B., D.D.S., M.P.H., Adjunct Associate Professor of Health Administration
- MIRDZA L. PETERSON, B.A., M.S., Ph.D., Adjunct Associate Professor of Environmental Chemistry and Biology
- FREDERIC K. PFAENDER, B.S., M.S., Ph.D., Assistant Professor of Environmental Microbiology
- G. BRIGGS PHILLIPS, B.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- HARRY T. PHILLIPS, M.D., D.P.H., Professor of Health Administration
- LEO PINE, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- DANA E. A. QUADE, B.A., Ph.D., Professor of Biostatistics
- ALFRED W. RADEMAKER, B.S., M.S., Ph.D., Assistant Professor of Biostatistics
- K. V. RANGANATAHAN, M.B.B.S., B.Sc., M.P.H., Adjunct Associate Professor of Health Education
- ERNEST RATLIFF, LL.B., Adjunct Assistant Professor of Health Administration
- JOHN K. READ, B.S., M.S., Ph.D., Associate Professor of Parasitology and Laboratory Practice
- KENNETH L. READ, B.A., M.A., Ph.D., Visiting Assistant Professor of Biostatistics
- PARKER CRAMER REIST, B.S., S.M., S.M., Sc.D., Professor of Environmental Sciences and Engineering
- WILSON B. RIGGAN, B.S., Ph.D., Adjunct Associate Professor of Biostatistics
- PERRY S. RILEY, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- LYMAN A. RIPPERTON, B.A., B.S., Ph.D., Adjunct Professor of Air Hygiene
- DORIS EMMA ROBERTS, R.M., B.S., M.P.H., Ph.D., Adjunct Professor of Public Health Nursing
- ROSLYN Q. ROBINSON, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- JOHN RODAK, JR., A.B., S.M., Adjunct Assistant Professor of Health Administration
- FRANZ WESTON ROSA, B.S., M.D., M.P.H., Adjunct Professor of Maternal and Child Health
- JAMES A. ROSEBORO, Sc.B., Sc.M., Ph.D., Assistant Professor of Medical Physics
- LEONARD S. ROSENFELD, B.S., M.D., M.P.H., Professor of Health Administration
- NADINE H. RUND, B.A., Ph.D., Adjunct Associate Professor of Health Education
- EVA SALBER, M.B., D.P.H., M.D., Lecturer in Maternal and Child Health
- MINTA M. SAUNDERS, B.A., M.A., Ph.D., Research Assistant Professor of Maternal and Child Health
- WILLIAM L. SAYLOR, M.S., Adjunct Assistant Professor of Radiological Hygiene
- EARL SCHAEFER, B.S., M.A., Ph.D., Professor of Maternal and Child Health
- MORRIS SCHAEFER, B.S., M.A., D.P.A., Professor of Health Administration
- PHILIP E. SCHAMBRA, B.A., Ph.D., Adjunct Associate Professor of Environmental Management and Protection
- JEAN J. SCHUENEMAN, B.S., M.P.H., Adjunct Associate Professor of Air and Industrial Hygiene

- JAMES SCHWANKL, M.D., M.P.H., Instructor in Epidemiology
PRANAB K. SEN, B.S., M.S., Ph.D., Professor of Biostatistics
RICHARD H. SHACHTMAN, B.S., M.A., Ph.D., Associate Professor of Biostatistics
BABUBHAI V. SHAH, B.Sc., M.Sc., Ph.D., Adjunct Associate Professor of Biostatistics
CHARLES C. SHEPARD, B.S., M.S., M.B., M.D., Adjunct Associate Professor of
Laboratory Practice (field)
JABBAR K. SHERWANI, B.S.C.E., M.C.E., Ph.D., M.P.A., Associate Professor of
Systems Analysis and Hydrology
MORRIS A. SHIFFMAN, D.V.M., M.P.H., Docteur-Veterinaire, M.G.A., Ph.D., Professor
of Environmental Health
MARK S. SHUMAN, B.S., Ph.D., Associate Professor of Environmental Chemistry
CARL M. SHY, M.D., Dr.P.H., Research Professor of Epidemiology
EARL SIEGEL, B.S., M.D., M.P.H., Professor of Maternal and Child Health
PHILIP C. SINGER, B.C.E., M.S., S.M., Ph.D., Associate Professor of Environmental
Sciences and Engineering
CECIL SLOME, M.B., Ch.B., D.P.H., Professor of Epidemiology
WENDELL C. SMITH, B.S., M.S., Ph.D., Assistant Professor of Biostatistics
MARK D. SOBSEY, B.S., M.S., Ph.D., Assistant Professor of Environmental Micro-
biology
ALEXA M. SORANT, S.B., M.A., Instructor (part-time) in Biostatistics
DIRK J. SPRUYT, B.A., M.D., M.P.H., Assistant Professor of Health Administration
JAMES STEBBINGS, B.S., Sc.D., Adjunct Associate Professor of Epidemiology
ALLAN B. STECKLER, B.S., M.P.H., Dr.P.H., Lecturer in Health Education
ARTHUR C. STERN, M.E., M.S., D.E. (Hon.), Professor of Air Hygiene
GUY W. STEUART, M.A., M.Ed., M.P.H., Ph.D., Professor of Health Education
J. RICHARD STEWART, B.S., M.S., Ph.D., Assistant Professor of Biostatistics
JOHN A. STEWART, A.B., M.D., M.S., Adjunct Associate Professor of Laboratory
Practice (field)
E. BARBARA STOCKING, R.N., B.S., M.P.H., Associate Professor of Maternal and
Child Health (Nursing) and Public Health Nursing
FRANK T. STRITTER, A.B., M.A., Ph.D., Associate Professor of Health Education
CHIRAYATH SUCHINDRAN, B.Sc., M.Sc., M.S.P.H., Ph.D., Assistant Professor of
Biostatistics
W. DANIEL SUDIA, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory
Practice (field)
CORRINA SHERRON SUTTON, B.A., M.P.H., Ph.D., Adjunct Assistant Professor of
Laboratory Practice
BOYD R. SWITZER, M.A., Ph.D., Assistant Professor of Nutrition
MICHAEL JOSEPH SYMONS, B.A., M.P.H., Ph.D., Associate Professor of Biostatistics
DOROTHY M. TALBOT, R.N., B.S.N., M.A., M.P.H., Ph.D., Professor of Public Health
Nursing
PREM P. TALWAR, B.A., M.A., M.Sc., M.S.P.H., Ph.D., Adjunct Assistant Professor of
Biostatistics
JOEL M. TEITELBAUM, B.A., M.A., Ph.D., Research Assistant Professor of Nutrition
HELEN L. TIMMIN, B.A., M.P.H., Ph.D., Adjunct Associate Professor of Health
Education
CLYDE THORNSBERRY, B.S., Ph.D., Adjunct Associate Professor of Laboratory
Practice (field)
H. DENNIS TOLLEY, B.S., Ph.D., Adjunct Assistant Professor of Biostatistics
CRAIG D. TURNBULL, B.A., M.P.H., Ph.D., Assistant Professor of Biostatistics
ALVIS G. TURNER, JR., B.S., M.S.P.H., Ph.D., Associate Professor of Environmental
Sciences

- EUNICE NICKERSON TYLER, Ph.B., M.P.H., Ph.D., Professor of Health Education,
Emeritus
- HERMAN ALFRED TYROLER, A.B., M.D., Professor of Epidemiology
- J. RICHARD UDRY, B.S., M.A., Ph.D., Professor of Maternal and Child Health
- H. MAC VANDIVIERE, A.B., M.A., M.D., Adjunct Associate Professor of Laboratory
Practice (field)
- JAMES E. VENEY, B.A., M.S., Ph.D., Associate Professor of Health Administration
- EDWARD H. WAGNER, A.B., M.D., M.P.H., Assistant Professor of Epidemiology
- PATRICIA F. WALLER, A.B., M.S., Ph.D., Research Professor of Health Administration
- KENNETH W. WALLS, A.B., M.S., Ph.D., Adjunct Associate Professor of Laboratory
Practice (field)
- PHILLIP J. WALSH, B.S., M.S.P.H., Ph.D., Adjunct Assistant Professor of Radiological
Hygiene
- ARTHUR W. WALTNER, A.B., M.S., Ph.D., Professor of Radiological Science
- DAVID G. WARREN, A.B., J.D., Adjunct Professor of Health Administration
- JULIA DAY WATKINS, B.A., R.N., M.P.H., Associate Professor of Public Health
Nursing
- JAMES E. WATSON, JR., B.S., M.S., Ph.D., Assistant Professor of Radiological Hygiene
- ROBERT BRIGGS WATSON, B.S., M.D., M.P.H., Professor of Parasitology and
Laboratory Practice, Emeritus
- NORMAN FRED WEATHERLY, B.S., M.S., Ph.D., Professor of Parasitology and
Laboratory Practice
- STANLEY J. WEIDENKOPF, B.S.C.E., M.P.H., Eng.D., Professor of Environmental
Engineering, Emeritus
- CHARLES M. WEISS, B.S., Ph.D., Professor of Environmental Biology
- HENRY BRADLEY WELLS, B.A., M.S.P.H., Ph.D., Professor of Biostatistics
- BETTY BARBREY WEST, R.N., B.S., M.P.H., Adjunct Assistant Professor of Public
Health Nursing
- JANICE RUTH WESTABY, R.N., B.S., M.P.H., Adjunct Associate Professor of Health
Administration
- TONY L. WHITEHEAD, B.A., M.S.Hyg., Ph.D., Clinical Assistant Professor of Health
Education
- JEAN AUDREY WIGHT, B.S., M.S., Ed.D., Visiting Associate Professor of Nutrition
- HAZEL W. WILKINSON, B.S., M.S., Ph.D., Adjunct Assistant Professor of Laboratory
Practice (field)
- DONALD G. WILLHOIT, A.B., M.S., Sc.D., Associate Professor of Radiation Biophysics
- CAROLYN A. WILLIAMS, B.S., M.S., Ph.D., Assistant Professor of Epidemiology
- O. DALE WILLIAMS, B.S., M.P.H., Ph.D., Assistant Professor of Biostatistics
- WILLIAM E. WILSON, JR., B.S., Ph.D., Adjunct Associate Professor, Air and Industrial
Hygiene
- JOHN JOSEPH WRIGHT, A.B., M.D., M.P.H., Professor of Health Administration,
Emeritus
- DAVID L. ZALKIND, B.A., M.S., Ph.D., Assistant Professor of Health Administration
- DONALD W. ZIEGLER, A.B., M.S., Ph.D., Adjunct Associate Professor of Laboratory
Practice (field)

GENERAL INFORMATION

In 1936 a Division of Public Health was established within the School of Medicine at The University of North Carolina at Chapel Hill. The Division was given the status of a separate School in 1940. It is today, with the Schools of Medicine, Dentistry, Nursing and Pharmacy, a unit of the Division of Health Affairs and is accredited by the American Public Health Association. The original departments of the School were Epidemiology, Parasitology (changed in 1968 to Parasitology and Laboratory Practice), Public Health Administration (changed to Health Administration in 1969), and Sanitary Engineering (changed in 1962 to Environmental Sciences and Engineering). Five additional departments are currently operating: Biostatistics, Health Education, Maternal and Child Health, Public Health Nursing and Nutrition.

The School of Public Health is one of eighteen such schools in the United States accredited by the American Public Health Association. The mission of the School is to prepare individuals for professional health careers aimed at preventing disease and disability and in analyzing, improving, promoting and maintaining the optimum health of the public. Students successfully completing programs of study pursue careers for the most part either in a health service agency or in educational and other organizations in such roles as researchers, investigators, teachers, technical specialists and consultants.

As a part of the School's teaching, research and service responsibilities, 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, health services, and research organizations. Such affiliations are local, statewide, national, and international in scope. The nature of the various affiliations includes joint sponsorship and effort in a number of teaching and research programs, joint faculty appointments, and establishment of field training centers for students in a number of official and voluntary international, federal, state and local health organizations.

In addition to its teaching responsibilities, the School of Public Health has two other major functions: research and service to the state and region. Varied research is conducted by all departments. Similarly, all departments render field service to various organizations and agencies within the state and nation under the coordination of the Division of Community Health Service.

The Division of Community Health Service was organized in the fall of 1973 to develop and extend the service capabilities of the School. The Division was organized in order to carry out the School's commitment to community service as a part of its public responsibility. The Division is made up to five units, Technical Assistance, Continuing Education, the Off-Campus Degree Program, the Area Health Education Center program, and Field Training Coordination.

Graduate degrees offered by the School of Public Health are the Master of Science (M.S.), Doctor of Philosophy (Ph.D.), and the following professional graduate degrees: Master of Public Health (M.P.H.), Master of Science in Public Health (M.S.P.H.), Master of Science in Environmental Engineering (M.S.E.E.), and Doctor of Public Health (Dr.P.H.). All requirements concerning the latter degrees are administered by the faculty of the School of Public Health with the approval of the Administrative Board of the Graduate School.

The University of North Carolina at Chapel Hill is committed to the principle of equal opportunity. It is the policy of this University not to discriminate on the basis of race, sex, color, national origin, religion, or handicap with regard to its students, employees, or applicants for admission or employment. Such discrimination is also prohibited by federal law. Any complaints alleging failure of this institution to follow this policy should be brought to the attention of the Assistant to the Chancellor.

Students in the School of Public Health have all the rights and privileges of the student body at The University of North Carolina at Chapel Hill. They may take courses in other departments of the University, North Carolina State University, and Duke University, provided they are properly qualified and have the approval of their faculty advisers. Certain courses in chemistry, biochemistry, microbiology, economics, education, political sciences, social work, sociology, anthropology, and statistics have an especially close relationship to public health.

The School of Public Health admits only those students who would be expected to profit most by the educational program offered. It reserves the right to limit the number of students admitted to any course and drop from the roll any student whose work is unsatisfactory for any reason. It will be assumed that all applicants have assented to these conditions.

ADMISSION POLICIES

The regular entrance requirements of the Graduate School must be met by all students applying for admission to the School of Public Health.

The applicant must hold the bachelor's or Master's degree from an accredited college or university with a grade average of B or better in the area of the major, and must present credentials showing the completion of prerequisite courses for the special field he proposes to undertake in a graduate program. Applicants with a grade-point average below 3.0 in the major can be considered only if they submit scores for the Graduate Record Examination.

Work done *in absentia* will not be counted for graduate credit except that, in certain cases approved by the Administration, part of the work on the thesis for a higher degree may be done elsewhere. All such work, even when credited, is subject to the final examination required for the degree.

All master's degrees are terminal degrees. The student must be readmitted for the doctoral program if his Department deems it advisable for him to continue beyond the master's level.

Health. Each new student, before his arrival at the University, is required to send the Director of Student Health Service a report of a physical examination properly completed by his own physician. The health questionnaire is furnished by the Graduate Office and included in the letter of admission. A former student who has been approved for readmission to the University and who has been away from the University for a year or more is required also to submit the medical form. Since clearance for registration will not be granted until all pre-entrance medical requirements have been met, those who arrive in Chapel Hill without completing these requirements must defray the costs of having the physical examination, laboratory examinations, and immunizations performed by the Student Health Service.

APPLICATION FOR ADMISSION

All applicants are required to pay a \$10.00 non-deductible, non-refundable application fee.

The program of study is arranged in a sequence which makes it advisable for students to enter the School in the fall semester. Admission at other times is granted only for exceptional reasons.

Letters of inquiry regarding admission and requests for application forms should be addressed to the Dean, School of Public Health, University of North Carolina, Chapel Hill, North Carolina. Applicants are urged to conform to the deadlines for submitting application material: July 1 for Fall Semester; December 1 for Spring Semester; May 20 for First Summer Session.

TUITION AND FEES¹

Tuition and fees per semester for bona fide residents of North Carolina are \$349.00. For out-of-state students, tuition and fees per semester are \$1059.00. In addition, the following courses require field experience for which there is a fee: BIOS 301, MHCH 212, \$150.00; PHNU 271, \$300; ENVR 164, \$350.00; BIOS, 302, EPID, 315, HADM 206, HEED 240, HEED 340, MHCH 214, NUTR 251, PHNU 381, PHNU 396, PHNU 398, \$450.00 each, and HADM 207, \$600.00.

Accounts not paid by the end of registration are subject to a late payment fee.

Summer School

The curricula of certain of the departments extend through a summer period of 12 weeks. For each six week period, tuition and fees for graduate students are \$139.00 for in-state, and \$423.00 for out-of-state students.

RESIDENCE STATUS FOR TUITION PAYMENT²

General. Every applicant for admission is required to make a statement as to his or her length of residence in North Carolina. The tuition charge for legal residents of North Carolina is less than for nonresidents. To qualify for in-state tuition a legal resident must have maintained his domicile in North Carolina for at least 12 months immediately prior to his classification as a resident for tuition purposes. In order to be eligible for such classification, the

¹ Tuition and fees are subject to change without notice. Amounts given are for semester system. Additional field fee courses may be established.

² The information in this section comes from three sources: (i) North Carolina General Statutes, Sec. 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, July 1975*; (iii) Chancellor's Rules and Procedures for Residence Classification of Students for Tuition Purposes.

student must 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 mere temporary residence incident to enrollment in an institution of higher education.

Domicile. Domicile means one's permanent dwelling place of indefinite duration, as distinguished from a temporary place of abode; synonymous with "legal residence."

Burden of Proof and Statutory Presumptions. The burden of establishing facts which justify classification of a student as a resident entitled to in-state tuition rates is on the applicant for such classification. For a student to be classified a resident for tuition purposes, the balancing of all the evidence must produce a clear preponderance of the evidence supporting the assertion of in-state residence. Proof of residential status is controlled, initially, by two statutorily prescribed and complementary presumptions, which are stated in terms of prima facie evidence:

a. If the parents or court-appointed legal guardian of the student (without reference to the question of whether the student is a minor or an adult) are not domiciliaries (legal residents) of North Carolina, under the Statute this fact constitutes prima facie evidence that the student is not a domiciliary (legal resident), of North Carolina, unless the student has lived in this State the five consecutive years prior to enrolling or re-registering. The student must assume the burden of rebutting the prima facie showing by producing evidence that he or she, independently, is in fact a domiciliary (legal resident) of North Carolina, in spite of the nonresident status of his or her parents;

b. Conversely, if the parents of the student are domiciliaries of North Carolina under the Statute, this fact constitutes prima facie evidence that the student is a domiciliary of North Carolina. This prima facie evidence may also be rebutted by other evidence of legal residence. If the student has neither parents nor legal guardian, the prescribed prima facie evidence rule cannot and does not apply.

Statutory Exceptions

a. *Grace Period.* By virtue of the provisions of G.S. 116-143.1, if a student has been properly classified as a resident for tuition purposes, a change in that student's state of residence thereafter does not effect in all cases an immediate automatic loss of entitle-

ment to the in-state tuition rate. To qualify for the grace period, the following conditions must be satisfied:

1. The student must have been properly classified as a resident for tuition purposes, on the basis of a valid finding that the student in fact was a legal resident of North Carolina and had been such for the requisite twelve-month period prior to classification;

2. At the time of subsequent change of legal residence to a state other than North Carolina, the student must have been enrolled in a public institution of higher education in North Carolina.

The extent of this grace period, during which the in-state rate is applicable in spite of the fact that the student is not a legal resident of North Carolina, is twelve months from the date of change in legal residence, plus any portion of a semester or academic term remaining, as of the expiration date of the twelve-month period, in which the student is enrolled.

b. *Qualifying Periods for Spouses.* By virtue of the provisions of G.S. 116-143.1, the prescribed twelve-month period of legal residence required for entitlement to classification as a resident for tuition purposes may be shortened on the basis of the marital status of the student, in specified circumstances. If a student otherwise can demonstrate compliance with the fundamental statutory requirement that he or she be a legal resident of North Carolina, 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 spouse of the student, if the spouse has been a legal resident of the State for the requisite twelve-month period.

Married Persons. The domicile of a married person, irrespective of sex, is determined by reference to all relevant evidence of domiciliary intent. No person shall be 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 shall be 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 domicile of his or her spouse shall be deemed relevant evidence to be considered in ascertaining domiciliary intent.

Minors. A minor is any person who has not reached the age of eighteen years. The domicile of a minor is that of the father. With

a few exceptions noted below, this presumption is virtually irrefutable. 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 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. Even though a person is a minor, under certain circumstances the person may be treated by the law as being sufficiently independent from his parents as to enjoy a species of adulthood for legal purposes. The consequences, for present purposes, of such circumstances 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 in fact has been established. The circumstances recognized as having the potentially emancipating effect are:

- a. Marriage of the minor person;
- b. Parental disclaimer of entitlement to the minor's earnings and the minor's proclamation and actual experience of financial independence from his parents, with the actual establishment and maintenance of a separate and independent place of residence.

Aliens. An alien holding a visa which will permit eventual permanent residence in the United States is subject to the same considerations as a citizen. An alien holding a visa which will not permit eventual permanent residence in the United States (for example, a student visa) cannot be classified as a resident.

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 for himself by the usual requirements of residential act plus intent. No person shall lose his in-state residence status solely by serving in the armed forces outside of the State of North Carolina.

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.

Change of Status. 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) shall be classified by the admitting institution either as a resident or as a nonresident for tuition purposes prior to actual matriculation. A residential classification once assigned (and confirmed pursuant to any appellate process invoked) may be changed thereafter (with 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 treated as a new student by the institution to which he or she is transferring and must be assigned an initial Residential Classification for tuition purposes.

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. Any student or prospective student in doubt concerning his residence status must bear the responsibility for securing a ruling by stating his or her case in writing to 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 Admission of these circumstances in writing. Failure to give complete and correct information regarding residence constitutes grounds for disciplinary action.

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 as a nonresident at the time of tuition billing should pay the nonresident rate. Conversely, if a student is classified as a resident at the time of billing, he or she should pay the resident rate.

Appeals of Rulings of Admission Officers. A student appeal of a classification decision made by any admissions officer shall be filed by the student with that officer in writing and shall be transmitted to the Residence Status Committee by that officer, who shall not vote in that Committee on the disposition of such appeal. The student shall be notified of the date set for consideration of the appeal, and, on request of the student, he or she shall be afforded an opportunity to appear and be heard by the Committee. Any student desiring to appeal a decision of the Residence Status Committee shall give notice in writing of that fact within 10 days of receipt by the student of the decision of the Residence Status Committee, and the basis for such appeal, to the Chairman of the Residence Status Committee, and the Chairman shall promptly transmit the appeal to the State Residence Committee.

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 is available for inspection in the Admissions Offices of the University.

All students are responsible for knowledge of the contents of the statute and the *Manual*.

SOUTHERN REGIONAL EDUCATION BOARD TUITION CONTRACT

The in-state tuition rate would apply to any out-of-state student who might be attending the School of Public Health under the Southern Regional Education contract arrangement for participating states.

REGISTRATION AND PAYMENT OF BILLS

All students are expected to report for registration on the opening date of the fall semester.

Bills for the fall and spring semesters are payable at the University Cashier's Office no later than the first day of classes for each semester. Failure to pay as specified will result in the assessment of an extra fee of \$5.00. This ruling does not apply to fellowship students or students who are sent by agencies.

APPLICATION FEE AND ADMISSION DEPOSIT

A non-refundable application fee of \$10.00 must be submitted with application for admission to the Graduate School. An applicant who has been offered admission may reserve his place with payment of a \$25.00 deposit which is credited against 1st semester tuition.

Payment by check or money order should be sent directly to the University Cashier, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27514, along with an Admission and Deposit Record. No payment should be sent either to the Graduate School, to the School of Public Health, or to the department of one's major. Due to the number of applicants, we will not be able to hold your place if this deposit is not received within three weeks of the date of the admission letter.

Students who make the deposit and who attend the University on a fellowship, traineeship, or other award which pays directly to the University the entire cost of tuition and fees may obtain refund of the deposit after November 1.

AUTOMOBILE REGULATIONS

Every student at the University who owns and/or operates an automobile or other motor vehicle in or around Chapel Hill is required by University regulations to register it with the Traffic Office. Motor vehicle registration is made each school year during the academic registration procedure. Motor vehicles acquired after the time of enrollment must be registered at the Traffic Office within forty-eight hours after acquisition. A motor vehicle registration sticker is for registration purposes only and should not be construed as a parking permit. In no sense does the sticker guarantee the student a parking space. However, students in residence halls may have a reasonable expectation of finding a parking space within the zone in which their registration sticker is valid.

A complete set of rules and regulations governing parking and traffic will be furnished to each student at the time of registration of his motor vehicle.

HOUSING

The primary objective of the Department of University Housing at Chapel Hill is to provide a physical and psychological atmosphere

conducive to each and every student having opportunity to develop to the utmost his or her personality, ability and sensitivity. The University provides residence hall accommodations for approximately 6600 registered students—undergraduate, graduate and professional men and women. Three hundred and six apartments are available for married students.

Information regarding residence hall accommodations is available by writing to: Department of University Housing, Contracts Office, Carr Building, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27514.

Information regarding married student housing is available by writing to: Manager, UNC Married Student Housing, Odum Village, Branson Street, Chapel Hill, North Carolina 27514.

Student Dining Facilities: Dining facilities are operated in locations convenient to residence halls and meals are offered at reasonable rates.

PRIVATELY OWNED RESIDENCE HALL ACCOMMODATIONS —UNIVERSITY SQUARE

Nearly 800 women and 700 men are housed in privately owned Granville Towers. The location is just off the UNC campus about one block from the Carolina Inn.

These supervised residence halls, one for women and one for men, have a cafeteria dining commons. The fee charged includes room and board. Further information is available from Granville Towers, University Square, Chapel Hill, N.C.

Arrangements for these accommodations should be made directly with Granville Towers Business Office.

LAUNDRY, LINEN, PILLOW, AND BLANKET SERVICE

Laundry Service: Finished laundry service at reasonable cost is provided by the University Laundry Department to students who wish to use it. This service is available on a Cash-and-Carry basis at any of eight Laundry Call Offices. (Students desiring to do so may use the deposit system in lieu of Cash-and-Carry).

Linen Rental Service: For students who do not wish to provide their own linen, the University Laundry will furnish two sheets, one pillow case, and three bath towels each week on an exchange basis. This service is available at all Laundry Call Offices. A fee of \$40.00, which includes a \$10.00 refundable deposit, for the

school year (August through May) is payable when service is requested.

Pillows may be rented for \$1.50 for the school year. Blankets are available for a deposit of \$3.50 each, with provision for a refund of \$2.00 when blanket is returned in good condition.

Dry Cleaning. Complete dry cleaning service is available at all University Laundry Call Offices on a Cash-and-Carry basis.

Coin-Op Service: Coin-op service is available at Avery, Craige, Ehringhaus, James, Joyner, Morrison, Odum Village Community Center, and Winston Basement.

TRAINEESHIPS, ASSISTANTSHIPS, FELLOWSHIPS & LOANS

Federally sponsored traineeships and fellowships are available to properly qualified candidates. Application should be made to the School of Public Health at the time of application for admission. Traineeships or fellowships will not be awarded until the student has been admitted to the School. A few graduate assistantships are available in some departments. Graduate assistantships are "service" appointments and usually require a reduced load of academic work. Application should be made to the department to which the student is admitted.

Other work opportunities and some student loan funds are available from the University Student Aid Office. Application should be made to William M. Geer, Director, Office of Student Aid, 300 Vance Building, Chapel Hill, N.C.

THE MARGARET BLEE – RUTH WARWICK HAY SCHOLARSHIP

Professor Ruth Warwick Hay, the first Head of the Department of Public Health Nursing, left a part of her estate in trust for a scholarship which she wished to be known as the Margaret Blee – Ruth Warwick Hay Scholarship. The income from the fund is to be awarded annually as an honorary scholarship to one or more students enrolled in the Department of Public Health Nursing. A Scholarship Committee of faculty and students make recommendations to the Departmental Chairman on the basis of criteria established for the award. An appropriate occasion is to be planned each year for awarding the scholarship and recognizing the recipient.

STUDENT HEALTH SERVICE

The University employs a staff of full-time physicians and maintains a well-equipped infirmary under the immediate supervision of the Director of Student Health Service. When a student is admitted to the Infirmary, he is not charged for services rendered by the staff. He is, however, required to pay for any additional service—surgery, consultations, special nurses, etc.—recommended by the attending physician.

RECREATION

The University gymnasium, swimming pools, tennis courts, golf course, and large athletic fields provide ample facilities for exercise and recreation, all under the supervision and direction of a well-organized Department of Physical Education.

LIBRARIES

The Health Sciences Library is situated across the street from the School of Public Health. Other library facilities include the various departmental and school libraries and the general University Library.

STUDENT UNION

All members of the School of Public Health student body are members of the Student Union. Its offices are made up of departmental representatives and a central Union Board which represents the entire student body. A faculty member serves as a liaison representative. Its purpose is (1) to enhance and ensure the opportunity of the student to receive an education of the highest attainable quality; (2) to represent and advocate causes and interests of the student body; (3) to stimulate interest in and encourage activities which relate to health in its broadest sense; and (4) to function as a channel of communication both to and from the student body.

NOTICE ON "DIRECTORY INFORMATION" TO ALL STUDENTS OF THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

The University of North Carolina at Chapel Hill has routinely made public certain information about its students. Some typical ways

this has been done include the following. Names of students who are selected by the various honorary societies, who receive scholarships, who make the Dean's List, who hold offices, or who are members of athletic teams are frequently made public. To facilitate campus communication the University annually publishes the *Campus Directory*. Some professional and graduate school student groups publish directories of students in their departments or schools. The annual commencement program publishes the names of persons who have received degrees during the year.

The Family Educational Rights and Privacy Act defines the term "directory information" to include the following categories of information: the student's name, address, telephone listing, date and place of birth, major field of study, 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. The University will make public information about each student *limited* to these categories in ways such as those described above. Of course, information from all these categories is not made public in every listing. The *Campus Directory* for example, publishes only names, addresses and telephone numbers.

Students who do not wish to have any or all of such "directory information" made public without their prior consent must notify the Office of Records and Registration, The University of North Carolina at Chapel Hill of this fact in a signed and dated statement specifying items that are not to be published. This notice must be received by the Office of Records and Registration by the end of the registration period for the semester or session of first enrollment or, after an absence, of re-enrollment, and by the end of *each* fall registration period thereafter.

ACADEMIC INFORMATION

GRADES

The graduate grading system is as follows: **H**, indicating work of superior quality; **P**, indicating satisfactory performance; **L**, indicating unsatisfactory work; **F**, indicating a failing performance.

The grades of **H**, **P**, and **L** carry full graduate credit with the exception that a student who earns a total of nine semester hours in the **L** category becomes ineligible for continued study in the Graduate School; the grade of **F** is disqualifying.

DELTA OMEGA

Election to the Delta chapter of Delta Omega, public health's national honor society, occurs shortly before graduation and is based upon attainment.

DEGREES OFFERED

The following graduate professional degrees are offered: Master of Public Health, Master of Science in Public Health, Master of Science in Environmental Engineering and Doctor of Public Health. Degrees are awarded in May, August, and December, although Commencement exercises are held only in May. All Master's degrees are terminal degrees, so that a student who desires to proceed in a doctoral program must be recommended to the Graduate School by his major department.

MASTER OF PUBLIC HEALTH

This program is designed to meet the needs of individuals already proficient in one or more specialized areas of academic and/or professional knowledge pertinent to public health in preparation for positions that require additional knowledge of the broad field as well as of their own specialties.

To meet this broad objective, the students must be grounded: (1) in content areas designed to emphasize the total relation of man to his biological, physical and social environment, and to demonstrate the effect of this relationship upon man's physical, mental and social well-being, and (2) in disciplines and subject areas basic to public health methodology.

Fields of Specialization

Programs of study leading to the Master of Public Health degree are offered by the following departments: Biostatistics, Environmental Sciences and Engineering, Epidemiology, Health Administration, Health Education, Maternal and Child Health, Nutrition, Parasitology and Laboratory Practice and Public Health Nursing (for the various programs offered, see under the heading of each department in a later section of this catalogue.)

Requirements for Admission

The following are avenues for admission:

1. **Prior doctoral degree** (M.D., D.V.M., D.D.S., or equivalent) from approved schools. Also other doctoral degrees (Ph.D., etc.) from approved schools, provided the total academic preparation has included at least **six** courses in one of the broad areas germane to public health (natural or social sciences) and **two** courses in the other broad area.
2. **Prior master's degree** (professional or academic) from approved schools, provided the total program has included the minimum number of courses in the areas mentioned above.
3. **Bachelor's degrees** (from approved schools).
 - a. In a professional area that qualifies the holder for a first level position in public health, provided the program has included the minimum number of courses in the areas mentioned above.
 - b. Other Bachelor's degrees, provided the program has included a minimum of **ten** courses in one of the broad areas germane to public health (natural or social sciences), and **four** courses in the other broad area.

In addition, the undergraduate record of each applicant must be a strong one overall with an average of B or better in the subject of the major.

Requirements for the Degree

1. **Residence.** A period of residence of not less than one academic year with a more extended period for majors in various programs (see under each department in a later section of this catalogue).

2. **Course Program.** Within the minimum of 30 semester hours of credit needed for graduation, all students must include the following courses required by the School.

- a. Biostatistics 100
- b. Epidemiology 160
- c. Health Administration 105, 107, or 108

OR

Health Education 108, 130, 133, or 206

AND

- d. At least one course from ENVR, MHCH, NUTR, PALP, or PHNU. Therefore, all candidates are required to complete **four** courses, **three** of which must be from outside the major department.

If a student has had the equivalent of BIOS 100 or EPID 160, he may request exemption from the course(s) by discussing the matter with the instructor(s) of the course(s). To protect the student and the accreditation of the School, all approved exemptions must be documented by filing a form signed by the instructor(s) involved and the head of his department(s). These forms are available in the office of the Associate Dean for the Academic Program, Room 360, and must be submitted to him in triplicate. Likewise, the same procedure is available to students who wish to substitute a course for one of those listed above in Health Administration and Health Education.

3. **Admission to Candidacy.** An application for admission to candidacy, which includes the total course program and title of the written report (see below), must be filed with the Graduate school about three months before the expected date of graduation. The specific deadline is given in the "Calendar of Events" in the front sheets of this Catalogue.

4. **Written Report.** Each student is required to select a topic and submit to his major department an acceptable report that deals with some subject relevant to public health. Two typewritten copies are due in the department office at least one month before the degree is expected.

5. **Final Written Examination.** This is limited to work taken in the major department, including the written report. This must be taken not later than one month before the degree is

expected. The specific deadline is given in the "Calendar of Events" in the front sheets of this Catalogue. In the Department of Environmental Sciences and Engineering, students are required to pass an oral comprehensive examination in lieu of the written examination.

6. **Time Limitation.** All requirements for the degree must be completed within **five** years of the time the student matriculated in the program. If the program is interrupted, the student must satisfy all requirements in effect during the final year of his work.

MASTER OF SCIENCE IN PUBLIC HEALTH

This program is designed to prepare students for professional careers in specialized fields of public health. The major emphasis is upon specialization in an area of proficiency germane to public health. However, the core *School* requirements provide for an orientation to certain public health sciences.

Fields of Specialization

Programs of study leading to the Master of Sciences in Public Health degree are offered by the following departments: Biostatistics, Environmental Sciences and Engineering, Epidemiology, Health Administration, Health Education, Maternal and Child Health, and Parasitology and Laboratory Practice. The various programs involved are listed under the heading of each department in a later section of this catalogue.

Requirements for Admission

1. A Bachelor's degree from an approved school in a program that included a minimum of 27 semester hours in the natural and/or social sciences.
2. A strong undergraduate record overall with an average grade of B or better in the subject of the major.
3. Special requirements by departments (see under each department in a later section of this catalogue).

Requirements for the Degree

1. **Residence.** A period of residence of not less than one academic year with a more extended period for majors in various

programs (see under each department in a later section of this catalogue).

2. **Course Program.** Within the minimum of 30 semester hours of credit needed for graduation, all students must include the following courses required by the School.
 - a. BIOS 100, or equivalent, and
 - b. EPID 160, or equivalent.
3. **Admission to Candidacy.** An application for admission to candidacy, which includes the total course program and title of the written report, must be filed with the Graduate School about three months before the expected date of graduation. The specific deadline is given in the "Calendar of Events" in the front sheets of this catalogue.
4. **Written Report.** Each student is required to select a topic and submit to his major department an acceptable report that deals with some subject germane to his specialized program. Two typewritten copies are due in the department office at least one month before the degree is expected.
5. **Final Written Examination.** This is limited to work taken in the major department, including the written report. This must be taken not later than about one month before the degree is expected. The specific deadline is given in the "Calendar of Events" in the front sheets of this catalogue. In the Department of Environmental Sciences and Engineering, students are required to pass an oral comprehensive examination in lieu of the written examination.
6. **Time Limitation.** All requirements for the degree must be completed within **five** years of the time the student matriculated in the program. If the program is interrupted, the student must satisfy all requirements in effect during the final year of his work.

MASTER OF SCIENCE IN ENVIRONMENTAL ENGINEERING

The curriculum leading to this degree is designed to prepare for the general field of sanitary engineering and for careers in the engineering divisions of national, state, and local health agencies; in municipal public works and service organizations; in such industries as involve sanitary problems; and in professional engineering

organizations engaged in the investigation, design, supervision of construction, and operation of sanitary works.

Requirements for Admission

Candidates for this degree must hold an engineering degree from an institution accredited by the Engineers' Council for Professional Development or from an equivalent foreign institution—preferably in civil, sanitary, chemical, or mechanical engineering—where the curriculum has involved fundamental work in chemistry, physics, mathematics, and the engineering sciences.

Requirements for the Degree

1. **Residence.** A minimum of one calendar year (11 months) of residence for students who have graduated with high credit from approved engineering schools.
2. **Course Program.** Upon admission, there is a presentation of an acceptable program of study covering the student's period of residence. This program must include a minimum of 30 semester hours of graduate grade.
3. **Admission to Candidacy.** An application for admission to candidacy which includes the total course program and title of the written report (see below) must be filed with the Graduate School about three months before the expected date of graduation. The specific deadline is given in the "Calendar of Events" in the front sheets of this Catalogue.
4. **Written Report.** At least one month before the time at which the degree is expected to be conferred, a report upon some sanitary engineering project of the student's choice, which may be a small piece of research, the solution of a complex problem or design, or a critical understanding of a sector of knowledge, must be deposited in the departmental office. This report or essay is designed to acquaint the student with the methods employed in the acquisition, preparation, and analysis of material and to test his ability to present in writing the results of his findings.
5. **Final Oral Examination.** This is limited to work taken in the major department, including the written report. This must be taken not later than about one month before the degree is expected. The specific deadline is given in the "Calendar of Events" in the front sheets of this Catalogue.

- 6. Time Limitation.** All requirements for the degree must be completed within **five** years of the time the student matriculated in the program. If the program is interrupted, the student must satisfy all requirements in effect during the final year of his work.

DOCTOR OF PUBLIC HEALTH

The Doctor of Public Health program is designed for the advanced education of individuals already possessing the MPH (or equivalent) in fundamental and applied aspects of public health necessary for the effective conduct or supervision of research, and the synthesis of new knowledge and techniques into field application. This program of study will emphasize the application of knowledge to practice, which requires unusually broad understanding of the interdisciplinary nature of public health, the roles of various disciplines within the field, and the interaction between man and his environment.

Fields of Specialization

Programs leading to the Doctor of Public Health degree are offered by the departments of Biostatistics, Epidemiology, Health Administration, Health Education, Maternal and Child Health, and Parasitology and Laboratory Practice.

Requirements for Admission

1. Prior master's and/or doctoral degree(s) from an approved school(s), and at least 12 months of successful experience in public health practice, which may be included as part of the Dr.P.H. program, or
2. A Bachelor's degree from an approved school, and, normally, at least three years of successful experience in public health practice before entering the program.
3. In addition to the above experience requirements, all applicants must have received the Master of Public Health degree (Diploma from Canada) or an equivalent professional master's degree in public health. Those admitted with the Master of Science in Public Health degree must complete the School course requirements for the M.P.H. degree (page 31).

Requirements for the Degree

1. **Time Required.** A minimum of two academic years. Ordinarily, the first year is spent in full-time course work and preparation of the research prospectus.
2. **Residence.** A minimum of one academic year in continuous study.
3. **Faculty Committee.** Upon entering the program, each student is assigned an appropriate Doctoral Advisory Committee composed of at least five members, all of whom must be on the Graduate Faculty. The Chairman presides at all meetings of the Committee, schedules all special examinations (see below), and directs the dissertation research. If desired, co-advisers may be appointed for this purpose.
4. **Course Program** (minimum of 18 S.H., exclusive of dissertation courses and research).
 - a. Major department.
 - b. Related departments.

The specific courses to be taken and the credits required will depend upon the qualifications of each student and his field of interest. However, inasmuch as this degree requires broad knowledge, it is expected that most students will be required to take courses from two or more disciplines (from within the SPH or other parts of the University). This dictates that the Faculty Committee be interdepartmental.

5. **Doctoral Examinations.** When the student has completed all of his course work or is in the terminal stage of his course program, he is eligible to take the first doctoral examination. This will be either the Doctoral Oral Examination or the Doctoral Written Examination, depending upon the policy of the major department. Both comprehensive examinations are conducted by members of the Faculty Committee and are designed to test and measure the student's knowledge of his chosen field, its content and methodology. In general, there should be a relatively brief time interval between the two examinations.

In the case of the Doctoral Oral Examination, at

least five members of the Faculty Committee must participate and, in addition to testing the depth and breadth of the student's knowledge, they must determine the feasibility of the dissertation topic.

6. **Admission to Candidacy.** After the student has passed **both** doctoral examinations, he must apply to the Graduate School for Admission to candidacy. This admission signifies that the candidate has completed all requirements for the doctorate except the dissertation and that he has entered the research phase of his program.
7. **Research Project.** The research for the dissertation is a scientific and original project conducted by the student under supervision of his adviser or co-advisers.
8. **Dissertation.** This is expected to be of such scope, independence, and skillful presentation as to indicate that the candidate has acquired a mastery of the research methodology, and has contributed new knowledge to his subject. Two copies of the dissertation, approved by the adviser and two readers, must be submitted to the Graduate School about two months prior to the expected date of graduation (a specific deadline is given in the "Calendar of Events" in the front sheets of this Catalogue).
9. **Application for Degree.** When a candidate nears the end of his research and can anticipate final approval of his dissertation, he should apply for a degree in a particular graduation. In the event the degree is not received in that graduation, he must file a **new** Application for Degree. Such applications must be filed about three months before the time scheduled for the candidate's graduation (a specific deadline is given in the "Calendar of Events" in the front sheets of this Catalogue).
10. **Final Oral Examination.** This examination, conducted by at least five members of the Faculty Committee, must be scheduled at least one week after the dissertation has been approved by the Graduate School for use in the examination, and before the end of Spring semester classes for those scheduled for May graduation (a specific deadline is given in the "Calendar of Events"). The primary purpose of this examination is to

have the candidate present and defend his dissertation, but other material may be included if the Faculty Committee desires.

11. **Time Limitation.** All requirements for the degree must be completed within **eight** years of the time the student matriculated in the program. If the program is interrupted, the student must satisfy all requirements in effect during the final year of his work.

DOCTOR OF PHILOSOPHY

In addition to the above graduate professional degrees, the Doctor of Philosophy degree has been authorized by the Graduate School for students majoring in the following departments: Biostatistics, Environmental Sciences and Engineering, Epidemiology, Health Education, and Parasitology and Laboratory Practice (see under each department in a later section of this catalogue, and for more details consult the Graduate School Catalogue).

ANNOUNCEMENT

Subject to the approval of the Board of Governors, plans are under way to offer an undergraduate program in Public Health effective in the fall of 1976. This four-year course of study will lead to the degree of Bachelor of Science in Public Health (B.S.P.H.). The first two years will be within the General College. Candidates then transfer to the School of Public Health and complete the final two years with a concentration of study in one of four options: Biostatistics, Health Administration, Health Education, and Nutrition.

DIVISION OF COMMUNITY HEALTH SERVICE

The Division was established in the fall of 1973 to further develop and extend the service capabilities of the School. This action was predicated on the recognition that faculty and students of the School should be actively involved in community service as a part of its public responsibility and as a means of demonstrating the relevance of its teaching and research effort. The Division thus serves as an interface between the School and various health and health related organizations which make up its constituency.

The Division is comprised of the following five functional units through which its services are coordinated. Information about any

of these units may be obtained by writing directly to the Unit Director.

Technical Assistance

The Technical Assistance Unit provides the coordinating mechanism to utilize the technical and professional knowledge and skills of the faculty of the School of Public Health in the assessment and solution of specific community health needs and problems. Under the aegis of this unit, the faculty of the School act as consultants to State and regional planning agencies, State and community health and health-related organizations, to governmental departments, and others involved in planning, organizing and delivering health services. Examples of the types of services available are: assistance with broad community surveys dealing with the definition of health needs by measuring the health status of the population; assistance in dealing with various inter-agency relationships revolving around health services; assistance in solving technical questions about program content, mode of delivery of services, manpower requirements, organizational structure, and staffing patterns, and assistance in resolving technical questions about environmental hazards, sewage and solid waste disposal, and problems in occupational health among industrial populations.

Continuing Education

The overall purpose of Continuing Education is to stimulate and facilitate the development of continuing education programs for professionals and scientists working in the field of public health. To this end, Continuing Education is concerned primarily with programs having one of the three following objectives: (1) to update public health personnel on scientific advances and professional innovations related to the practice of public health; (2) to reduce the time lag between the development of new knowledge and its application in public health practice; and (3) to provide short-term training and education in technical and specialty areas not normally available in the existing formal educational programs.

The activities of Continuing Education extend to all disciplines and specialties within the field of public health. Programs may be tailored to meet the needs of the individual disciplines or multi-disciplinary groups. The assistance of Continuing Education,

School of Public Health, is available to official and voluntary health agencies, professional associations, and other educational institutions. The type of assistance may include help in planning, developing, conducting, and possible financing continued educational programs in a wide variety of subject areas.

Support for short term courses generally comes from sources outside the University. Continuing Education has established a standard charge of \$27.50 per student per day. Any exception to this standard fee must receive official approval. Information on any of the services described above may be obtained by writing to — Director, Continuing Education, School of Public Health, University of North Carolina at Chapel Hill.

Field Relations

The Field Relations Unit serves as a coordinating unit for field training activities of the School of Public Health's students.

The objective of this unit is to increase the effectiveness of educational programs by providing community laboratories in which faculty and students may test and validate theoretical assumptions in the field of public health. To test, generate and apply theory, and to expand knowledge, the student is given an opportunity to become actively involved in the problem-solving actions characteristic of health practice. Field Training is thus reaffirmed as an integral part of the student's learning experience. The resources of the Division are used to identify learning opportunities for students and to assist in evaluating their experience in the field. Beginning in the fall of 1974, the academic schedule was adjusted to permit students to engage in field training concurrently with course work.

Off-Campus Degree Program

As a part of its effort to assist the State in meeting its health related needs, the School of Public Health—through the Off-Campus Unit—offers a master's degree program with a major in health administration to professionals in health and human service agencies. This program enables the School to fulfill its commitment to develop a means of bringing graduate education to professionals engaged in practice. Further, the program recognizes the need to upgrade the capacities of agency personnel so that they can deal more effectively with the increasing complexities involved

in the administration of health and human services organizations. The North Carolina Department of Administration and the North Carolina Department of Human Resources and its Divisions have been instrumental in developing this program.

The program enables agency staff unable to leave their work for full time study to obtain a graduate degree on a part-time basis. Except for the waiver of on-campus residency, each degree candidate must meet Department of Health Administration requirements for the Master's degree, including course work, a major paper, and a comprehensive examination.

Area Health Education Centers

The Area Health Education Program is a collaborative effort among the Schools of Medicine, Dentistry, Nursing, Pharmacy, and Public Health to assist underserved areas of the state in increasing and developing their health manpower resources.

Begun under a federal grant in 1972 and later supported by state appropriations, the program now covers all but four counties in the state. Students from the School of Public Health serve with health organizations in these areas to satisfy their academic requirement for field training. At the same time, they provide a personnel resource to that agency. Faculty of the school serve as advisors to students assigned in AHEC counties, and also provide technical assistance to the agencies.

Special efforts are made to assist health manpower working in AHEC counties with their training needs, through continuing education services.

The unique character of the AHEC program resides in the fact that it affords an opportunity for collaboration among all of the health science schools in the interest of improving the organization and delivery mechanism for health services in specific underserved areas. AHEC has thus been a catalyst for bringing together the interests and viewpoints of physicians and other health professionals where few such opportunities are otherwise available.

DIVISION OF HEALTH MEASUREMENT AND ANALYSIS

This Division includes the departments of Biostatistics and Epidemiology, which work in a collaborative fashion in providing training and related research and consultation on quantitative methods and their applications in the health field. Faculty and staff have a

variety of academic backgrounds, including mathematics, statistics, and biological and behavioral sciences.

Courses and specialized training programs cover such fields as Biometry, Clinical as well as Social Epidemiology, Data Management, the Environment, Health Services, Mental Health (including Alcoholism), and Population and Family Planning. Faculty of the Division are actively engaged in a number of research projects in these fields. They also furnish extensive consultation, in which students are sometimes involved, to health agencies in North Carolina as well as the rest of the United States.

Detailed information about the faculty, training programs, and courses of the departments of Biostatistics and Epidemiology is available elsewhere in this catalogue (pages 46, 68).

POPULATION PROGRAM

The University of North Carolina has established a University-wide comprehensive program in Population Studies. For this purpose, the Carolina Population Center helps to stimulate, support and coordinate studies of population dynamics and family planning throughout the institution. It assists in building population research and teaching within various concerned University Departments, in developing and administering interdisciplinary projects related to the population field, and in maintaining relationships with other programs in North Carolina and abroad for study and service purposes.

The School of Public Health has developed a series of courses and curricula at the Master's and Doctoral levels, especially for students desiring a concentration of studies on population dynamics and family planning at local, national, and international levels. These students take basic course requirements in a given Department, in addition to related population studies in the School of Public Health and in other Schools and Departments in the University. In the Department of Biostatistics, population students are especially concerned with methods of demographic measurement, analysis, and modelling. The Department of Epidemiology, which also serves as the WHO Collaborating Centre for Epidemiological Studies of Human Reproduction, deals with basic and applied studies in population dynamics. The Department of Health Administration is concerned with population program organization management and evaluation and also with broader

issues of population policies. The Department of Health Education deals with related community educational processes, communications methods and training problems. The Department of Maternal and Child Health is especially concerned with family planning in family planning program development and evaluation within family health services, and also provides the base for a special program in Nursing and Family Planning.

Additional information concerning opportunities for special study in this field may be obtained from the heads of the Departments referred to above, or from the Academic Programs Office of the Carolina Population Center. A brochure describing the population programs of the participating Departments may also be obtained from the Departments or from the CPC Academic Programs Office.

BIostatistics FACULTY

- JAMES E. GRIZZLE, B.S., M.S., Ph.D., Professor of Biostatistics
JAMES R. ABERNATHY, B.S., M.S.P.H., Ph.D., Professor of Biostatistics
ELIZABETH J. COULTER, A.B., A.M., Ph.D., Professor of Biostatistics
REGINA C. ELANDT-JOHNSON, M.S., Ph.D., Professor of Biostatistics
ROBERT C. ELSTON, B.A., Dip. Ag., M.A., Ph.D., Professor of Biostatistics and
Research Associate in Pathology
BERNARD G. GREENBERG, B.S., Ph.D., Kenan Professor of Biostatistics and Dean,
School of Public Health
ROY R. KUEBLER, JR., A.B., M.A., Ph.D., Professor of Biostatistics
PETER A. LACHENBRUCH, B.A., M.S., Ph.D., Professor of Biostatistics
FORREST E. LINDER, B.A., M.A., Ph.D., Professor of Biostatistics
DANA E. A. QUADE, B.A., Ph.D., Professor of Biostatistics
PRANAB K. SEN, B.Sc., M.Sc., Ph.D., Professor of Biostatistics
HENRY BRADLEY WELLS, B.A., M.S.P.H., Ph.D., Professor of Biostatistics
LILLIAN GURALNICK, B.A., M.Sc., Adjunct Professor of Biostatistics
DANIEL G. HORVITZ, B.S., Ph.D., Adjunct Professor of Biostatistics
ANDERS S. LUNDE, B.A., M.A., Ph.D., Adjunct Professor of Biostatistics
RONALD W. HELMS, B.A., M.A., Ph.D., Associate Professor of Biostatistics
GARY G. KOCH, B.S., M.S., Ph.D., Associate Professor of Biostatistics
RICHARD H. SHACHTMAN, B.S., M.A., Ph.D., Associate Professor of Biostatistics
MICHAEL J. SYMONS, B.A., M.P.H., Ph.D., Associate Professor of Biostatistics
DAVID G. HOEL, B.A., Ph.D., Adjunct Associate Professor of Biostatistics
WILLIAM C. NELSON, B.S., M.S., Ph.D., Adjunct Associate Professor of Biostatistics
WILSON B. RIGGAN, B.S., Ph.D., Adjunct Associate Professor of Biostatistics
BABUBHAI V. SHAH, B.Sc., M.Sc., Ph.D., Adjunct Associate Professor of Biostatistics
RICHARD E. BILSBORROW, B.A., M.A., Ph.D., Assistant Professor of Biostatistics
CLARENCE E. DAVIS, B.A., M.S., Ph.D., Assistant Professor of Biostatistics
MILDRED E. FRANCIS, B.S., Sc.M., Sc.D., Assistant Professor of Biostatistics
DENNIS B. GILLINGS, B.Sc., Dip. Math. Stat., Ph.D., Assistant Professor of Biostatistics
CAROL R. HOGUE, A.B., M.P.H., Ph.D., Assistant Professor of Biostatistics
DAVID G. KLEINBAUM, A.B., A.M., Ph.D., Assistant Professor of Biostatistics
LAWRENCE L. KUPPER, B.S., M.S., Ph.D., Assistant Professor of Biostatistics
JOAN W. LINGNER, B.S., M.S., Ph.D., Assistant Professor of Biostatistics
ALFRED W. RADEMAKER, B.Sc., M.Sc., Ph.D., Assistant Professor of Biostatistics
WENDELL C. SMITH, B.S., M.S., Ph.D., Assistant Professor of Biostatistics
J. RICHARD STEWART, B.S., M.S., Ph.D., Assistant Professor of Biostatistics
CHIRAYATH M. SUCHINDRAN, B.Sc., M.Sc., M.S.P.H., Ph.D., Assistant Professor of Biostatistics
CRAIG D. TURNBULL, B.A., M.P.H., Ph.D., Assistant Professor of Biostatistics
O. DALE WILLIAMS, B.S., M.P.H., Ph.D., Assistant Professor of Biostatistics
HAMED ABOU GAMRAH, B.A., Dip. Stat., Ph.D., Visiting Assistant Professor in Biostatistics
CHARLES H. LANGLEY, B.A., Ph.D., Adjunct Assistant Professor of Biostatistics
JAMES J. PALMERSHEIM, A.A., B.S., M.S., Ph.D., Adjunct Assistant Professor of Biostatistics
DONALD G. LARSON, B.S., M.A., Ph.D., Resident Advisor in Kenya
KENNETH L. READ, B.A., M.A., Ph.D., Visiting Assistant Professor in Biostatistics
KERRY L. LEE, B.S., M.S., Ph.D., Adjunct Assistant Professor in Biostatistics
PREM P. TALWAR, B.A., M.A., M.Sc., M.S.P.H., Ph.D., Adjunct Assistant Professor in Biostatistics
H. DENNIS TOLLEY, B.S., Ph.D., Adjunct Assistant Professor in Biostatistics

ELLEN B. KAPLAN, B.S., M.A., Instructor (part-time) of Biostatistics
 ALEXA M. SORANT, S.B., A.M., Instructor (part-time) of Biostatistics
 PRISCILLA A. GUILD, B.S., M.S.P.H., Adjunct Instructor of Biostatistics
 RAYMOND H. BAKER, B.A., B.S., M.B.A., Associate Director for Operations, POPLAB
 in Biostatistics
 MARTHA E. BLAKE, B.S., M.A., Lecturer in Biostatistics
 ELISKA L. CHANLETT, A.B., M.A., Research Associate in Biostatistics
 RODNEY GO, B.S., Ph.D., Research Associate in Biostatistics
 HANS E. KRUSA, B.A., M.S.P.H., M.S., Ph.D., Research Associate In Biostatistics
 KADAMBARI K. NAMBOODIRI, B.S., M.S., Ph.D., Research Associate in Biostatistics
 ROBERT SPIRTAS, A.B., M.S., Research Associate in Biostatistics
 ARJUN L. ADLAKHA, B.S., M.S., M.A., Ph.D., Research Assistant Professor in Bio-
 statistics

Field Counselors

Donald Bates, B.S., M.S., Manager of Survey Methodology and Operations Department,
 Research Triangle Institute, P.O. Box 12194, Research Triangle Park, North Carolina
 Robert Calhoun, A.B., M.A., P.E.D., Indiana State Board of Health, 1330 W. Michigan
 Street, Indianapolis, Indiana.
 David C. Corkey, B.S., M.S.P.H., Assistant-Chief Information, North Carolina Office of
 Emergency Medical Services, P.O. Box 12200, Raleigh, North Carolina
 C. R. Council, B.S., M.S., Assistant Director of Management Information and Statistics,
 N.C. Division of Mental Health Services, N.C. Department of Human Resources,
 Raleigh, North Carolina.
 Donald J. Davids, M.S., M.P.H., J.S., Chief, Records and Statistics Section, Colorado
 Department of Health, Denver, Colorado
 Jack Feldman, Ph.D., National Center for Health Statistics, 5600 Fishers Lane, Rock-
 ville, Maryland
 Joseph Fleiss, B.A., M.S., Ph.D., Associate Research Scientist, New York Department of
 Mental Hygiene, New York, New York
 Irvin G. Franzen, A.B., M.P.H., Director, Division of Registration and Health Statistics,
 Kansas State Department of Health, Topeka, Kansas
 Irving D. Goldberg, B.S., M.P.H., Chief, Evaluation Studies Section, Biometry Branch,
 NIMH, 5600 Fishers Lane, Rockville, Maryland 20852
 Michael D. Hogan, B.A., M.S., M.P.H., Ph.D., Mathematical Statistician, National Insti-
 tute of Environmental Health Sciences, Research Triangle Park, North Carolina
 Ellen W. Jones, B.A., M.P.H., Assistant Director, Harvard University Center for Com-
 munity Health and Medical Care, Boston, Massachusetts
 William Kitching, B.S., Public Health Advisor, Health Services Research Branch, Depart-
 ment of Health, Education, and Welfare, 15A-16 Parklawn Building, 5600 Fishers
 Lane, Rockville, Maryland
 Ben Z. Locke, B.A., M.S., Assistant Chief, Center for Epidemiologic Studies, NIMH,
 5600 Fishers Lane, Rockville, Maryland 20852
 Vito M. Logrillo, B.S., M.P.H., Director, Office of Biostatistics, New York State Depart-
 ment of Health, Albany, New York
 William Nelson, B.S., M.S., Ph.D., Chief, Biometry Branch, National Environmental
 Research Center, Environmental Protection Agency, Research Triangle Park, North
 Carolina
 Aleda V. Roth, B.S., M.S.P.H., Statistician, American Nurses Association, Kansas City,
 Kansas

- Charles J. Rothwell, B.S., M.S., M.B.A., Head, Public Health Statistics Branch, Division of Health Services, North Carolina Department of Human Resources, P.O. Box 2091, Raleigh, North Carolina
- Robert Sherman, B.S., M.S., Ph.D., Biometrician and Associate Director of Program Evaluation, Hennepin County Mental Health Center, 619 South 15th Street, Minneapolis, Minnesota
- Jack C. Smith, B.A., M.S., Chief, Statistical Services Unit, Family Planning Evaluation Activity, Epidemiology Program, Center for Disease Control, Atlanta, Georgia
- Walter B. Watson, B.A., M.S., Ph.D., Staff Associate, Research and Evaluation Unit, Technical Assistance Division, Population Council, 245 Park Avenue, New York, New York
- Carson E. Whitlow, B.A., M.S.P.H., Chief, Division of Records and Statistics, Iowa State Health Department, Des Moines, Iowa
- Rita Zemach, B.A., M.S., Ph.D., Research Associate, Michigan Department of Public Health, Lansing, Michigan

The MPH program is designed to prepare individuals for positions in federal, state, and local agencies that require knowledge of the broad field of public health as well as specialized knowledge in Biostatistics. Thus this program emphasizes professional training; it includes at least three courses in public health and the Biostatistics requirements may be met by courses which do not have calculus prerequisite. On the other hand, the MSPH programs are more theoretical in content; they are designed to prepare students for professional careers in more specialized fields of public health. Besides the general MSPH program, conveniently referred to as the program in biometry, there are five more specialized programs which emphasize applications in: (1) demography and population studies; (2) mental health statistics; (3) health services; (4) environmental biostatistics, and (5) data management. The student in any of these programs is of course required to take the core courses specified by the School for the respective degree. In addition, he must take field training (BIOS 302), unless he has had sufficient previous professional experience; and at least 18 semester hours in other Biostatistics courses, including: elementary probability and statistical inference (BIOS 105, 150, or 160, depending on his interests and on his program); statistical analysis (BIOS 145, 151, or 161); statistical data processing (BIOS 108 or 109); and sampling (BIOS 164). (Whenever a specific course is mentioned in connection with some program, it is to be understood that any equivalent course may be substituted.) Each student must write a report that deals with some subject relevant to

public health. And finally, he must pass a general written examination in Biostatistics.

The MS degree in Biostatistics is awarded in a research-oriented program in theory and methodology. The student is required to have a foundation in mathematics including advanced calculus and linear algebra, and in computer usage. Courses in basic statistics which are specifically required include elementary probability and statistical inference (BIOS 160), a first course in intermediate statistical theory (STAT 134), statistical analysis (BIOS 161), and sampling (BIOS 164); the student must also elect 9 semester hours in advanced statistics. In addition he must complete a supporting program of at least 9 semester hours in a field of application; this is often within public health, but not necessarily so, there being no specific public health requirement. Professional experience is acquired through field training (BIOS 302), or through training in statistical consulting (BIOS 340/1/2), either of which involves a written report, or through the completion of a master's thesis (BIOS 393). Each MS student also serves as a teaching assistant to a faculty member for one course each year. Finally, students must pass the Basic Written Examination in Biostatistics.

The program for the PhD degree in Biostatistics is a continuation of that for the MS, and students who are admitted to it are expected to earn the MS in Biostatistics unless they have already received an equivalent degree elsewhere. The requirements include all those described for the MS. Additional courses in basic statistics which are specifically required are a second course in intermediate statistical theory (STAT 135), and stochastic processes (BIOS 167); then there must be elected 18 semester hours (rather than 9) in advanced statistics. The supporting program for the PhD must include at least 15 semester hours (rather than 9) in a field or fields of application. The student must attain professional experience equivalent to 6 semester hours of training in statistical consulting (BIOS 340/1/2), statistical teaching (BIOS 350/1/2), or both. Finally, in addition to the Basic Written Examination, each student must pass Doctoral Written and Oral Examinations. He must then write a dissertation on a subject in statistics, representing a contribution to knowledge; and he must defend this at a Final Oral Examination.

The DrPH program is designed for the advanced education of individuals in fundamental and applied aspects of public health.

Generally an MPH degree (or equivalent) and 1 to 3 years experience in public health practice are required for admission. Each candidate for this degree with major in Biostatistics is required to have a foundation in mathematics (advanced calculus and linear algebra) and in computer usage (data processing and programming). Courses specifically required in basic statistics are elementary probability and statistical inference (BIOS 160), statistical analysis (BIOS 161), and sampling (BIOS 164); in addition, the student must elect at least 18 semester hours of further courses in intermediate and advanced statistics. He must also complete a supporting program of at least 18 semester hours in non-statistical courses relevant to public health. His professional experience must include at least 12 months in public health practice (if not completed before admission to the program), and at least 6 semester hours of training in statistical consulting (BIOS 340/1/2). Finally, each student must pass comprehensive Doctoral Oral and Written Examinations. He must then write a dissertation such as to indicate that he has acquired a mastery of the research methodology and has contributed new knowledge; and he must defend this at a Final Oral Examination.

In addition to all the programs just described, the Department of Biostatistics also participates in programs for the MS and PhD degrees with minor in Public Health, but with major in either (Mathematical) Statistics in the Department of Statistics of The University of North Carolina at Chapel Hill, or in (Experimental) Statistics in the Department of Statistics of North Carolina State University at Raleigh.

Further information is available in a brochure which can be obtained by writing the Department of Biostatistics, School of Public Health, Chapel Hill, North Carolina 27514.

DEPARTMENT OF ENVIRONMENTAL SCIENCES AND ENGINEERING

RUSSELL F. CHRISTMAN, B.S., M.S., Ph.D., Professor of Environmental Sciences and
Chairman of Department

CHARLES M. WEISS, B.S., Ph.D., Professor of Environmental Biology and Deputy
Chairman of Department

PROGRAM IN WATER RESOURCES ENGINEERING

- JAMES C. LAMB III, B.S.C.E., M.S., S.E., Sc.D., Professor of Sanitary Engineering,
Director of Program
- GEORGE E. BARNES, B.S.C.E., C.E. (hon.) M.A., Professor of Environmental
Engineering, Emeritus
- MILTON S. HEATH, JR., A.B., LL.B., Professor (Water Resources) (Joint appointment
as Professor of Public Law and Government and Associate Director, Institute of
Government)
- DAVID H. HOWELLS, B.S.C.E., M.S.S.E., Professor of Environmental Engineering
(Joint appointment as Professor in Department of Agricultural and Biological Engi-
neering at N.C. State University)
- MAYNARD M. HUFSCHMIDT, B.S., M.P.A., D.P.A., Professor (Regional and Environ-
mental Planning) (Joint appointment as Professor in Department of City and
Regional Planning)
- FOREST O. MIXON, B.S., M.S., Ph.D., Adjunct Professor of Environmental Engineering
- DANIEL A. OKUN, B.S.C.E., M.S., Sc.D., Kenan Professor of Environmental
Engineering
- CHARLES R. O'MELIA, B.C.E., M.S.E., Ph.D., Professor of Environmental Sciences and
Engineering
- JAMES C. BROWN, B.S.C.E., M.S.S.E., Associate Professor of Environmental Engineering
- DONALD T. LAURIA, B.C.E., M.S.S.E., Ph.D., Associate Professor of Environmental
Engineering
- DAVID H. MOREAU, B.S., M.S., (E.), Ph.D., Associate Professor (Systems Analysis)
(Joint appointment as Associate Professor, Department of City and Regional Plan-
ning)
- JABBAR K. SHERWANI, B.S., B.S.C.E., M.C.E., Ph.D., M.P.A., Associate Professor of
Systems Analysis and Hydrology
- PHILIP C. SINGER, B.C.E., M.S., S.M., Ph.D., Associate Professor of Environmental
Sciences and Engineering

PROGRAM IN ENVIRONMENTAL CHEMISTRY AND BIOLOGY

- J. DONALD JOHNSON, B.S., Ph.D., Professor of Environmental Chemistry, Director of
Program
- RUSSELL F. CHRISTMAN, B.S., M.S., Ph.D., Professor of Environmental Sciences
- EDWARD J. KUENZLER, B.S., M.S., Ph.D., Professor of Environmental Biology
- CHARLES M. WEISS, B.S., Ph.D., Professor of Environmental Biology
- LINDA WEST LITTLE, B.A., M.S.P.H., Ph.D., Associate Professor of Environmental
Biology
- MIRDZA L. PETERSON, B.A., M.S., Ph.D., Adjunct Associate Professor of Environ-
mental Chemistry and Biology
- MARK S. SHUMAN, B.S., Ph.D., Associate Professor of Environmental Chemistry
- JAMES R. HASS, B.A., Ph.D., Adjunct Assistant Professor of Environmental Chemistry
and Biology
- FREDERIC K. PFAENDER, B.S., M.S., Ph.D., Assistant Professor of Environmental
Microbiology

MARK D. SOBSEY, B.S., M.S., Ph.D., Assistant Professor of Environmental Microbiology (Joint appointment in Department of Bacteriology and Immunology)
DONALD E. FRANCISCO, B.A., M.A., Ph.D., Lecturer in Environmental Biology

PROGRAM IN ENVIRONMENTAL MANAGEMENT AND PROTECTION

MORRIS A. SHIFFMAN, D.V.M., M.P.H., Docteur-Veterinaire, M.G.A., Ph.D., Professor of Environmental Health, Director of Program
EMIL T. CHANLETT, B.S., M.S.P.H., M.S.S.E., Professor of Sanitary Engineering
RUSSELL F. CHRISTMAN, B.S., M.S., Ph.D., Professor of Environmental Sciences
STANLEY J. WEIDENKOPF, B.S.C.E., M.P.H., Eng.D., Professor of Environmental Engineering, Emeritus
PHILIP E. SCHAMBRA, B.A., Ph.D., Adjunct Associate Professor of Environmental Management and Protection
ALVIS G. TURNER, B.S., M.S.P.H., Ph.D., Associate Professor of Environmental Sciences

PROGRAM IN AIR AND INDUSTRIAL HYGIENE

PARKER CRAMER REIST, B.S., S.M., S.M., Sc.D., Professor of Environmental Sciences and Engineering, Director of Program
AUBREY P. ALTSHULLER, B.S., M.S., Ph.D., Adjunct Professor of Air Chemistry
MARIO C. BATTIGELLI, M.D., M.P.H., Professor of Occupational Health (Joint appointment as Professor in Department of Preventive Medicine)
WARREN A. COOK, A.B., Adjunct Professor of Industrial Health
DAVID A. FRASER, B.A., M.S., D.Sc., Professor of Industrial Health
LEONARD J. GOLDWATER, A.B., M.D., Med. Sci.D., M.S.P.H., Adjunct Professor of Occupational Medicine, (Visiting Scholar, Duke University)
LYMAN A. RIPPERTON, B.A., B.S., Ph.D., Adjunct Professor of Air Hygiene
ARTHUR C. STERN, M.E., M.S., D.E.(Hon.), Professor of Air Hygiene
ROBERT L. HARRIS, B.S.Ch.E., M.S., Ph.D., Associate Professor of Environmental Engineering
JEAN J. SCHUENEMAN, B.S., M.P.H., Adjunct Associate Professor of Air and Industrial Hygiene
WILLIAM E. WILSON, JR., B.S., Ph.D., Adjunct Associate Professor, Air and Industrial Hygiene
DONALD L. FOX, B.S., Ph.D., Assistant Professor of Air Hygiene
HARVEY E. JEFFRIES, B.S., M.S.P.H., Ph.D., Assistant Professor of Air Hygiene

PROGRAM IN RADIOLOGICAL HYGIENE

JAMES E. WATSON, JR., B.S., M.S., Ph.D., Assistant Professor of Radiological Hygiene, Director of Program
ARTHUR W. WALTNER, A.B., M.S., Ph.D., Professor of Radiological Science (Joint appointment as Professor of Physics, North Carolina State University)
RICHARD E. JOHNSTON, B.S., M.S., Ph.D., Adjunct Associate Professor of Radiological Hygiene (Joint appointment as Associate Professor, Department of Radiology)
DONALD G. WILLHOIT, A.B., M.S., Sc.D., Associate Professor of Radiation Biophysics

JAMES A. ROSEBORO, Sc.B., Sc.M., Ph.D., Assistant Professor of Medical Physics
(Adjunct Assistant Professor in the Department of Radiology)

WILLIAM L. SAYLOR, M.S., Adjunct Assistant Professor of Radiological Hygiene
(Joint appointment as Assistant Professor, Department of Radiology)

PHILLIP J. WALSH, B.S., M.S.P.H., Ph.D., Adjunct Assistant Professor of Radiological Hygiene

Research Associates

LAWRENCE D. KORNREICH, A.B., M.S., M.S.P.H., Ph.D., Research Associate in Air and Industrial Hygiene

PETER H. CAMPBELL, B.A., Ph.D., Research Associate in Environmental Chemistry and Biology

GUY WILSON INMAN, B.S., Ph.D., Research Associate in Environmental Chemistry

PROGRAMS OF STUDY

The Department of Environmental Sciences and Engineering offers five graduate academic programs: (1) Water Resources Engineering (2) Environmental Management and Protection (3) Environmental Chemistry and Biology (4) Air and Industrial Hygiene, and (5) Radiological Hygiene.

The following curricula are illustrative of the courses which are usually taken by students in the respective program areas. Courses are selected by the student and his faculty adviser to suit the particular background and interest of the student. Programs leading to the Ph.D. degree are too varied to permit illustration.

Courses may be taken at Duke and NCSU without payment of additional tuition. Departmental students taking required courses at NCSU may be reimbursed for travel costs.

Interdisciplinary studies are encouraged and coordinated by organizations within the University such as the Institute for Environmental Studies, the Water Resources Research Institute, and the Institute of Marine Sciences. Joint programs of study such as the Graduate Program in Water Resources Planning and Development jointly sponsored by the Departments of Environmental Sciences and Engineering and City and Regional Planning draw on the specific resources of the two departments with students developing their major interest depending on their training in basic disciplines.

The Department of Environmental Sciences and Engineering issues a Departmental brochure and a quarterly "ESE Notes."

PROGRAM IN WATER RESOURCES ENGINEERING

The Master of Science in Environmental Engineering curricula may be based upon courses of study involving: (1) the technical aspects of water supply and treatment; wastewater collection, treatment and disposal; and the control of water pollution (for environmental and sanitary engineers), or (2) the planning, engineering, economic and administrative aspects of water resources development and management (for water resources engineers and planners), or (3) a combination of these. Minimum course requirements and illustrative programs follow. It is important to note that the illustrative programs shown are for the minimum residence only (1 year). Those students who elect to remain for one or two extra semesters have opportunity for much greater flexibility and depth of program, both in course selection and the scope of the master's technical report.

COURSE REQUIREMENTS FOR MSEE DEGREE WATER RESOURCES ENGINEERING

				Min. No In Each Group
1. Statistics				1
BIOS	105	Statistical Inference (3)	Fall, Spring, Summer	
BIOS	135	Probability and Statistics (4)	Fall	
BIOS	145	Principles of Experimental Analysis (3)	Fall, Spring	
BIOS	150	Elements of Probability and Statistical Inference (3)	Fall	
BIOS	151	Elements of Statistical Analysis (3)	Spring	
2. Environmental Sciences				2
ENVR	122	Water Chemistry (4)	Fall	
ENVR	131	Biology in Environmental Science (3)	Spring	
ENVR	133	Environmental Biology (3)	Fall	
ENVR	134	Environmental Microbiology (3)	Spring	
ENVR	181	Ground Water Hydrology (2)	Fall	
ENVR	281	Advanced Hydrology (3)	Spring	
ENVR	217	Systems Analysis (3)	Fall	
ENVR	218	Environmental Systems Analysis I (3)	Spring	
ENVR	219	Environmental Systems Analysis II (3)	Fall	
3. Planning				1
ENVR	212	Environmental Protection: Planning and Development (3)	Spring	
ENVR	282	Public Investment Theory (3)	Fall	
ENVR	278	Development of a Water Project (3)	Spring	

ENVR	283	Natural Resource Law and Policy (3)	Fall, Spring	
ENVR	284	Planning of Water Resources Systems (3)	Spring	
ENVR	285	Project in Water Quality Planning	Summer	
4.	Water Quality Management			1
ENVR	132	Limnology and Water Pollution (3)	Fall, Spring	
ENVR	171	Principles of Water Quality Management (2)	Fall	
ENVR	172	Workshop in Water Quality Management (1)	Fall	
ENVR	174	Water and Wastes Treatment Processes (3)	Spring	
ENVR	174L	Water and Wastes Treatment Processes Lab (1)	Spring	
ENVR	176	Hydraulics and Hydrology (3)	Fall	
ENVR	271	Modeling of Natural Aquatic Systems (3)	Spring	
ENVR	274	Advanced Water and Wastes Treatment Processes I (3)	Fall	
ENVR	275	Advanced Water and Wastes Treatment Processes II (3)	Spring	
ENVR	276	Industrial Water Quality Management (3)	Spring	
5.	Design			1
ENVR	272	Technology of Engineered Water Systems (3)	Fall	
ENVR	273	Water and Wastewater Plant Design (3)	Summer	
ENVR	277	Engineering Project Design (3)	Summer	
6.	Master's Problem			1
ENVR	270, 370	Problems or Research in Sanitary Engineering and Water Resources (3 or more)		

NOTE:

Each student must complete at least 30 semester hours of graduate credit and take at least two courses in the School of Public Health outside the Environmental Sciences and Engineering Department.

ILLUSTRATIVE ONE-YEAR PROGRAM (MSEE)

Environmental and Sanitary Engineers

Fall Semester

Course No.	Course Title	Semester Hours
ENVR 171	Principles of Water Quality Management	2
ENVR 172	Workshop in Water Quality Management	1
ENVR 122	Water Chemistry	4
ENVR 272	Technology of Engineered Water Systems	3
BIOS 135	Probability and Statistics	4
ENVR 183	Water Resources Seminar	2

Spring Semester

ENVR	131	Biology in Environmental Science	3
ENVR	174	Water and Wastes Treatment Processes	3
ENVR	174L	Water and Wastes Treatment Processes Lab	1
ENVR	270	Problems in Sanitary Engineering and Water Resources	1
ENVR	278	Development of a Water Project	3
EPID	162	Epidemiology in Environmental Health	3
			<hr/>
			14

Summer

ENVR	273	Water and Wastewater Treatment Plant Design	3
ENVR	285	Special Project in Water Quality Planning	3
ENVR	270	Problems in Sanitary Engineering and Water Resources	3
			<hr/>
			9

ILLUSTRATIVE ONE-YEAR PROGRAM (MSEE)**Water Resources Engineers and Planners****Fall Semester**

Course No.	Course Title	Semester Hours
ENVR 171	Principles of Water Quality Management	2
ENVR 217	Systems Analysis	3
ENVR 272	Technology of Engineered Water Systems	3
ENVR 282	Public Investment Theory	3
BIOS 135	Probability and Statistics	4
		<hr/>
		15

Spring Semester

ENVR	218	Environmental Systems Analysis I	3
ENVR	283	Natural Resource Law and Policy	3
ENVR	284	Planning of Water Resources Systems	3
ENVR	270	Problems in Sanitary Engineering and Water Resources	1
EPID	'162	Epidemiology In Environmental Health	3
			<hr/>
			13

Summer

ECON	131	Intermediate Price and Distribution Theory	3
ENVR	277	Engineering Project Design	3
ENVR	270	Problems in Sanitary Engineering and Water Resources	3
			9

PROGRAMS IN ENVIRONMENTAL CHEMISTRY AND BIOLOGY

This program is intended to prepare students with backgrounds in chemistry and biology for careers in the sciences of water resources, ecology, and pollution control. Course work and research opportunities are offered in ecology, limnology, water chemistry, aquatic biology, virology, and microbiology.

The MS and MSPH programs usually require 21 months for completion; however, it is possible for the especially well prepared student studying full-time to complete the requirements in one year. The program for both master's and doctoral candidates is tailored to the research and career interests of the student with the advice and consent of his degree committee within the general regulations of the Graduate School. The completion of a research project for the master's report or thesis typically requires one-third of the student's program of study. Courses include a selection from offerings of other program areas and Duke and North Carolina State. There is latitude in selection of courses to satisfy program area requirements depending on career goals, academic background, and professional experiences of the individual student. The following is an outline of minimum course requirements for the MSPH.

CHEMISTRY AND BIOLOGY PROGRAM AREA

		Number of Required Courses	
		Chemistry Program	Biology Program
1.	Chemistry	3	1
	ENVR 122—Water Chemistry (4)—fall		
	ENVR 123—Organic Materials in Natural Waters (3)—fall		
	ENVR 128—Chemical Oceanography (4)—spring		

		Number of Required Courses	
		Chemistry Program	Biology Program
ENVR	222—Special Topics in Aquatic Chemistry (2)—fall, spring		
ENVR	247—Chemistry of the Troposphere (3)—fall		
CHEM	144—Separations (2)—spring		
CHEM	145—Electroanalytical Chemistry (2)—fall		
CHEM	146—Analytical Spectroscopy (2)—fall, spring		
CHEM	160—Intermediate Organic Chemistry (3)— fall, spring		
CHEM	180—Principles of Physical Chemistry (3)—fall		
CHEM	181—Physical Chemistry (3)—fall		
GEOL	142—Principles of Geochemistry (4)—fall		
2. Biological Sciences		2	4
Biology	Biology Minimum	1	1
*ENVR	131—Biology in Environmental Science (3)—spring		
ENVR	132—Limnology and Water Pollution (3)—fall, spring		
ENVR	133—Environmental Biology (3)—fall		
ENVR	134—Environmental Microbiology (3)—spring		
ENVR	136—Biological Oceanography (6) —spring		
ENVR	138—Environmental Virology (4)—spring		
ENVR	232—Special Topics in Aquatic Biology (2)—fall, spring		
BIOC	100—Biochemistry (3)—fall		
BOTN	114—Algae (5)—spring		
Ecology	Ecology Minimum	1	2
ENVR	132—Limnology and Water Pollution (3)—fall, spring		
ENVR	135—Ecology (4)—fall, spring		
ENVR	137—Ecology of Wetlands (4-6)—summer		
ENVR	233—Microbial Ecology (4)—fall		
ENVR	235—Ecology of Phytoplankton (4)—spring		
ZOOL	109—Introduction to Hydrobiology (4)—spring		
ZOOL	146—Marine Ecology (4)—spring		
ZOOL	108—Population Ecology (3)—spring		
ZOOL	226—Systems Ecology (3)—spring		

*Does not satisfy biology requirements for biologists.

		Number of Required Courses	
		Chemistry Program	Biology Program
3. Techniques and Applications		1	1
ENVR	174—Water & Waste Treatment Processes, Lab (4)—spring		
ENVR	221—Instrumental Methods of Analysis (4)—spring		
ENVR	223—Trace Analysis (3)—fall		
ENVR	231—Limnological Methods (3)—summer		
CHEM	141—Laboratory in Analytical Research Techniques I (2)		
BIOC	100L—Biochemistry Laboratory (2)—fall		
4. Environment and Health		1	1
EPID	160—Principles of Epidemiology (3)—fall		
EPID	162—Epidemiology in Environmental Health (3)—spring		
PALP	131—Parasitism and Human Disease (2)—fall		
PALP	134—Human Parasitology (3)—fall		
5. Statistics		1	1
BIOS	105—Principles of Statistical Inference (3)—fall, spring		
BIOS	135—Probability and Statistics (4)—fall		
BIOS	145—Principles of Experimental Analysis (3)—spring		
6. Environmental Protection		1	1
ENVR	211—Environmental Management (3)—summer		
ENVR	215—Environmental Issues and Assessment (2)—fall		
7. Other Environmental Science Areas		1	1
ENVR	115—Electron Microscopy (3)—spring		
ENVR	141—Elements of Air Hygiene (2)—summer		
ENVR	143—Applied Physiology and Toxicology (3)—fall		
ENVR	144—Air Pollution Measuring, Monitoring and Survey (3)—spring		
ENVR	154—Management of the Institutional Environment (3)—spring		
ENVR	161—Elements of Radiological Hygiene (2)—spring, summer		

		Number of Required Courses	
		Chemistry Program	Biology Program
ENVR	171—Principles of Water Quality Management (2)—fall		
ENVR	217—Systems Analysis in Environmental Planning (3)—fall		
ENVR	283—Natural Resource Law and Policy (3)—fall, spring		
8. Reading and Research		1	1
6 units minimum			

The master's program of study is constructed from the area requirements listed above. The program can be completed in 12 months but the majority of students prefer to invest a significant amount of effort in the preparation of a master's report. This may require as much as 21 months of study to complete the degree. The PhD program expands these area requirements to include advanced study in either Chemistry or Biology.

PROGRAM IN AIR AND INDUSTRIAL HYGIENE

Designed to prepare students for careers in practice and research in air pollution and industrial hygiene. Students may follow a program leading to the Master of Science in Public Health degree, or persons with an engineering background may take a program with somewhat different emphasis leading to the Master of Science in Environmental Engineering degree. For either specialty within the program area, certain courses are required; others are highly recommended. These are listed below. A few of the courses offered are fundamental to both industrial hygiene and air pollution and are required for all students in the program. By judicious choice of elective courses, students can be prepared for professional work in either of the two specialties or for a career which combines the two.

Courses Required for All Students			Credit Hours
BIOS	105	Principles of Statistical Inference, fall, spring	3
	or		
BIOS	135	Probability and Statistics, fall	4
EPID	162	Epidemiology in Environmental Health, spring (MSPH candidates only)	3

ENVR	143	Applied Physiology and Toxicology, fall	3
ENVR	242	Industrial Hygiene Practices, spring	3
ENVR	243	Air and Its Contaminants, fall	3

Additional Courses**Required for Students Primarily Interested in Industrial Hygiene**

ENVR	146,	Industrial Hygiene Engineering Control Design, fall,	
	146L	(for MSEE candidates)	3-4
ENVR	244	Industrial Hygiene Laboratory, spring	3

Additional Courses**Required for Students Primarily Interested in Air Pollution**

ENVR	144	Air Pollution Measuring, Monitoring and Survey, spring	3
ENVR	245	Air Pollution Control, spring	3
ENVR	249	Air Pollution Meteorology (required for MSEE candidates only), spring	3

Recommended Elective Courses

(for both air pollution and industrial hygiene students unless otherwise noted)

ENVR	115	Applied Electron Microscopy, spring	3
ENVR	145	Instrumentation and Data Acquisition, fall	3
ENVR	147	Occupational Safety, spring	3
ENVR	154	Management of the Institutional Environment (Industrial Hygiene), spring	3
ENVR	161	Elements of Radiological Hygiene, spring, summer (Industrial Hygiene)	2
ENVR	163	Radiation Instrumentation, fall	3
ENVR	211	Environmental Management, summer	3
ENVR	212	Environmental Protection: Planning and Development, spring	3
ENVR	221	Instrumental Methods of Analysis, spring	4
ENVR	241,	Introduction to Aerosol Science, Lab, fall	3-4
	241L		
ENVR	246	Biological Effects of Air Pollution, fall	3
ENVR	247	Chemistry of the Troposphere, fall	3
ENVR	248	Industrial Medicine, Practice and Management, spring	3
ENVR	276	Industrial Water Quality Management, spring	3
ENVR	283	Natural Resource Law and Policy, fall, spring	3
COMP	216x	Introduction to Computer Use, fall spring, summer (No degree credit)	3

There is also the possibility of scheduling special projects and studies as a reading course (ENVR 140) or working for credit on a current research project (ENVR 240). The number of credit hours to be assigned for these courses is variable. Advisor concurrence is required.

PROGRAM IN ENVIRONMENTAL MANAGEMENT AND PROTECTION

Environmental Management:

The environmental management program is intended for persons concerned with the direction or supervision of environmental protection programs and with environmental planning. The major emphasis is on program planning, administration and management, as well as environmental policy development. Newer management approaches to environmental control are considered.

There are two levels of training offered:

1. The advanced management one-year program limited to applicants with a substantial educational and experience background in environmental science or engineering.
2. The two-year program for applicants with limited experience includes preparation in environmental protection supplemented by a basic environmental management program of study.

Environmental Protection:

This curriculum is designed to provide students with the scientific principles which are essential for the operation of environmental protection programs. It includes courses in (a) the applied sciences fundamental to understanding environmental pollution (b) current practices, concepts, and technologies in the environmental health sciences, and (c) the basic elements of program planning and management.

The student may concentrate in one of three areas, including:

1. Community Environment—to prepare environmental planners and practitioners whose activities are directed at the interface at which environmental hazards and stresses impinge on the individual and community. The program of study includes courses in community sanitation, food protection, the institutional environment, housing, noise, insect and vector control and solid waste as well as introductory courses in air and industrial hygiene and radiological health.
2. Hospital and Institutional Environment—a specialized program to prepare students for responsible administrative and technical management positions in the control of the health facilities and institutional environment. Graduates are em-

ployed by health care facilities and official agencies responsible for evaluating and accrediting such facilities.

3. Food and Consumer Protection—an in-depth curriculum in food protection is available through a program offered in cooperation with the Department of Food Science at the North Carolina State University.

Graduates of these programs are employed by health agencies, other governmental agencies, industries, and institutions with comprehensive programs of environmental control.

**EXAMPLE OF A ONE-YEAR PROGRAM OF STUDY IN
ENVIRONMENTAL PROTECTION (MSPH)**

Fall Semester

BIOS	105	Principles of Statistical Inference	3
ENVR	143	Applied Physiology and Toxicology	3
ENVR	171	Principles of Water Quality Management	2
ENVR	251	Environmental Protection I	3
ENVR	252	Environmental Protection II	3
			14

Spring Semester

ENVR	154	Management of the Institutional Environment	3
ENVR	212	Environmental Protection: Planning and Development	3
ENVR	253	Environmental Protection III	3
ENVR	255	Solid Waste Management	2
EPID	162	Epidemiology in Environmental Health	3
			14

Summer

ENVR	141	Elements of Air Hygiene	2
ENVR	142	Elements of Industrial Hygiene	2
ENVR	161	Elements of Radiological Hygiene	2
ENVR	211	Environmental Management	3
ENVR	250	Problems in Environmental Management and Protection	VAR
			9

Students in the two-year program in Environmental Protection have the opportunity to take further course work offered by other program areas of the Department in the specialized fields of environmental protection or to continue in the Environmental Management program of study.

**EXAMPLE OF A ONE-YEAR PROGRAM OF STUDY IN
ENVIRONMENTAL MANAGEMENT (MSPH)**

Fall Semester

BIOS	105	Principles of Statistical Inference	3
ENVR	171	Principles of Water Quality Management	2
ENVR	172	Workshop in Water Quality Management	1
ENVR	215	Environmental Issues and Assessment	2
ENVR	217	Systems Analysis in Environmental Planning	3
ENVR	282	Public Investment Theory and Techniques	3
			14

Spring Semester

ENVR	212	Environmental Protection: Planning and Development	3
ENVR	283	Natural Resource Law and Policy	3
EPID	162	Epidemiology in Environmental Health	3
PLAN	241	Environmental Planning	3
ENVR	253	Environmental Protection III	3
			15

Summer

ENVR	211	Environmental Management	3
ENVR	277	Engineering Project Design	3
ENVR	250	Problems	6
			12

The two-year program in Environmental Management permits further study in environmental policy, planning and management. Students in the two-year program have an opportunity to elect appropriate courses throughout the School of Public Health and in the University. These include courses in the Departments of City and Regional Planning, Political Science and Economics among others.

PROGRAM IN RADIOLOGICAL HYGIENE

Radiological Hygiene is that area of science devoted to the protection of man and his environment from undue radiation exposure and the promotion of the use of nuclear energy to the benefit of mankind. The objectives of the program are to provide competent professional personnel to meet the increasing demand for radiological health specialists in industries, government agencies, universities, and hospitals. The physics of radiation protection and radiobiology are emphasized. Instruction in nuclear engineering may be elected. Individual study of projects in medical radiation physics is a joint effort with the Department of Radiology, School of Medicine. The program is a cooperative venture between the two campuses of the University of North Carolina, in Raleigh and in Chapel Hill. Students may enter through either branch of the University through these departments: at Chapel Hill, Environmental Sciences and Engineering; or Raleigh, Physics or Nuclear Engineering.

ILLUSTRATIVE ONE-YEAR PROGRAM IN RADIOLOGICAL HYGIENE (MSPH)

Summer¹

ENVR	118	Quantitative Studies for Environmental Sciences	5
			<hr/> 5

Fall Semester

BIOS	105, or	Principles of Statistical Inference, or	3
BIOS	135	Probability and Statistics	4
ENVR	162	Modern Physics for Environmental Science	3
ENVR	163	Radiation Instrumentation	3
ENVR	241	Introduction to Aerosol Science	3
ENVR	160,	Readings or Problems in Radiological	
	260	Hygiene	2
			<hr/> 14-15

¹The assignment of the first summer program depends on the undergraduate preparation of the student.

Spring Semester

ENVR	261	Radiation Biophysics	3
ENVR	263	Radiation Hazards Evaluation I	3
GN	532 (NCSU)	Biological Effects of Radiation	3
PY	520 (NCSU)	Measurements in Nuclear Physics	3
EPID	162	Epidemiology in Environmental Health	3
			<hr/>
			15

Summer²

ENVR	164	Field Observations in Radiological Hygiene	3
ENVR	211	Environmental Management	3
ENVR	260	Problems in Radiological Hygiene	6
			<hr/>
			12

**ILLUSTRATIVE TWO-YEAR PROGRAM IN
RADIOLOGICAL HYGIENE (MSPH)****1st Year—Fall Semester**

BIOS	135, or	Probability and Statistics, or	4
BIOS	105	Principles of Statistical Inference	3
ENVR	162	Modern Physics for Environmental Science	3
ENVR	163	Radiation Instrumentation	3
ENVR	241	Introduction to Aerosol Science	3
			<hr/>
			12-13

Spring Semester

ENVR	261	Radiation Biophysics	3
ENVR	263	Radiation Hazards Evaluation I	3
ENVR	160	Readings in Radiological Hygiene	2
GN	532 (NCSU)	Biological Effects of Radiation	3
PY	520 (NCSU)	Measurements in Nuclear Physics	3
			<hr/>
			14

Summer

ENVR	260	Problems in Radiological Hygiene	6
ENVR	164	Field Observations in Radiological Hygiene	3
ENVR	211	Environmental Management	3
			<hr/>
			12

²The assignment of the first summer program depends on the undergraduate preparation of the student.

2nd Year—Fall Semester

ZOOL	108	Ecology	4
PHYS	160, or	Introduction to Quantum Mechanics, or	3
ENVR	262	Health Physics	3
		_____ Electives	6
			<hr/> 13

Spring Semester

EPID	162	Epidemiology in Environmental Health	3
ENVR	260	Problems in Radiological Hygiene	3
ENVR	264	Radiation Hazards Evaluation II	3
		_____ Elective	3
			<hr/> 12

Students who extend the Master's program over a two-year period have an opportunity to do an investigation in depth and to take additional courses available at UNC and NCSU. Generally, a Master's candidate may expect to spend a good part of one semester's course work at NCSU.

DOCTOR OF PHILOSOPHY

The Department of Environmental Sciences and Engineering offers the Ph.D. Degree in each of the program areas.

Applicants without Master's Degrees are required to pursue the Ph.D. via a Master's degree. Students already possessing Master's degrees from other schools may be admitted directly to the Ph.D. or may be required to enroll for a Master's Degree in this Department, depending upon a review of the student's background by the Department faculty. In the latter approach, the time required to complete the Ph.D. would be slightly longer than if the student had been admitted directly to that program.

The University requires a minimum of four semesters of full-time graduate study, at least two of which must be continuous at the University. Based upon past experience, actual residence time for completion of a Ph.D. program may be considered a minimum of two years following a Master's degree, with a median of three years.

Other specific requirements include a major in one of the program areas and a supporting program of at least 15 semester

hours, (excluding seminar or research units, but preferably 21 semester hours) selected to be of maximum benefit in conduct of the research and preparation of the dissertation. The Department and the University require knowledge of one research skill or one language for the Ph.D.

Doctoral written and oral examinations customarily are given upon completion of course work and prior to initiating research for the dissertation. The defense of the dissertation is the final oral examination for the Ph.D.

EPIDEMIOLOGY

MICHEL A. IBRAHIM, M.D., M.P.H., Ph.D., Professor of Epidemiology and Acting Chairman

JOHN C. CASSEL, B.S., M.B., B.Ch., M.P.H., Alumni Distinguished Professor of Epidemiology, Chairman Emeritus

DRAGANA ANDJELKOVIC, M.S., M.P.H., Dr.P.H., Assistant Professor of Epidemiology

CAROLINE BECKER, A.B., M.D., Assistant Professor of Epidemiology

KENNETH BRIDBORD, M.D., M.P.H., Adjunct Assistant Professor of Epidemiology

JOAN CLAIRE CORNONI, B.A., M.P.H., Ph.D., Associate Professor of Epidemiology

DAVID DEUBNER, M.D., M.P.H., Adjunct Assistant Professor of Epidemiology

JOHN THOMAS FULTON, D.D.S., Professor of Epidemiology, Emeritus

STEPHEN H. GEHLBACH, B.A., M.D., M.P.H., Adjunct Assistant Professor of Epidemiology

MICHAEL HAMILTON, B.M., M.D., M.P.H., Adjunct Assistant Professor of Epidemiology

DOUGLAS I. HAMMER, M.D., M.P.H., Adjunct Assistant Professor of Epidemiology

CARL GROOVER HAYES, B.S., M.P.H., Ph.D., Adjunct Professor of Epidemiology

MICHAEL HOGAN, M.S., M.P.H., Ph.D., Adjunct Assistant Professor of Epidemiology

JAMES HOUSE, Ph.D., Adjunct Assistant Professor of Epidemiology

BARBARA SORENSON HULKA, B.A., M.S., M.D., M.P.H., Associate Professor of Epidemiology

SHERMAN A. JAMES, A.B., Ph.D., Assistant Professor of Epidemiology

BERTON H. KAPLAN, B.S., M.S., Ph.D., Professor of Epidemiology

G. J. LOVE, B.S., M.P.H., D.Sc., Adjunct Assistant Professor of Epidemiology

EUGENE S. MAYER, B.S., M.D., Assistant Professor of Epidemiology

ANTHONY McMICHAEL, B.S., Ph.D., M.D., Assistant Professor of Epidemiology

ABDEL R. OMRAN, M.D., D.P.H., M.P.H., Dr.P.H. Professor of Epidemiology

RALPH CLINTON PATRICK, JR., A.B., A.M., Ph.D., Associate Professor of Epidemiology

JAMES SCHWANKL, M.D., M.P.H., Instructor in Epidemiology

CARL M. SHY, M.D., Dr.P.H., Research Professor in Epidemiology

CECIL SLOME, M.B., Ch.B., D.P.H., Professor of Epidemiology

JAMES STEBBINGS, B.S., Sc.D., Adjunct Associate Professor of Epidemiology

HERMAN A. TYROLER, A.B., M.D., Professor of Epidemiology

EDWARD H. WAGNER, A.B., M.D., M.P.H., Assistant Professor of Epidemiology

CAROLYN A. WILLIAMS, B.S.N., M.S., Ph.D., Assistant Professor of Epidemiology

Research Associates

JO EADDY MAREADY, B.A., Research Associate in Epidemiology
FREDERIC J. ROMM, M.D., M.P.H., Research Associate in Epidemiology
SUSANNE H. WOLF, B.S.N., M.P.H., Research Associate in Epidemiology

MASTER OF PUBLIC HEALTH

This is an eleven month program designed to provide foundation in the use of epidemiologic method in the study of health and disease. It is designed primarily for medical and dental graduates, but consideration will be given to others who are particularly interested and whose background of training and experience are suitable.

The core curriculum required by the School of Public Health for this degree includes:

- a) Biostatistics 100
- b) Epidemiology 160
- c) Health Administration 105, 107, or 108

or

Health Education 108, 130, 133, or 206

and

- d) At least one course from ENVR, MHCH, PALP, NUTR, or PHNU.

Therefore, all candidates are required to complete *four* courses, *three* of which must be from outside the major department.

Beyond this core the faculty advisor and the student design a curriculum to meet the needs of the individual student. The program usually includes a sequence of Epidemiology courses and a number of courses in Biostatistics. Other courses are available either in the School of Public Health, other Schools in the Division of Health Sciences, or elsewhere in the University (e.g., Departments of Sociology, Psychology, and Information Science). In developing this curriculum, it is expected that each student should be able to identify the major issues in his field of interest, and that he and his advisor would then jointly determine the areas of competence needed to solve these issues. A final written examination and a master's thesis are also required by the Department for this degree. On one or two special days set aside during the summer session all master students present their completed work on the Master's Presentation Day.

MASTER OF SCIENCE IN PUBLIC HEALTH

The requirements for admission and for the degree are listed on page 34 of this catalogue.

The program of study usually requires a more extended period of residence, and is intended primarily for students without the usual professional background who wish to specialize in depth in a particular area. This program is more flexible than other master's programs both in terms of courses required by the School of Public Health and the length of time in residence.

Within the minimum of thirty semester-hours of credit needed for graduation, all students must include the following courses required by the school.

1. Biostatistics 100, or equivalent, and
2. EPID 160, or equivalent.

M.S.P.H. students must complete the final written examination and present their completed thesis work with other masters students on Master's Presentation Day.

Required Courses

BIOS	103	Management of Public Health Data (2)
BIOS	105	Principles of Statistical Inference (3)
EPID	160	Principles of Epidemiology (3)
		OR
EPID	161	Epidemiology in Population Dynamics and Family Planning (3)
EPID	162	Epidemiology in Environmental Health (3)
BIOS	287	Statistical Methods in Epidemiology (3)
EPID	230	Applied Methods in Epidemiology Research (3)
EPID	231	Epidemiologic Research in Personal Health Services (3)
EPID	240	Alcohol Behavior and Health (2)
EPID	241	Research Methodology in Alcoholic Usage (2)
EPID	260	Epidemiological Foundations for Disease Control Programs (3)
EPID	262	Epidemiology of Program Acceptance (2)
EPID	264	Culture and Health (3)
EPID	265	History of Epidemiology (3)
EPID	266	Epidemiology Investigation (3)
EPID	368	Evaluative Research Methods (2)
HADM	110	Concepts of Health Administration (3)
		OR
ENVR	101	Political, Economic, and Social Perspective on Health Administration (2)
HEED	130	Principles of Public Health Education (2)

Electives

EPID	140, 141	Problems in Epidemiology (1 or more)
EPID	211	Determinants of Communicable Diseases (2)
EPID	251	Advanced Population Epidemiology (3)
EPID	268	Advanced Methods in Epidemiology (3)
EPID	270	Application of Psychological Theory and Research to Health (3)
EPID	276	Advanced Environmental Epidemiology (3)
HADM	212	Principles of Chronic Disease Control (2)
HADM	170	Personal Health Services Administration (2)
HADM	220	Veterinary Medicine and Public Health (2)
HADM	211	Control of Communicable Diseases (2)
MHCH	210	Maternal and Child Health I (3)
HADM	202, 203, 204	Seminar in Public Health Administration (1 each)
HADM	231	Seminar in Dental Public Health Practice (2)

DOCTOR OF PUBLIC HEALTH

This program, designed for those students interested in careers as professional epidemiologists, is available to physicians, dentists, social scientists, and biometricians. The program is entirely research oriented, and in addition to the admission requirements indicated on page 37 of this catalogue, each applicant has to satisfy the faculty as to his research interest and potentiality.

Each student's program is individually planned, centering around a major research project, and there are no fixed curriculum requirements. The Graduate School Handbook contains most of the rules and regulations adhered to by the Department of Epidemiology.

DOCTOR OF PHILOSOPHY

This program is similar in many respects to the program leading to the degree of Doctor of Public Health. It is a more stringent program, however, in that in addition to the requirement for a research dissertation of high calibre, all the course requirements and language requirements specified by the department and/or the individual student's doctoral committee have to be met.

HEALTH ADMINISTRATION

- SAGAR C. JAIN, B.A., M.A., M.S., Ph.D., Professor of Health Administration and Department Chairman
- MOYE WICKS FREYMANN, B.S., M.D., M.P.H., Dr.P.H., Professor of Health Administration
- THOMAS L. HALL, M.D., M.P.H., Dr.P.H., Professor of Health Administration and Director, Carolina Population Center
- WILLIAM G. HOLLISTER, A.B., B.S., M.D., M.P.H., Research Professor of Health Administration
- JOHN THOMAS HUGHES, B.S., D.D.S., M.P.H., Dr.P.H., Professor of Health Administration, Professor of Dental Ecology, School of Dentistry, and Director of Continuing Education
- ARNOLD DANIEL KALUZNY, B.A., M.H.A., Ph.D., Professor of Health Administration
- JACOB KOOMEN, B.S., M.D., M.P.H., Adjunct Professor of Health Administration and Director, Division of Health Services, N.C. State Department of Human Resources
- WILLIAM FRED MAYES, B.S., M.D., M.P.H., Professor of Health Administration, Emeritus
- JAMES W. OSBERG, M.D., Adjunct Professor of Health Administration and Assistant Director of Mental Health, Division of Mental Health, N.C. Department of Human Resources
- HARRY T. PHILLIPS, M.D., D.P.H., Professor of Health Administration and Director of UNC Program in Health Planning
- LEONARD S. ROSENFELD, B.S., M.D., M.P.H., Professor of Health Administration
- MORRIS SCHAEFER, B.S., M.A., D.P.A., Professor of Health Administration
- PATRICIA F. WALLER, A.B., M.S., Ph.D., Research Professor of Health Administration
- JOHN JOSEPH WRIGHT, A.B., M.D., M.P.H., Professor of Health Administration, Emeritus
- JAMES ELMORE ALLEN, B.A., S.T.B., M.S.P.H., Ph.D., Associate Professor of Health Administration
- B. J. CAMPBELL, B.A., M.A., Ph.D., Adjunct Associate Professor of Health Administration and Director, University of North Carolina Highway Safety Research Center
- ABRAHAM S. DAVID, B.S., M.S., Ph.D., M.S.P.H., Adjunct Associate Professor of Health Administration and Senior Population Economist RTI
- WILLIAM SHOEMAKER FLASH, A.B., M.P.A., Ph.D., Associate Professor of Health Administration
- JEROME B. HALLAN, B.S., M.S.P.H., Dr.Ph.D., Adjunct Associate Professor of Health Administration
- CHARLES L. HARPER, B.A., M.S.P.H., Ph.D., Associate Professor of Health Administration, and Associate Dean for Community Health Service
- MARTIN PATTERSON HINES, D.V.M., M.P.H., Adjunct Associate Professor of Health Administration and Director, Section of Epidemiology, Division of Health Services, N.C. Department of Human Resources
- LYDIA SAY HOLLEY, A.B., R.P.T., M.P.H., Associate Professor of Health Administration
- ALBERT L. JOHNSON, B.A., M.A., M.P.H., Ph.D., Associate Professor of Health Administration and Associate Professor of Social Work
- WILLIAM BURNS JONES, B.S., M.D., M.P.H., Adjunct Associate Professor of Health Administration and Director, Chronic Disease Section Division of Health Services, N.C. Department of Human Resources
- FLORENCE KAVALER, B.A., M.D., M.S., M.P.H., Adjunct Associate Professor of Health Administration

- DONALD L. MADISON, B.M.E., M.D., Associate Professor of Health Administration and Associate Professor of Family Medicine
- ROBERT M. MORONEY, A.B., M.S.W., M.P.H., Ph.D., Associate Professor of Health Administration and Associate Professor of City and Regional Planning
- ERNEST A. PEARSON, JR., A.B., D.D.S., M.P.H., Adjunct Associate Professor of Health Administration and Director, Dental Health Section, Division of Health Services, N.C. Department of Human Resources
- JAMES E. VENEY, B.A., M.S., Ph.D., Associate Professor of Health Administration
- DAVID G. WARREN, A.B., J.D., Adjunct Professor of Health Administration and Associate Professor of Public Law and Government
- JANICE R. WESTABY, B.S., M.P.H., Adjunct Associate Professor of Health Administration
- PATRICIA Z. BARRY, B.A., M.A., Dr.P.H., Assistant Professor of Health Administration
- DAN EDWARD BEAUCHAMP, B.A., M.A., Ph.D., Assistant Professor of Health Administration
- CHESTER W. DOUGLASS, D.D.S., M.P.H., Assistant Professor of Health Administration and Associate Professor of Dental Ecology
- GEORGE DUDNEY, B.S., D.D.S., M.P.H., Adjunct Assistant Professor of Health Administration and Assistant Director, Dental Health Section, Division of Health Services, N.C. Department of Human Resources
- WILLIAM THEODORE HERZOG, B.A., M.S.P.H., Assistant Professor of Health Administration and Director of Off-Campus Programs
- ERNEST RATLIFF, LL.B., Adjunct Assistant Professor of Health Administration and Associate Professor of Health Law, NCCU
- JOHN RODAK, JR., A.B., S.M., Adjunct Assistant Professor of Health Administration
- DIRK J. SPRUYT, B.A., M.D., M.P.H., Assistant Professor of Health Administration
- DAVID L. ZALKIND, B.A., M.S., Ph.D., Assistant Professor of Health Administration
- LAUREL FILES GOOCH, B.A., M.A., Instructor in Health Administration
- GRAHAM BARNES, S.T.B., M.A., Lecturer in Health Administration, President and Professor, Southeast Institute
- ERWIN M. DANZIGER, B.S., M.B.A., Lecturer in Health Administration and Director, Administrative Data Processing Systems
- DANIEL C. JONES, M.E., E.E., J.D., Lecturer in Health Administration and Deputy Director for Administration, Carolina Population Center
- HANS E. KRUSA, B.A., M.S., M.S.P.H., Ph.D., Lecturer in Health Administration and Special Assistant to the Director, PopLab Program
- ROBERT A. LODDENGARD, B.E.E., M.S.P.H., Lecturer in Health Administration
- ROBERT BURNS MOORHEAD, B.A., M.P.A., Lecturer in Health Administration and Associate Dean, School of Public Health
- GLENN J. MARTIN, B.S.Ed., Visiting Fellow in Health Administration, and Chief, Program Experimentation Branch, Division of Special Operations, Bureau of Health Insurance, Social Security Administration, DHEW

The Department of Health Administration prepares students for leadership in health administration with emphasis on planning, organizing, and managing health and human resources services at the local, state, federal and international levels. Because the health services industry is huge and complex, our study programs stress innovation and creativity in a flexible curriculum designed to build on each student's unique background.

MASTER'S DEGREES

The Department offers two master's degree programs—the Master of Public Health (MPH) and the Master of Science in Public Health (MSPH). Both are normally twenty-one month programs. In special cases individuals with prior relevant graduate training, such as M.D., D.D.S., M.B.A., etc., or at least three years' experience in a responsible administrative position in a health program may complete degree requirements in twelve months.

PROGRAMS OF STUDY: MASTER'S LEVEL

The educational program at the master's level is designed to develop broadbased health administrators who have a sound understanding of issues in the delivery of health services, and who have abilities and skills to develop, organize, manage and evaluate health services. Realizing that students come with diverse backgrounds and career goals, opportunities and facilities are offered to permit them to design their learning experience to suit their special needs. To this end, required courses are kept to a minimum, and opportunities are provided for exemption of these courses through special examinations as well as through establishment of equivalency. Also, students are encouraged to take advantage of courses offered by other departments in the school, by departments outside the school, as well as at Duke University at Durham and North Carolina State University at Raleigh.

The Department offers a wide variety of courses and a student, if he chooses, could gain depth in his learning in the following interest areas:

- Health Planning and Evaluation
- Medical Care and Facilities Administration
- Community Health Services Administration
- Mental Health Administration
- Dental Public Health Administration
- Population Program Administration

Although in curriculum plans little emphasis is placed on "required" courses, it should be pointed out that all master's degree students have to take the following school required courses:

MPH Degree

At least 30 semester hours including the required school core (BIOS 100, EPID 160, and one other course outside the department in the School of Public Health).

MSPH Degree

At least 30 semester hours including BIOS 100 and EPID 160.

DOCTOR OF PUBLIC HEALTH DEGREE

The doctoral program (Dr.P.H.) prepares academicians and high-level health administrators. Open to individuals with an MPH or master's degree in related fields, the program normally requires two years of course work and a dissertation. Each doctoral student works under the guidance of his doctoral committee, made up of at least five members of the faculty. These committees guide and supervise their respective students in selection of courses and research projects.

Special Curricula

The Department also offers a part-time off-campus master's degree program designed for employees of health, and human services agencies. Currently the off-campus program is offered at Asheville. Additional locations are under consideration. All students in off-campus programs have to meet the admission requirements specified for on-campus students. Details are available on request.

ADMISSIONS

The Department encourages individuals with training and experience in the fields of medicine, dentistry, veterinary sciences, nursing and other health professions, administration and management, behavioral and social sciences, law, engineering, and mathematics to apply. Each year approximately forty students enter the study programs. Details regarding school requirements for admission to the three degree programs are to be found in an earlier part of this record (see page 31). In addition, the Department requires GRE general aptitude scores, TOEFL scores (applies to only those students whose mother tongue is other than English), three references, and "supplementary information sheet" as a part of application for admission.

Applications must be received by March 15 for admission in the following fall semester. Midyear admissions are rare, made only as exceptions.

FELLOWSHIP

Limited amount of financial assistance is available to qualified applicants on a competitive basis, following admission.

ADDITIONAL INFORMATION

Detailed and current information on the curricula, faculty, departmental organization, various requirements, etc. is available in the departmental catalogue. Copies of the departmental catalogue are available on request to the Department of Health Administration.

COURSES OFFERED IN DEPARTMENT OF HEALTH ADMINISTRATION

HADM	104	Health and Disease (3)
HADM	105	Concepts of Health Administration (3)
HADM	106	Quantitative and Analytical Methods for Health Administration (3)
HADM	107	Organization, Financing and Delivery of Health Services I (3)
HADM	108	U.S. Health System: Evolution and Future Trends (3)
HADM	109	Concurrent Field Training in Health Administration (1)
HADM	110	Elements of Health Administration (2)
HADM	113	Cases and Issues in Hospital Administration (3)
HADM	117	The Economics of Health Care (3)
HADM	124	Seminar in Population and Family Planning (2)
HADM	126	Introduction to Population Policy (3)
HADM	140	Readings in Health Administration (1 or more)
HADM	148	Concepts of Modeling Problems in Health Services Delivery (3)
HADM	153	Health Care Costs and Financing (3)
HADM	167	Introduction to Dental Public Health: Basic Knowledge and Skills (2)
HADM	168	Structure and Functions of Community Health Organ (3)
HADM	182	Budgeting and Financial Management (2)
HADM	183	Personnel Administration (2)
HADM	187	Survey of Mental Health Programs (3)
HADM	188	Health Law (2)
HADM	189	Development of Personal Effectiveness (3)
HADM	196	Organizational Behavior of Health Institutions (3)
HADM	197	Introduction to Injury Control (2)
HADM	201	Research Methods in Health and Health Services (3)
HADM	202	Issues in Health Administration (1 or more)

HADM	204	Policy for Alcohol and Other Drugs (3)
HADM	206	Field Work in Health Administration (1 or more)
HADM	217	Theory and Methods of Health Planning and Evaluation I (3)
HADM	218	Theory and Methods of Health Planning and Evaluation II (3)
HADM	219	Planning of Community Health Services (3)
HADM	221	Health Manpower Planning: Methods and Issues (3)
HADM	222	Organizational Pathology (3)
HADM	223	The Politics of Health Organizations (3)
HADM	227	Organization, Financing, and Delivery of Health Services II (3)
HADM	228	Administrative Epidemiology (3)
HADM	229	Health Facilities Planning (3)
HADM	233	Issues in Health Care (1)
HADM	237	Local Public Health Programming (2)
HADM	241	Quantitative Methods for Planning and Evaluating Health Services (3)
HADM	243	Long Term Illness and Disability (3)
HADM	247	Population Program Development and Administration (3)
HADM	248	Organizational Analysis and Development (3)
HADM	252	Emergency Medical Services Planning and Administration (3)
HADM	253	Operations Research and the Health System (3)
HADM	255	Public Policy Analysis for Health (3)
HADM	258	Ethical Issues in Health Policy (2)
HADM	263	Dental Public Health Practice (3)
HADM	276	Long Term Care and Rehabilitation (3)
HADM	282	Comparative National Health Services Systems (3)
HADM	287	Mental Health Program Leadership (3)
HADM	292	Psychosocial Problems Affecting Mental Health Program Administration (3)
HADM	293	Health Policy and the Governing Process: Executive, Legislative, and Judicial (3)
HADM	296	United States Health Policy (2)
HADM	298	Family Planning Program Evaluation (3)
HADM	304	Seminar in Teaching of Health Administration (3)
HADM	317	Management and Organizational Issues in Mental Health (3)
HADM	319	Advanced Methodology in Health Administration Research (3)
HADM	331	Interorganizational Relations in Health and Human Services (3)
HADM	332	Organizational Measurement (3)
HADM	333	Doctoral Seminar in Health Administration Studies (2)
HADM	334	Selected Topics in Health Administration: Advanced Seminar (2)
HADM	373	Seminar in Health Administration (1 or more)
HADM	384	Advanced Studies in Population Policy (3)
HADM	393	Masters Paper (1-6)
HADM	394	Doctoral Dissertation (3-9)
HADM	400	General Registration (0)

HEALTH EDUCATION

GUY W. STEUART, M.A., M.Ed., M.P.H., Ph.D., Professor of Health Education and Chairman

RALPH M. BOATMAN, JR., B.S., Ed., M.P.H., Ph.D., Professor of Health Education

GODFREY M. HOCHBAUM, B.A., M.A., Ph.D., Professor of Health Education

LUCY S. MORGAN, A.B., M.A., M.S., Ph.D., Professor of Health Education, Emeritus

EUNICE TYLER, Ph.B., M.P.H., Ph.D., Professor of Health Education, Emeritus

HOWARD BARNHILL, B.S., M.S.P.H., Associate Professor of Health Education

MERREL D. FLAIR, B.S., M.S., Ph.D., Associate Professor of Health Education

RITA JOHNSON, A.A., B.A., M.A., Ed.D., Associate Professor of Health Education

JOHN W. HATCH, B.A., M.S.W., Dr.P.H., Associate Professor of Health Education

ROSEMARY MAY KENT, B.A., M.A., Ph.D., Associate Professor of Health Education, Emeritus

FRANK STRITTER, A.B., M.A., Ph.D., Associate Professor of Health Education

JEROME KIRK, B.A., Ph.D., Adjunct Associate Professor of Health Education

K. V. RANGANATHAN, M.B.B.S., B.S.Sc., M.P.H., Adjunct Associate Professor of Health Education

NADINE H. RUND, B.A., Ph.D., Adjunct Associate Professor of Health Education

HARRIET HYLTON BARR, A.B., M.P.H., Assistant Professor of Health Education

EVA CLAYTON, B.S., M.S., Adjunct Assistant Professor of Health Education

GRACE H. DANIEL, A.B., M.S.P.H., Adjunct Assistant Professor of Health Education

LEONARD H. DAWSON, A.B., M.S.P.H., Assistant Professor of Health Education

JO ANNE EARP, B.A., Sc.D., Assistant Professor of Health Education

TONY L. WHITEHEAD, B.A., M.S. Hyg., Ph.D., Clinical Assistant Professor of Health Education

HELEN L. TINNIN, B.A., M.P.H., Ph.D., Adjunct Associate Professor of Health Education

JOHN C. KEY, B.S., M.S.P.H., M.S.W., Ph.D., Adjunct Assistant Professor of Health Education

SUSAN LIEBERMAN, B.A., M.C.P., Ph.D., Adjunct Assistant Professor of Health Education

DONALD R. DANCY, B.S., M.P.H., Adjunct Assistant Professor of Health Education

ALLAN B. STECKLER, B.S., M.P.H., Dr.P.H., Lecturer in Health Education

MARGARET POLLARD, B.S., M.S.P.H., Clinical Instructor in Health Education

JOHN ALLEN, B.S., M.S.P.H., Adjunct Instructor in Health Education

The Health Education Department is concerned with the general field of health-related social and behavioral change. It has a particular interest in sub-cultural and minority groups and cross-cultural settings.

The teaching program is engaged in the preparation of professionals and scientists, the research program is directed toward applied and theoretical issues and the community service program consists of consultation, technical assistance and continuing education in North Carolina, the nation and internationally.

Within certain general but well-defined constraints, students are expected to take a major responsibility for their own individual

programs of study, research and experience and to take the initiative in maintaining close relationship with their respective faculty advisors.

In admission policy, besides the level and relevance of previous academic achievement, special consideration is given to developing a balanced student body recognizing the obligation to state residents and to minorities and including a mix of individuals with special life or work experience drawn from the United States and from foreign countries.

There are four graduate programs:

MASTER OF PUBLIC HEALTH

The basic qualification for the professional health education specialist. It prepares candidates for professional roles in community action, development and education programs of health and allied agencies both domestic and international.

The general requirements for admission are set forth on pages 31-34. The previous bachelor's degree should include a minimum of four courses in psychology, sociology, anthropology and/or political science, at least one of these to be an advanced course. The candidate would preferably have a minimum GPA of 3.0 for courses in the above areas.

The minimum period of study is four semesters and two summer sessions in continuous full-time residence, admissions being only in the fall of each academic year.

All students are required to have field work experience in a selected community which is continuous throughout the program.

DOCTOR OF PUBLIC HEALTH

A professional and research degree. It prepares candidates for administrative, consultative and evaluative research roles in community health education and for faculty teaching and research positions in public health and other professional schools.

The prerequisite is possession of the MPH degree or equivalent. Candidates for this program are normally expected to have an outstanding academic record in their prior undergraduate and graduate programs.

The minimum period of study is full-time residence of two academic years (four semesters and four summer sessions).

In addition to an advanced general knowledge of public health and selected social science foundations, emphasis is placed on evaluative research in field settings.

MASTER OF SCIENCE IN PUBLIC HEALTH

A more specialized degree than the MPH, its particular emphasis is on evaluation and research. It may be a terminal degree but commonly will be a prelude to the Doctor of Philosophy program. As a terminal degree it prepares candidates for specialized roles (e.g., mass media, personnel development) in community health education and development programs.

The general requirements for admission are set forth on pages 34-36. The usual requirement is a prior bachelor's major in the social sciences, but certain exceptions are acceptable.

The minimum period of study is four semesters and two summer sessions in full-time residence.

DOCTOR OF PHILOSOPHY

A basic social science and research degree. It prepares candidates primarily for teaching and research careers in universities and professional schools and consultative roles relevant to community health education and development.

The prerequisite is normally the M.S.P.H., or a social science masters degree.

Candidates are normally expected to have an outstanding academic record in their prior undergraduate and graduate programs.

The minimum period of study is full-time residence of two academic years (four semesters and four summer sessions).

Besides advanced knowledge in selected substantive areas of the social sciences, emphasis is placed on basic research relevant to health related social and behavior change, both planned and unplanned.

MATERNAL AND CHILD HEALTH

NAOMI MINNER MORRIS, B.A., M.D., M.P.H., Professor of Maternal and Child Health
SIDNEY SHAW CHIPMAN, B.A., M.D., M.P.H., Professor Emeritus of Maternal and Child Health

C. ARDEN MILLER, M.D., Professor of Maternal and Child Health

EARL SCHAEFER, B.S., M.A., Ph.D., Professor of Maternal and Child Health

EARL SIEGEL, B.S., M.D., M.P.H., Professor of Maternal and Child Health

- J. RICHARD UDRY, B.S., M.A., Ph.D., Professor of Maternal and Child Health
KARL E. BAUMAN, A.B., M.A., Ph.D., Associate Professor of Maternal and Child Health
- ELIZABETH M. EDMANDS, R.N., B.S.P.H., M.A., Associate Professor of Public Health Nursing and Maternal and Child Health
GERALDINE GOURLEY, Ph.B., M.S.W., Associate Professor of Maternal and Child Health
- JAROSLAV FABIAN HULKA, B.S., M.D., Associate Professor of Obstetrics and Gynecology and Maternal and Child Health
E. BARBARA STOCKING, R.N., B.S., M.P.H., Associate Professor of Maternal and Child Health
- LYNN K. KNAUFF, B.A., M.S.P.H., Assistant Professor of Maternal and Child Health
CYNTHIA B. JENKINS, B.A., M.S.W., M.P.H., Instructor in Maternal and Child Health
FRANZ WESTON ROSA, B.S., M.D., M.P.H., Adjunct Professor of Maternal and Child Health
- SARAH TAYLOR MORROW, B.S., M.D., M.P.H., Adjunct Professor of Maternal and Child Health
MINTA M. SAUNDERS, A.A., B.A., M.A., Ph.D., Research Assistant Professor of Maternal and Child Health
- ROBERT A. GREENBERG, A.B., M.D., Lecturer in Maternal and Child Health
PATRICIA GUSTAVESON, A.B., M.S.W., Lecturer in Maternal and Child Health
FRANK ALOYSIUS LODA, B.A., M.D., Lecturer in Maternal and Child Health
JEAN F. MARTIN, M.D., M.S.P.H., Lecturer in Maternal and Child Health
EVA SALBER, M.B., D.P.H., M.D., Lecturer in Maternal and Child Health

The Department Maternal and Child Health is strongly committed to improving health care systems for women, children, and their families. The teaching program prepares physicians, nurses, social workers and others for a wide range of challenging career opportunities. Stimulating learning experiences are enhanced by the multidisciplinary makeup of faculty and students.

Courses of study and practice may be planned for those anticipating pursuing careers traditionally identified with the field: maternity services, child care and development, services for handicapped children and family services. Programs may also be planned for careers that are based on precepts derived from maternal and child health. Examples include family planning, comprehensive health care, and some aspects of community development. Within recent years particular attention has been paid to mechanisms through which communities and consumer groups can be assisted in identifying and meeting their own needs.

Efforts are made to organize each student's program in terms of his previous experiences, special needs and professional goals. A

student may elect to emphasize teaching, training, research or preparation for leadership roles in community service programs. Within these broad areas of interest, specialized skills may be developed for functions which include planning, program development, administration and evaluation.

PROGRAM DESIGN

All departmental programs combine courses and seminars with carefully selected field opportunities to examine a variety of relevant community programs. Student-faculty seminars and small group tutorials are directed towards preparation of students to assume leadership roles. A favorable faculty-student ratio is maintained. Exposure to research methodology is provided for all students.

The major elements of each program are indicated below:

Core Courses—Courses in biostatistics, epidemiology and human ecology are required of all students in order to provide knowledge and skills in the sciences which are basic to public health. Foundation courses in maternal and child health and child development and/or family planning are also required.

Elective Courses—Courses may be drawn from many departments of the University in designing individual programs of elective studies appropriate to career needs.

Field Work—Community based learning experiences are an integral part of the educational program. Field work assignments are individually tailored by the student and faculty advisor.

A rich variety of interdisciplinary programs associated with the University of North Carolina provides opportunity for students to develop special interests. These include the Health Services Research Center, Carolina Population Center, Division for Disorders of Development and Learning, Frank Porter Graham Child Development Center, Area Health Education Centers, North Carolina State Division of Health Services and a rural program of community development and comprehensive health services.

MASTER'S LEVEL DEGREES:

Students with major interest in the broad field of maternal and child health pursue a program leading to the Master of Public Health degree. Students having a special interest in family planning

and population studies or in child care and development may follow a more specialized program which leads to the Master of Science in Public Health degree.

Programs usually cover two sixteen week semesters and a twelve week summer period. Longer programs may be arranged to meet individual needs. Course sequencing restrictions require students to enter the program in the fall semester.

ADMISSION REQUIREMENTS

All students must meet the university requirements as outlined on page 31 for the Master of Public Health and on page 34 for the Master of Science of Public Health. The department adheres to the University policy of affirmative action on behalf of minorities. Additional departmental requirements are the following:

1. **Medicine.** The degree of Doctor of Medicine (or its equivalent) is usually required. Training in obstetrics or pediatrics is helpful, although some physicians enter their work in public health during or directly after medical school or in conjunction with preventive medicine or community medical care residencies.
2. **Nursing.** The bachelor's degree in nursing from a school of nursing accredited by the National League for Nursing is required. Graduate education in obstetric or pediatric nursing or in nurse midwifery is a desirable prerequisite. In selected instances experiences in obstetrics, pediatrics or maternal and child health nursing may be accepted in lieu of advanced training.
3. **Social Work.** The master's degree in social work is ordinarily required, although in exceptional situations persons with social work experience but no master's degree will be considered. Experience dealing with mothers and children, family planning or child care and development is helpful. Students who enter the program without this experience will be assisted in acquiring it through field placements and a course of study that are more extended than usual.
4. **Other health professionals.** Dentists, physical therapists, speech therapists, teachers and other professional people with a background of interest in children, mothers, or family life will be considered.

5. A small number of well qualified students may be admitted with no prior academic preparation in the health professions provided their career motivations are firm and they have had at least two years of community health related experience.
6. Most students are required to present two years' experience in health related work before enrollment.

A limited number of fellowships and scholarships covering tuition, fees, and reasonable living expenses is available in some years.

DOCTOR OF PUBLIC HEALTH DEGREE:

The Department of Maternal and Child Health offers a Dr.P.H. in Maternal and Child Health in the following areas:

1. Child care and development and service programs to affect child care development.
2. Human reproduction and service programs to affect human reproduction.

For selected individuals, who have previously earned the M.P.H. degree or its equivalent, this program provides an opportunity for:

1. further study of the biologic, cultural and environmental factors influencing the health of mothers, children and their families;
2. the development of investigative skills;
3. the application of knowledge, skills and techniques to the improvement of the health of mothers and children.

All requirements for the degree are as stated in the description of the Doctor of Public Health program on page 37 of the School of Public Health Catalogue. It is expected that the student will indicate upon admission which substantive area he or she will emphasize from the two listed above.

DEPARTMENT OF NUTRITION

JOSEPH C. EDOZIEN, D.Sc., M.D., F.R.C.P. (Ed.), F.R.C. Path., Professor and Chairman

RICHMOND K. ANDERSON, M.D., M.P.H., Adjunct Professor

REBECCA B. BRYAN, M.S., M.P.H., Associate Professor

BOYD R. SWITZER, Ph.D., Assistant Professor

MARION ELIZABETH BRANNON, M.S., Assistant Professor

TERRY L. BAZZARRE, M.S., Ph.D., Instructor
MARY HELEN McLACHLAN, M.A., Lecturer
JOHN J. B. ANDERSON, M.A., Ph.D., Associate Professor
LEONARD AURAND, B.S., M.S., Ph.D., Adjunct Professor
FREDERIC NORDSIEK, M.S., Ph.D., Adjunct Professor
JOEL M. TEITELBAUM, B.A., M.A., Ph.D., Research Assistant Professor
J. AUDREY WIGHT, M.S., Ed.D., Visiting Associate Professor

Field Counselors

ASENATH COOKE, Nutrition Consultant, Guilford County Health Department, Greensboro, N.C.
CATHERINE COWELL, Director, Bureau of Nutrition, New York City Department of Health, New York, New York
MARIE VIRGINIA DE LARA, Director, Nutrition Services, Puerto Rico Department of Health, San Juan, Puerto Rico
LOIS EARL, Nutrition Consultant, District of Columbia, Department of Human Resources, Washington, D.C.
FRANCES HANKS, Nutrition Coordinator, Division of Physical Health, Georgia Department of Human Resources, Atlanta, Georgia
ELAINE HIEL, Nutrition Consultant, San Diego County Health Department, San Diego, California
FRANCES HOFFMAN, Educational Coordinator, Division of Health, Florida State Department of Human Resources, Jacksonville, Florida
VIRGINIA JAUCH, Director, Division of Nutrition, The Chicago Board of Health, Chicago, Illinois
CAROLYN SPARKS, Nutrition Consultant, Wayne County Health Department and Children and Youth Project, Goldsboro, N.C.
JUDITH SYLVESTER, Coordinator of Education, Nutrition Section, Louisiana Department of Health and Rehabilitation Services, New Orleans, Louisiana
MAYTON ZICKEFOOSE, Nutrition Consultant, Delaware Division of Public Health, Dover, Delaware

Teaching Assistant

JUDITH ANDERSON, B.S., M.P.H.

The programs of study in Nutrition in the School of Public Health are designed to prepare qualified individuals for careers in public health nutrition, including the fields of health services, education, and research. Through these programs a broad curriculum in public health sciences is provided as well as courses in the physiological, biochemical, and behavioral aspects of nutrition and their application to the health of human populations. Development of skills in the process and methodology of community and laboratory research is emphasized. The programs currently offered are the one and two-year MPH degree programs.

Applicants for both programs should have a "B" average or better and they are required to submit Graduate Record Examin-

ation (GRE) Scores. Applicants whose native language is not English are required to take the Test of English as a Foreign Language (TOEFL) in addition to the usual requirements. Each applicant is required to submit a brief autobiographical letter stating his/her reasons for applying to this degree program and his/her future career goals. (Please do not exceed one typewritten page.) Graduates in medicine and dentistry are encouraged to apply for admission to the programs.

PREREQUISITES FOR ADMISSION

MPH applicants should have at least four semesters (two academic years) of the Biological Sciences, one college level chemistry course such as Inorganic Chemistry (one academic year), and introductory courses in Anthropology, Psychology and Sociology are strongly recommended. Deficiencies in course prerequisites must be rectified prior to admission. A course in Organic Chemistry would be helpful.

ONE-YEAR MPH PROGRAM

Academic and experience requirements for admission are: (a) completion of the bachelor's degree with a major in foods and nutrition or in the biological sciences; and (b) a minimum of one year's experience in nutrition or a closely related field such as public health or social services, hospital dietetics, home economics education, or child development. The program requires a minimum of two semesters and two summer sessions of study for completion. It includes courses in biostatistics, epidemiology and nutrition, as well as six to eight weeks of block field training in an agency providing community nutrition services.

TWO-YEAR PROGRAM

Selected graduates with a bachelor's degree and a major in areas such as foods and nutrition, home economics education, biological sciences, social sciences or nursing may be admitted without work experience. Such students can complete the requirements for the MPH degree in 24 months. In addition to the same course requirements for the one-year MPH degree program, opportunities are provided to make up course deficiencies, to receive clinical instruction, and to take more elective courses.

Required Courses for MPH Degree

BIOS	100	Public Health Statistics (3)
EPID	160	Principles of Epidemiology (2)
NUTR	150	Cell Biology (4)
NUTR	204	Nutrition and Human Health (3)
NUTR	205	Community Nutrition (3)
NUTR	251	Field Experience (6-8)
NUTR	252	Field Experience Seminar (2 or more)
NUTR	393	Master's Thesis (3-6)

In addition to the above courses, students must take one course in HADM or HEED and another course in the School of Public Health outside of the Nutrition Department.

Elective Courses

HADM	105	Concepts of Health Administration (3)
HEED	130	Principles of Public Health Education (2)
NUTR	140	Reading in Nutrition (1 or more)
NUTR	151	Cell Biology Laboratory (3)
NUTR	157	Therapeutic Nutrition (3)
NUTR	202	Nutritional Biochemistry (3)
NUTR	203	Food Science and Technology (3)
NUTR	206	Food Habits: Determinants and Techniques for Modification (3)
NUTR	208	Nutrition Programs and Services (3)
NUTR	240	Problem in Nutrition (1 or more)
NUTR	250	Clinical Nutrition Practice (1 or more)
NUTR	340	Seminar in Nutrition (1 or more)
NUTR	390	Nutrition Research (2 or more)
MHCH	140	Problems in Maternal and Child Health (1 or more)
MHCH	200	Issues and Trends in MCH and Family Planning (3)
EPID	262	Epidemiology of Program Acceptance (2)

ILLUSTRATIVE ONE-YEAR MPH PROGRAM

Fall Semester

Course No.	Course Title	Semester Hours
EPID 160	Principles of Epidemiology	3
BIOS 100	Public Health Statistics	3
NUTR 150	Cell Biology	4
NUTR 205	Community Nutrition	3
	Elective	3

Spring Semester

NUTR	204	Nutrition and Human Health	3
NUTR	208	Nutrition Programs and Services	3
		Electives	9-10
			<hr/>
			15-16

First Summer Session

NUTR	251	Field Experience	6
------	-----	------------------	---

Second Summer Session

NUTR	393	Master's Thesis or Expanded Report of Field Experience	4
NUTR	252	Field Experience Seminar	2
			<hr/>
			6

ILLUSTRATIVE TWO-YEAR MPH PROGRAM**1st Year—Fall Semester**

Course No.	Course Title	Semester Hours
EPID 160	Principles of Epidemiology	3
BIOS 100	Public Health Statistics	3
NUTR 150	Cell Biology	4
NUTR 151	Cell Biology Laboratory	3
NUTR 203	Food Science and Technology	3
		<hr/>
		16

Spring Semester

NUTR	206	Food Habits	3
NUTR	157	Therapeutic Nutrition	3
		Electives	9-10
			<hr/>
			15-16

First and Second Summer Sessions

NUTR	250	Clinical Nutrition Practice	12
------	-----	-----------------------------	----

Second Year—Fall Semester

NUTR	205	Community Nutrition	3
		Electives	12-13
			<hr/>
			15-16

Spring Semester

NUTR	204	Nutrition and Human Health	3
NUTR	208	Nutrition Programs and Services	3
		Electives	9-10
			<hr/>
			15-16

First Summer Session

NUTR	251	Field Experience	6
------	-----	------------------	---

Second Summer Session

NUTR	393	Master's Thesis or Expanded Report of Field Experience	4
NUTR	252	Field Experience Seminar	2

(For students who are laboratory-oriented, six or more hours of electives may be devoted to research. In such cases, results of laboratory investigations would be included in a Master's Thesis.)

PARASITOLOGY AND LABORATORY PRACTICE

JOHN EDGAR LARSH, JR., B.A., M.S., Sc.D., Professor of Parasitology and Laboratory Practice

HILTON THOMAS GOULSON, A.B., M.S.P.H., Ph.D., Professor of Parasitology and Laboratory Practice

ROBERT BRIGGS WATSON, B.S., M.D., M.P.H., Professor of Parasitology and Laboratory Practice, Emeritus

NORMAN FRED WEATHERLY, B.S., M.S., Ph.D., Professor of Parasitology and Laboratory Practice

ELMER F. CHAFFEE, B.S., M.S.P.H., Ph.D., Associate Professor of Parasitology and Laboratory Practice

JAMES RICHARD HENDRICKS, B.S., M.S., Ph.D., Associate Professor of Parasitology and Laboratory Practice

JOHN K. READ, B.S., M.S., Ph.D., Associate Professor of Parasitology and Laboratory Practice

JUDY CLEM KLAAS, B.A., M.P.H., Ph.D., Assistant Professor of Parasitology and Laboratory Practice

BETTYE L. OWENS, B.S., M.P.H., Research Assistant

NANCY ROBERTS PAGANO, B.A., Research Assistant

LIBERO AJELLO, A.B., M.A., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)

- DON J. BRENNER, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- MARION M. BROOKE, A.B., M.A., Sc.D., Adjunct Associate Professor of Laboratory Practice (field)
- JOHN B. BROOKS, B.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- WILLIAM BAILEY CHERRY, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- WALTER R. DOWDLE, B.A., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- VULUS RAYMOND DOWELL, JR., B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- JOHN J. FARMER, III, B.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- JOHN C. FEELEY, A.B., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- JOHN E. FORNEY, B.A., M.A., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- JOHN W. FOSTER, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- MICHAEL L. FURCOLOW, B.A., M.D., M.A., Adjunct Associate Professor of Laboratory Practice (field)
- WILLIAM KAPLAN, B.S., M.P.H., D.V.M., Adjunct Associate Professor of Laboratory Practice (field)
- LEO KAUFMAN, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- EDNA H. KNOTT, B.S., M.P.H., Adjunct Instructor of Laboratory Practice
- LYNN GRAY MADDRY, B.S., M.S.P.H., Ph.D., Adjunct Associate Professor of Laboratory Practice
- MAX D. MOODY, A.B., M.A., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- CLAUDE WAYNE MOSS, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- JOHN F. OBIJESKI, B.A., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- ERSKINE L. PALMER, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- G. BRIGGS PHILLIPS, B.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- LEO PINE, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- PERRY S. RILEY, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- ROSLYN Q. ROBINSON, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- CHARLES C. SHEPARD, B.S., M.S., M.B., M.D., Adjunct Associate Professor of Laboratory Practice (field)
- JOHN A. STEWART, A.B., M.D., M.S., Adjunct Associate Professor of Laboratory Practice (field)
- W. DANIEL SUDIA, B.S., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)
- CORRINA SHERON SUTTON, B.A., M.P.H., Ph.D., Adjunct Assistant Professor of Laboratory Practice

CLYDE THORNSBERRY, B.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)

H. MAC VANDIVIERE, A.B., M.A., M.D., Adjunct Associate Professor of Laboratory Practice (field)

KENNETH W. WALLS, A.B., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)

HAZEL W. WILKINSON, B.S., M.S., Ph.D., Adjunct Assistant Professor of Laboratory Practice (field)

DONALD W. ZIEGLER, A.B., M.S., Ph.D., Adjunct Associate Professor of Laboratory Practice (field)

Teaching Assistants

JAMES R. CARLSON, B.A., M.S.P.H.

KERMIT N. FARRIS, B.A., M.S.

ARTHUR J. GOVEN, B.S., M.S.P.H.

ROBERT W. LUEBKE, B.S., M.S.P.H.

WILLIAM A. RUTALA, B.S., M.S.

Graduate Assistants (Research)

GEORGE W. MOORE, III, B.A., M.S.

Becton Dickinson Fellow

JAMES P. O'CONNEL, B.S., M.P.H.

The Department of Parasitology and Laboratory Practice offers the following degree programs.

MASTER OF PUBLIC HEALTH

The requirements for admission and for the degree are listed on pages 31-34 of this catalogue. The program of study is intended primarily for those with experience in public health laboratory practice and requires a minimum of one academic year (nine months).

Required Courses

BIOS	100	Public Health Statistics (3)
EPID	160	Principles of Epidemiology (3)
HADM	105	Concepts of Health Administration (3)
PALP	134	Human Parasitology (4)
PALP	142	Problems in Public Health Laboratory Practice (2)
PALP	150	Public Health Bacteriology (3)
PALP	151	Public Health Virology (3)
PALP	333	Seminar in Public Health Laboratory Practice (1)

Electives

PALP	131	Parasitism and Human Disease (2)
PALP	232	Parasitological Methods (4)
PALP	234	Medical Entomology (3)
PALP	250	Public Health Laboratory Methods I (2)
PALP	251	Public Health Laboratory Methods II (5)
BIOS	105	Principles of Statistical Inference (3)
BIOS	287	Statistical Methods in Epidemiology (3)

MASTER OF SCIENCE IN PUBLIC HEALTH

The requirements for admission and for the degree are listed on pages 34-36 of this catalogue. The program of study requires a minimum of one academic year (nine months), and is intended primarily for those who plan to pursue a career in some phase of laboratory practice or who plan to proceed in a Doctor of Philosophy degree program.

Required Courses

BIOS	100	Public Health Statistics (3)
EPID	160	Principles of Epidemiology (3)
HADM	228	Administrative Epidemiology (3)
PALP	131	Parasitism and Human Disease (2)
PALP	134	Human Parasitology (4)
PALP	140	Problems in Parasitology (2)
PALP	232	Parasitological Methods (4)
PALP	230	The Nature of Parasitism (3)
PALP	234	Medical Entomology (3)
PALP	331	Seminar in Parasitology (1)

Electives

BIOC	100	Biochemistry for Students of Biology and Chemistry (4)
BIOS	287	Statistical Methods in Epidemiology (3)

DOCTOR OF PUBLIC HEALTH

The requirements for admission and for the degree are listed on pages 37-40 of this catalogue. The program of study in Public Health Laboratory Practice is planned individually for each student based on previous academic preparation, laboratory experience, future plans and personal interests. However, all students are required to take the following courses, and to gain research competence all must perform research activities on a one-half time basis for at least two semesters.

Required Courses

BIOC	101a,b	Biochemistry for Dental Students (4)
PALP	235	Problems in Public Health Laboratory Methodology (3)
PALP	250	Public Health Laboratory Methods I (2)
PALP	251	Public Health Laboratory Methods II (5)
PALP	260	Public Health Laboratory Management I (2)
PALP	261	Public Health Laboratory Management II (3)
PALP	333	Seminar in Public Health Laboratory Practice (1)
PALP	336	Research in Public Health Laboratory Methodology (3)

DOCTOR OF PHILOSOPHY

The course program leading to the Ph.D. degree may be taken on a major-minor basis between the Department of Parasitology and Laboratory Practice and one or more departments within the University. An applicant may elect to minor in Zoology, Botany, Bacteriology, or any other areas approved by his study committee. Under certain conditions, a student may be permitted to omit a formal program in a minor field. Each student's program is planned individually in terms of his previous preparation and experience, his future plans, and his interests.

Teaching experience is an essential part of professional training in this Department. Therefore, laboratory instruction equivalent to six contact hours a week for two semesters, or until teaching competence is acquired, is required of all Ph.D. candidates.

PUBLIC HEALTH NURSING

DOROTHY M. TALBOT, R.N., B.S.N., M.A., M.P.H., Ph.D., Professor and Chairman of Public Health Nursing

MARGARET BLEE, R.N., B.S., M.Ed., Professor of Public Health Nursing, Emeritus

NORA F. CLINE, R.N., B.S.P.H.N., M.Litt., Associate Professor of Mental Health

ELIZABETH M. EDMANDS, R.N., B.S.P.H.N., M.A., Associate Professor of Public Health Nursing

MARION E. HIGHRITER, B.A., M.N., R.N., M.P.H., S.D. in Hyg., Associate Professor of Public Health Nursing

MARIE J. McINTYRE, R.N., B.S., M.S., M.S., Hyg., Associate Professor of Public Health Nursing

VIRGINIA MARGARET NELSON, B.A., R.N., B.S., M.P.H., Associate Professor of Public Health Nursing

E. BARBARA STOCKING, R.N., B.S., M.P.H., Associate Professor of Maternal and Child Health (Nursing) and Public Health Nursing

JULIA DAY WATKINS, B.A., R.N., M.P.H., F.N.P., Associate Professor of Public Health Nursing

¹ IRENE D. COURTENAY, R.N., B.S., M.P.H., (I.H.), Assistant Professor of Occupational Health Nursing

¹ Resigned August 11, 1975.

- ROSE GERALDINE GEORGE, R.N., B.S., M.S., Assistant Professor of Public Health Nursing
- BEATRICE BELL MONGEAU, B.S.P.H.N., M.P.H., Ph.D., Assistant Professor of Public Health Nursing
- NORMAN DEPAUL BROWN, B.S., M.S., Instructor of Public Health Nursing
- DORIS EMMA ROBERTS, R.N., B.S., M.P.H., Ph.D., Adjunct Professor of Public Health Nursing
- ELIZABETH STEPHENS HOLLEY, B.A. R.N., M.A., Adjunct Associate Professor of Public Health Nursing
- MABEL SMITH JOHANSSON, R.N., B.S., M.P.H., Adjunct Assistant Professor of Public Health Nursing
- BETTY BARBREY WEST, R.N., B.S., M.P.H., Adjunct Assistant Professor of Public Health Nursing

The Department of Public Health Nursing provides graduate study in public health nursing, occupational health nursing, and mental health. Students have the opportunity to choose an area of concentration such as practice, supervision, administration, consultation, or education.

REQUIREMENTS FOR ADMISSION

Students are admitted at the beginning of the fall semester. In addition to the requirements listed on page 31 of the School of Public Health Catalogue an applicant to the Department must meet one of the following criteria. **Students in public health nursing:** completion of appropriate undergraduate courses in public health nursing or graduation from a baccalaureate program in a school of nursing accredited for preparation in public health nursing and a minimum of one year's nursing experience including community health action. **Students in occupational health nursing:** graduation from a state approved school of nursing and from a baccalaureate program and have a minimum of one year's experience in occupational health nursing. **Students in mental health:** graduation from an approved program of study and from a baccalaureate program and have a year's experience in a field related to public mental health.

DEGREES

The Department offers three degrees: the Master of Public Health (M.P.H.), the Master of Science in Public Health (M.S.P.H.), and the Master of Science (M.S.)

The M.P.H. is normally eleven months and requires 30 semester credits, the M.S.P.H. is a minimum of eleven months with a

minimum of 30 credits, and the M.S. is normally two academic years and requires 45 semester hours.

Programs of study are planned with advisors on the basis of individual experience, needs and career goals.

PROGRAMS OF STUDY

Public Health Nursing: This program is designed to prepare experienced nurses for collaborative work with multidiscipline teams in planning, conducting and evaluating community health services, and for the provision and administration of public health nursing. M.P.H. Degree.

PUBLIC HEALTH NURSING

PHNU	291	Planning Community Nursing Services I	3
PHNU	292	Planning Community Nursing Services II	3

PUBLIC HEALTH

EPID	160	Principles of Epidemiology	3
BIOS	100	Public Health Statistics	3
PUBH	100	Ecology of Human Health	3

One Core course from ENVR, HADM or HEED on approved list on page 33.

One additional course from outside the major department.

RESEARCH

PHNU	299	Research Methods in Public Health Nursing (or its equivalent)*	3
------	-----	-------------------------------------------------------------------	---

WRITTEN REPORT

See Department statement for options.	3
---------------------------------------	---

ELECTIVES	9-15
------------------	------

Occupational Health Nursing: This program is designed to prepare experienced occupational health nurses for supervision, administration, or consultation in occupational health. M.P.H. Degree.

NURSING

PHNU	181	Occupational Health Nursing I	3
PHNU	281	Occupational Health Nursing II	3

*Required for students who elect to carry out a study or research project for their Written Report.

PUBLIC HEALTH AND ENVIRONMENTAL HEALTH

PUBH	100	Ecology of Human Health	3
BIOS	100	Public Health Statistics	3
EPID	162	Epidemiology in Environmental Health	3
ENVR	143	Applied Physiology and Toxicology	3
ENVR	242	Industrial Hygiene Practices	3
ENVR	147	Occupational Safety	2

FIELD EXPERIENCE

PHNU	381	Advanced Practice in Occupational Health Nursing	3
------	-----	--------------------------------------------------	---

WRITTEN REPORT

PHNU	282	Problems in Occupational Health Nursing	3
------	-----	-----------------------------------------	---

ELECTIVES

Selected to meet individual interests, needs and career goals.			6
----------------------------------------------------------------	--	--	---

Mental Health: This program is designed to prepare practitioners, consultants, and educators for interdisciplinary collaboration in the provision and evaluation of mental health services in community health and education systems. M.P.H. Degree.

MENTAL HEALTH

MHCH-PHNU	201	Foundations for Mental Health Practice	2
MHCH-PHNU	202	Foundations for Mental Health Practice	3
MHCH-PHNU	203	Foundations for Mental Health Practice	2

PUBLIC HEALTH*

PUBH	100	Ecology of Human Health	3
BIOS	100	Public Health Statistics	3
EPID	160	Principles of Epidemiology	3
HADM	105	Concepts of Health Administration	3
		or	
HEED	130	Principles of Health Education	2

CONSULTATION

MHCH-PHNU	255	Consultation: A Public Health Method	2
-----------	-----	--------------------------------------	---

FIELD EXPERIENCE

PHNU	240, 241, or 242	Problems in Mental Health	2-4
------	------------------------	---------------------------	-----

*M.S.P.H. Degree. One 3-credit course in ecology of health from the list of approved courses (PUBH 100, ENVR 101, HADM 111). Two courses in sciences of public health.

WRITTEN REPORT

See Department statement for options. 3

ELECTIVES

Selected from the behavioral sciences, consultation, education and evaluation for individual career goals.

Teacher Preparation: This program is designed to prepare teachers of community health nursing. Emphasis is on community health nursing practice, curriculum development, and nursing education in the system of higher education. This program is illustrative for that taken by public health nurses. M.S. Degree.

PUBLIC HEALTH NURSING

PHNU	291	Planning Community Nursing Services I	3
PHNU	292	Planning Community Nursing Services II	3

PUBLIC HEALTH

EPID	160	Principles of Epidemiology	3
BIOS	100	Public Health Statistics	3
PUBH	100	Ecology of Human Health	3

TEACHING

PHNU	271	Practicum in Teaching Community Health Nursing	3
------	-----	------------------------------------------------	---

RESEARCH

PHNU	299	Research Methods in Public Health Nursing or its equivalent	3
------	-----	----------------------------------------------------------------	---

WRITTEN REPORT

PHNU	393	Master's Thesis	3-6
------	-----	-----------------	-----

ELECTIVES

Selected to meet individual needs. 12

COURSES OF INSTRUCTION

Note: Courses numbered 100 through 199 are for Advanced Undergraduates and Graduates and those numbered from 200 to 399 are for Graduates only.

Biostatistics—BIOS
Environmental Sciences and Engineering—ENVR
Epidemiology—EPID
Health Administration—HADM
Health Education—HEED
Maternal and Child Health—MHCH
Nutrition—NUTR
Parasitology and Laboratory Practice—PALP
Public Health Nursing—PHNU

DEPARTMENT OF BIOSTATISTICS

- BIOS 100 **PUBLIC HEALTH STATISTICS (3)**. An introduction to fundamental procedures in the collection, summarization, presentation, and analysis of public health data: vital statistics, including rates and ratios; demographic data; community diagnosis; observations in research studies and construction of questionnaires. Elements of statistical inference: probability distributions, sampling, confidence interval estimation of means and rates, the t-test, the chi-square test. *Two lecture and two laboratory hours a week, fall.* Williams, Greenberg.
- BIOS 102 **DETERMINANTS AND CONSEQUENCES OF POPULATIONS CHANGE (2)**. Historical and contemporary levels, differentials and trends in: natality; mortality; migration; population composition and distribution. Theories and evidence concerning population change and its social and economic effects and population policy. *Three lecture hours a week, fall.* Bilsborrow, Lingner.
- BIOS 103 **MANAGEMENT OF PUBLIC HEALTH DATA (2)**. This course is intended for students who take more extensive courses in statistical inference than BIOS 100 (for example, BIOS 105, BIOS 135, BIOS 150). The course comprises the topics given in the description of BIOS 100 with the omission of elements of statistical inference. *Two lecture and two laboratory hours a week for ten weeks.* Williams, Greenberg.
- BIOS 105 **PRINCIPLES OF STATISTICAL INFERENCE (3)**. 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 cover probability distributions, confidence interval estimation of population parameters, tests of significance, analysis of variance, correlation and regression. *Three lecture hours a week, fall and spring, and summer.* Staff.

- BIOS 106 **MATHEMATICAL METHODS IN BIOSTATISTICS** (Mathematics 106) (3). Prerequisite, Math 32 or equivalent. Special mathematical techniques in the theory and the 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. *Three lecture hours a week, fall.* Staff.
- BIOS 108 **INTRODUCTION TO STATISTICAL DATA PROCESSING** (2). Brief introduction to digital computers. Characteristics, design, construction, and maintenance of machine-stored data sets. Statistical analysis with generally available computer programs. No previous knowledge of computers or programming is required. *Two lecture hours a week, fall, spring and summer.* Staff.
- BIOS 109 **COMPUTER PROGRAMMING IN BIOSTATISTICS** (1). Encompasses all the material of BIOS 108, and also basic computer programming skills using the FORTRAN language. No previous knowledge of computers or programming is required. *Two lecture and two laboratory hours a week, fall, spring and summer.* Staff.
- BIOS 120 **SPECIAL TECHNIQUES IN BIOMETRY** (1-3). Special topics of current interest in Biometry. *One-three lecture hours a week, fall, spring and summer.* Staff.
- BIOS 135 **PROBABILITY AND STATISTICS** (4). Prerequisite, integral calculus. Basics of probability; random variables and their probability distributions; special distributions, including the binomial, Poisson, normal, gamma; expectation and moments; combined 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. *Four lecture hours a week, fall.* Kupper.
- BIOS 140, 141, 142 **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. *Two or more hours a week, fall, spring and summer.* Staff.
- BIOS 145 **PRINCIPLES OF EXPERIMENTAL ANALYSIS** (3). Prerequisite, BIOS 105 or equivalent. Continuation of BIOS 105; multiple regression, design and analysis of simple experiments, nonparametric and other procedures. *Three lecture hours a week, fall and spring.* Staff.
- BIOS 150 **ELEMENTS OF PROBABILITY AND STATISTICAL INFERENCE** (Statistics 101). (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.* Staff.

- BIOS 151 **ELEMENTS OF STATISTICAL ANALYSIS** (Statistics 102) (3). Prerequisite, BIOS 150 or equivalent. Various topics in statistical methods, including applied regression analysis, analysis of simple experimental designs, data analysis. *Three lecture hours a week, spring.* Staff.
- BIOS 160 **PROBABILITY AND STATISTICAL INFERENCE** (Statistics 126-7) (6). Prerequisite, integral calculus. Introduction to the theory of probability: random variables, probability distributions, generating functions, sums and sequences of random variables. Distributions of functions of random samples; introductory theory of estimation; hypothesis testing. *Six lecture hours a week, fall.* Staff.
- BIOS 161 **INTERMEDIATE STATISTICAL ANALYSIS** (6). Prerequisite, BIOS 150 or equivalent. Application of normal-theory and non-parametric methods to various topics in statistical analysis, including: descriptive statistics, goodness of fit, correlation and regression, independent and matched samples and other simple experimental designs, categorical data, and elementary multivariate problems. *Six lecture hours a week, spring.* Symons, Quade.
- BIOS 164 **SAMPLE SURVEY METHODOLOGY** (Statistics 104) (3). Prerequisite, BIOS 105 or equivalent. Fundamental principles and methods associated with survey sampling, giving primary attention to as non-mathematical as possible a treatment of simple random sampling, stratified sampling, and cluster sampling. Also: techniques of questionnaire design; the problems of non-response, and sources of non-sampling errors. Practical experience in the applied aspects of sampling is provided by student participation in the design, execution, and analysis of an actual survey. *Three lecture hours a week, spring.* Francis.
- BIOS 165 **ANALYSIS OF CATEGORICAL DATA** (3). Prerequisite, BIOS 105 or equivalent. Statistical methods for analyzing categorized data, including: multi-factor, multi-response models for contingency tables; measures and tests of association; interpretation of interactions. *Nine lecture hours a week, first summer session.* Koch.
- BIOS 167 **APPLIED STOCHASTIC PROCESSES** (ORSA 167) (3). Prerequisite, BIOS 160 or equivalent. Survey of renewal theory, Markov chains, Poisson processes and extensions, epidemic models, branching processes and other stochastic models of empirical processes. Disease, population, and health services applications. *Three lecture hours a week, fall.* Shachtman.
- BIOS 213 **DATA MANAGEMENT IN BIostatistics** (3). Prerequisite, BIOS 109 or equivalent. Techniques for designing, implementing, and operating computerized data management systems for large studies with particular emphasis on collaborative medical studies. *Three lecture hours a week, fall.* Smith.

- BIOS 215 **HEALTH DATA PROCESSING LABORATORY (1-3)**. Prerequisite, BIOS 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. *Two or more hours a week, fall, spring, and summer*. Smith.
- BIOS 224 **SOME QUANTITATIVE METHODS IN PLANNING AND EVALUATION (3)**. 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. *Two lecture and two laboratory hours a week*. Gillings.
- BIOS 230 **INFORMATION SYSTEMS IN MENTAL HEALTH (MENH 230) (3)**. History and current status of mental health information systems on federal, state, and local level, with emphasis on comprehensive mental health centers. National, regional and state organizations active in the field of mental health statistics. History and current status of classificatory schemata for mental disorders. Review of DSM-11 and some other frameworks of classification. Some statistical techniques in classification problems. *Three lecture hours a week, fall*. Stewart.
- BIOS 240, 241, 242 **SPECIALIZED METHODS IN HEALTH STATISTICS (1 or more)**. Prerequisite, permission of the instructor. Statistical theory applied to a special problem area 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. *One or more hours a week, fall, spring, and summer*. Staff.
- BIOS 250 **ADVANCED TECHNIQUES IN BIOMETRY (3)**. Prerequisites BIOS 109, BIOS 160, and 161, or equivalents. Design of experiments, bioassay, sequential analysis, Bayesian analysis, and other topics. *Nine lecture hours a week, summer*. Symons.
- BIOS 256 **INTRODUCTION TO NONPARAMETRIC STATISTICS (Statistics 171) (3)**. Prerequisite, BIOS 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. *Nine lecture hours a week, first summer session*. Quade.
- BIOS 257 **NONPARAMETRIC PROCEDURES IN BIOMETRIC RESEARCH (3)**. Prerequisite, BIOS 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 and bioassays. (1977 and alternate years.) *Three lecture hours a week, spring*. Sen.

- BIOS 260 **LARGE SAMPLE THEORY** (3). Prerequisite, BIOS 160; corequisite, MATH 121. An introduction to limit theorems and laws of large numbers in probability, statistics, and stochastic processes. *Three lecture hours a week, fall.* Sen.
- BIOS 265 **LINEAR MODELS IN CATEGORICAL DATA ANALYSIS** (3). Prerequisite, BIOS 266. Theory of statistical methods for analyzing categorical data by means of linear models; multifactor and multiresponse situations; interpretation of interactions. (1977 and alternate years.) *Three lecture hours a week, spring.* Koch.
- BIOS 266 **LINEAR MODELS I** (4). Prerequisites, Linear Algebra; and BIOS 109, 160 and 161, or equivalents. Multivariate normal and related distributions; basic univariate and multivariate linear models; computational aspects. *Four lecture hours a week, fall.* Helms, Grizzle.
- BIOS 267 **LINEAR MODELS II** (4). Prerequisite, BIOS 266. Principal components, discriminant functions, canonical variates, repeated measurements experiments, analysis of longitudinal data, components of variance. *Four lecture hours a week, spring.* Grizzle, Helms.
- BIOS 270 **DEMOGRAPHIC TECHNIQUES I** (3). Prerequisite, BIOS 100 or equivalent. Fundamental principles and methods employed in the study of population. Attention is given to providing the student with a basic understanding of the characteristics of censuses, vital statistics registration systems, and other sources of demographic data, and the problems involved in the interpretation of the available data on population structure and change. The topics covered include rates and ratios, standardization, complete and abridged life tables, estimation and projection of fertility, mortality, migration and geographic distribution, population composition, and population projection and estimation. *Three lecture hours a week, fall.* Wells.
- BIOS 271 **DEMOGRAPHIC TECHNIQUES II** (3). Prerequisites, BIOS 270 and integral calculus. Methods of analysis when data are deficient; population projection methods; stable and quasistable methods; interrelations among demographic variables; migration analysis; uses of population models. *Three lecture hours a week, spring.* Suchindran.
- BIOS 275 **STATISTICS IN POPULATION PROGRAMS** (2). Prerequisite, permission of instructor. Covers applications of statistical and demographic methods in population programs with special emphasis on their use in planning, operation and evaluation of programs. Topics include data needs, and systems for data acquisition through operation sources and special studies, methods for obtaining estimates when data are inadequate, evaluation of effectiveness of birth control methods, target setting in program planning, and evaluation techniques useful in population programs. *Two lecture hours a week, spring.* Abernathy.

- BIOS 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, etc. (1977 and alternate years.) *Three lecture hours a week, spring.* Suchindran.
- BIOS 280 **SURVIVORSHIP ANALYSIS** (3). Life tables, hazard rates, estimation of survival functions, parametric models of mortality experience, concomitant variables, clinical trials, comparisons of survival functions, competing risks, chi-square analysis, sequential methods. (1976 and alternate years.) *Three lecture hours a week, spring.* Elandt-Johnson.
- BIOS 281 **STATISTICAL METHODS IN HUMAN GENETICS** (3). Prerequisite, permission of the 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, polygenic inheritance. Special emphasis will be given to segregation and linkage analysis. (1977 and alternate years.) *Three lecture hours a week, spring.* Elston.
- BIOS 287 **STATISTICAL METHODS IN EPIDEMIOLOGY** (Epidemiology 287) (3). Prerequisites, BIOS 100 and EPID 160, or equivalents. Lectures, discussions, and laboratory work on the principles and methods of epidemiology investigation, with laboratory work in assembling and analyzing crude data resulting from field investigations of epidemics. Consideration of the theory of epidemics, and models that have been used to demonstrate the effects of varying factors which influence the course of epidemics. *Two lecture and two laboratory hours a week, spring.* Kleinbaum, Hogue.
- BIOS 301 **FIELD OBSERVATION IN NATIONAL HEALTH STATISTICS** (0). Orientation to the organization and operation of the major national agencies concerned with demographic and health statistics. Supervised visits to the U.S. Bureau of the Census, National Center for Health Statistics, and the National Institutes of Health, lectures and demonstrations by administrative and research personnel. Field Fee \$150. *Spring.* Coulter, Wells; agency counselors.
- BIOS 302 **FIELD TRAINING IN PUBLIC HEALTH STATISTICS** (1-6) This course is designed to offer students majoring in biostatistics an opportunity for supervised experience in all phases of the statistical programs in selected health departments. Open only to students majoring in biostatistics. Field Fee \$450. *Summer.* Wells; field counselors.
- BIOS 340,
341,
342 **STATISTICAL CONSULTING IN THE HEALTH SCIENCES** (2 or more). Prerequisite, a minimum of one year of graduate work in statistics. By actual participation in current projects, the advanced student will be given instruction in the processes of statistical consulting service for the health sciences; initial and

		continuing conference with the research worker in a health science, definition of the problem in statistical terms, design of experiment with reference to statistical implications, analysis of data, and report writing. <i>Four or more laboratory hours a week, fall, spring, and summer.</i> Staff.
BIOS	350, 351, 352	TRAINING IN STATISTICAL TEACHING IN THE HEALTH SCIENCES (2 or more). Prerequisite, a master's degree or equivalent. 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. <i>Four or more laboratory hours a week, fall, spring and summer.</i> Staff.
BIOS	390, 391, 392	RESEARCH IN BIostatISTICS (2 or more). Individual arrangements may be made by the advanced student to spend part or all of his time in supervised investigation of selected problems in statistics. <i>Four or more laboratory hours week, fall, spring and summer.</i> Staff.
BIOS	393	MASTERS THESIS (0-6). <i>Fall, spring, and summer.</i> Staff.
BIOS	394	DOCTORAL DISSERTATION (0-9). <i>Fall spring, and summer.</i> Staff.
BIOS	400	GENERAL INFORMATION

DEPARTMENT OF ENVIRONMENTAL SCIENCES AND ENGINEERING

ENVR	51	ENVIRONMENTAL PROTECTION (3). Prerequisite, natural science requirement of the General College. A man-centered study of the health, economic, ecological and aesthetic effects of our use of water, air and land. The physical, biological and chemical processes that occur in nature are studied, particularly as they relate to man's activities and his generation of waste residues, heat, noise and radiation. Methods of control and for abatement of environmental degradation are presented. <i>Three lecture hours a week, fall and spring.</i> Chanlett.
ENVR	100	READING IN ENVIRONMENTAL SCIENCES AND ENGINEERING (1 or more). Prerequisite departmental permission. For students outside the Department who desire to conduct 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 individual instance. <i>Two or more hours a week, fall, spring, summer.</i> Staff.
ENVR	101	ELEMENTS OF ENVIRONMENTAL HEALTH (2). The study of environmental pollution, its sources, public health significance, and methods of control. Air, water, food, housing, waste disposal, insects, rodents, accidents, and the physical sources of heat, light, noise, and ionizing radiation are considered. <i>Two lecture hours a week, spring and summer.</i> Christman, Turner; staff.

- ENVR 111 **MAN AND HIS ENVIRONMENT** (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. *Spring*. Shiffman.
- ENVR 115 **APPLIED ELECTRON MICROSCOPY** (3). Prerequisites, college physics and permission of instructor. The use of the electron microscope as a research tool. Theory of operation and image formation and interpretation are discussed. Current applications on the instrument are reviewed with particular emphasis on the study of the environment, contamination and associated phenomena. Techniques for the preparation of biological thin sections, powder, replica, and electron diffraction specimens are presented in the laboratory. *Two lecture and two laboratory hours a week, spring*. Fraser.
- ENVR 118 **QUANTITATIVE STUDIES FOR ENVIRONMENTAL SCIENCES** (5). Prerequisite, MATH 15. Applied mathematics from the viewpoint of the needs of those studying environmental science. Specific aspects of differential and integral calculus are developed as needed in environmental hygiene. *Ten lecture and eight laboratory hours a week, second summer session*. Reist.
- ENVR 120 **READING IN ENVIRONMENTAL CHEMISTRY AND BIOLOGY** (1 or more). Selected readings for orientation of students to environmental problems with particular emphasis on chemical and biological aspects. *Fall, spring and summer*. Staff.
- ENVR 122 **WATER CHEMISTRY** (4). Prerequisites, CHEM 11 and CHEM 21. Principles and applications of water chemistry. Consideration of equilibrium relationships in aqueous solutions such as natural waters. Proton transfer, solubility, complex formation, and redox reactions in natural waters are discussed; examples in natural systems include alkalinity, hardness, chemistry of iron, manganese, aluminum, and the oxidation of organic carbon. Thermodynamic background for equilibrium calculations, including free energy and activity relationships, is presented. Laboratory includes examples of titrimetric, colorimetric and electrometric methods of water analysis. *Three lecture and two laboratory hours a week, fall*. Johnson, O'Melia, Singer.
- ENVR 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. *Fall*. Christman.
- ENVR 124 **ENVIRONMENTAL KINETICS OF CHEMISTRY AND BIOLOGY** (2). Prerequisite, ENVR 122. Rates of chemical and biological processes of environmental systems. Theory and models of gas and solution kinetics. *Fall*. Johnson.

- ENVR 127 **OCEANOGRAPHY (3)**. (ZOO 126, MASC 101). Prerequisite, ZOO 11 or BOTN 11. *Three lecture hours a week, fall*. Martens.
- ENVR 128 **CHEMICAL OCEANOGRAPHY (MASC 105) (3)**. Prerequisites, one semester of physical chemistry or ENVR 122, CHEM 180 or equivalent. Presentation and interpretation of the complex chemistry of the oceans, the variation and abundance of the sea water constituents, and the chemical, physical and biological processes contributing to the distribution of the chemical species. The special problems relating to the introduction and dispersion of conservative and non-conservative substances will also be considered. *Three lecture hours a week, spring*. Staff.
- ENVR 128L **CHEMICAL OCEANOGRAPHY LAB (MASC 105L) (1)**.
- ENVR 131 **BIOLOGY IN ENVIRONMENTAL SCIENCE (3)**. Prerequisite, general chemistry. An introduction to biology, including principles of bio-chemistry, cell structure, classification, and ecology. Application to public health, including biology of waste treatment systems, biological indices of pollution, and water and airborne diseases. Laboratory emphasizes techniques utilized in measurement and control of environmental pollution. *Two lecture and two laboratory hours a week, spring*. Little.
- ENVR 132 **LIMNOLOGY AND WATER POLLUTION (3)**. Prerequisites, two semesters of chemistry or ENVR 122. The principles of limnology as they apply to water supply and waste disposal. Emphasis is placed on the physical, chemical and biological factors of the aquatic environment in order to define the ecology of nonpolluted and polluted water, including lakes, streams and estuaries. *Two lecture and two laboratory hours a week, fall and spring*. Weiss.
- ENVR 133 **ENVIRONMENTAL BIOLOGY (3)**. Prerequisites, general and organic chemistry, ENVR 131 or equivalent. An overview of environmental biology with emphasis on ecological theory as it relates to applied biological problems. Topics for discussion include the metabolism of individuals, the reaction of populations and communities to environmental stress and ecosystem responses to perturbations. The laboratory emphasizes techniques widely used in aquatic biology and pollution control. *Two lecture and two laboratory hours a week, fall*. Little, Pfaender.
- ENVR 134 **ENVIRONMENTAL MICROBIOLOGY (3)**. Prerequisites, organic chemistry and ENVR 131 or ENVR 133, and permission of instructor. Principles of general microbiology: an examination of the microbial world with emphasis on non-pathogenic 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.

- ENVR 135 **ECOLOGY** (3) (BIOL 102, ZOOLOGY 108, BOTANY 141). Prerequisites, BOTANY 11 or ZOOLOGY 11 or BIOL 21, 22. *Three lecture hours a week, fall and spring.* Reice, Stiven, Leith, Peet.
- ENVR 135L **ECOLOGY LABORATORY** (1) (BIOL 102L, BOTANY 141L, ZOOLOGY 108L). Corequisite, ENVR 135. *Three laboratory hours a week, fall and spring.* Reice, Stiven, Leith, Peet.
- ENVR 136 **BIOLOGICAL OCEANOGRAPHY** (6) (ZOOLOGY 140S, MASC 104S). Prerequisites ZOOLOGY 106 and 108 or permission of instructor. *Spring.* Kuenzler, Wood and Staff of Institute of Marine Sciences.
- ENVR 137 **ECOLOGY OF WETLANDS** (6) (MASC 137). Prerequisites, environmental biology or general ecology or permission of the instructor. An introduction to the functioning of freshwater and estuarine marsh and swamp ecosystems, with emphasis on the systems of the southeastern U.S. *Six lecture and sixteen laboratory hours a week, first summer session.* Kuenzler, Frankenberg.
- ENVR 138 **ENVIRONMENTAL VIROLOGY** (4). Prerequisite, introductory course in microbiology; or ENVR 131 or 133; or permission. Ecological, environmental health and fundamental aspects of virology, with special emphasis on viruses in air, water and food. *Three lecture and three laboratory hours a week, spring.* Sobsey.
- ENVR 140 **READING IN AIR AND INDUSTRIAL HYGIENE** (1 or more). Prerequisite, permission of the instructor. Reading and tutorial guidance in the fields of industrial hygiene and community air pollution. *Fall, spring and summer.* Staff.
- ENVR 141 **ELEMENTS OF AIR HYGIENE** (2). Prerequisite, admission to graduate standing or permission of the instructor. Health aspects of the air are covered from the standpoint of community air pollution. The chemical and physical behavior and the biological effects of air contaminants are discussed. Means of controlling air pollution are reviewed. *Five lecture hours a week, first summer session.* Stern, Fox, Jeffries.
- ENVR 142 **ELEMENTS OF INDUSTRIAL HYGIENE** (2). Prerequisite, admission to graduate standing or permission of instructor. Problems and control of exposure to occupational diseases and industrial accident hazards, the organization and function of industrial and governmental services dealing with these problems, the industrial aspects of communicable and noncommunicable diseases, the procedures of workmen's compensation plans, and the integration of occupational health services with local health department activities are presented. *Five lecture hours a week, second summer session.* Fraser, Harris, Reist; staff.
- ENVR 143 **APPLIED PHYSIOLOGY AND TOXICOLOGY** (3). Prerequisite, admission to graduate standing or permission of instructor. Physiologic response of the various organs and organ systems of the body to the physical and chemical stresses of the industrial 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, synergism will be investigated in the laboratory. *Three lecture hours a week, fall.* Fraser.

- ENVR 144 **AIR POLLUTION, MEASURING, MONITORING AND SURVEY** (3). Prerequisites, graduate standing or permission of the instructor. Theory and application of the analysis of samples; manual methods; sensor calibration; site selection; monitoring; gas and aerosol sampling. *Two lecture and four laboratory hours a week, spring.* Fox, Jeffries.
- ENVR 145 **INSTRUMENTATION AND DATA ACQUISITION** (3). Prerequisite, graduate standing or permission of the instructor. Concepts and principles employed in electronic-aided measurements of air quality including acquisition of measurements, principles of input transduction, and on-line minicomputers. *Three lecture hours a week, fall.* Jeffries.
- ENVR 146 **INDUSTRIAL HYGIENE ENGINEERING CONTROL DESIGN** (3). Prerequisite, engineering degree or permission of the instructor. Design of industrial exhaust systems and control of heat exposures in occupied spaces. *Three lecture hours a week, fall.* Harris.
- ENVR 146L **INDUSTRIAL VENTILATION LABORATORY** (1). Corequisite, ENVR 146. Laboratory exercises in fluid mechanics specifically related to industrial ventilation. *Fall.* Harris.
- ENVR 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. *Spring.* Fraser.
- ENVR 150 **READING IN ENVIRONMENTAL MANAGEMENT AND PROTECTION** (1 or more). Readings in basic works throughout the field of environmental management and protection. Critical analysis of these works by students and faculty. *Fall, spring, and summer.* Staff.
- ENVR 152 **MICROBIOLOGY OF THE INSTITUTIONAL ENVIRONMENT** (3). Prerequisite, permission of the instructor. Study of microbial contaminants in the hospital environment and their relationships to the infectious disease process. Routes of transmission and epidemiology of noscomial infection will be stressed. *Three lecture hours a week, fall.* Turner, Craddock.
- ENVR 154 **MANAGEMENT OF THE INSTITUTIONAL ENVIRONMENT** (3). Prerequisites, General chemistry and biology. The study of the particular environment of hospitals, nursing homes, schools, and related institutions. The application of biological and chemical methods to the identification of problems; and the epidemiology and management of environmental factors influencing health in the institutional setting. *Three lecture hours a week, spring.* Turner.

- ENVR 160 **READING IN RADIOLOGICAL HYGIENE** (1 or more). Prerequisite, permission of the instructor. A search of the literature on a topic in Radiological Hygiene. Evaluation and judgment of the subject matter. *Fall, spring, and summer.* Roseboro, Watson; staff.
- ENVR 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 discussed. The basic principles of radiation protection and public health aspects of nuclear radiations are emphasized. Laboratory exercises deal with the detection and measurement of ionizing radiation from sources of concern in public health. *Two lecture hours a week, spring, and second summer session.* Roseboro, Watson, Willhoit.
- ENVR 162 **MODERN PHYSICS FOR ENVIRONMENTAL SCIENCE** (3). Prerequisite, ENVR 118. Modern physics with the emphasis on radioactivity and ionizing radiations. *Three lecture hours a week, fall.* Watson.
- ENVR 163 **RADIATION INSTRUMENTATION** (3). Corequisite, ENVR 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.* Roseboro.
- ENVR 164 **FIELD OBSERVATIONS IN RADIOLOGICAL HYGIENE** (3). Prerequisites, ENVR 118. Field observations of modern public health practice in state and local agencies and of health physics practice at the Oak Ridge National Laboratory and associated facilities. Field fee, \$350.00. *Instruction is conducted during summer-fall and fall-spring intercession periods in the field.* Staff.
- ENVR 170 **READING IN SANITARY ENGINEERING AND WATER RESOURCES** (1 or more). For students desiring to conduct extensive library study of some special subject in sanitary engineering or water resources. The subject and requirements of the project are arranged with the faculty in each individual instance. *Two or more hours a week, fall, spring, and summer.* Staff.
- ENVR 171 **PRINCIPLES OF WATER QUALITY MANAGEMENT** (2). The lectures and seminar discussions are designed to develop a basic understanding of the importance of water resources, past development of the field, its current status, and trends for the future. Topics covered include; water resources and uses, health aspects of water resources, stream pollution, elements of water handling and treatment systems, rationale of regulatory standards and their limitations, drinking water standards, other quality requirements for water and wastewater, and economic considerations. *One lecture and two seminar hours a week, fall.* Lamb; staff.

- ENVR 172 **WORKSHOP IN WATER QUALITY MANAGEMENT (1).** Corequisite ENVR 171, permission of instructor required. Seminar presentations by students, and occasionally others, on selected water quality management topics. Sessions will develop topics of special interest to students in greater depth than possible in ENVR 171. *Fall.* Lamb.
- ENVR 174 **WATER AND WASTES TREATMENT PROCESSES (3).** Prerequisites, ENVR 122, ENVR 131 or permission of instructor. A one semester 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 hours a week, spring.* Singer.
- ENVR 174L **WATER AND WASTES TREATMENT PROCESSES LABORATORY (1).** Corequisite, ENVR 174. Laboratory exercises to illustrate the process principles discussed in ENVR 174. *Two laboratory hours a week, spring.* Singer.
- ENVR 176 **HYDRAULICS AND HYDROLOGY (3).** Prerequisites, mathematics through calculus, undergraduate physics. Principles of hydraulics and ground and surface water hydrology are presented with particular emphasis on the applications of these principles to the design of water and wastewater systems. *Three lecture and three laboratory hours a week, fall.* Brown, Okun.
- ENVR 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 resource, principal water uses and conflicts, public objectives and policy issues, institutional arrangements, legal framework, planning and governmental agency programs. *Two lecture hours a week, fall.* Howells.
- ENVR 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 requirement of the project are arranged with the faculty in each individual instance. *Two or more hours a week, fall, spring, summer.* Staff.
- ENVR 211 **ENVIRONMENTAL MANAGEMENT (3).** Permission of the instructor required. An analysis of decision-making for environmental protection programs including policy development, program implementation and management approaches. Case studies of specific environmental protection problems emphasizing public policy and actions, organizational structure and institutional arrangements. *First summer session.* Shiffman.

- ENVR 212 **ENVIRONMENTAL PROTECTION: PLANNING AND DEVELOPMENT (3)**. Prerequisite, ENVR 111 or equivalent or permission of the instructor. Concepts and techniques in planning, organization and management. Covers program development, decision making, methods for achieving administrative ends, field supervision, criteria establishment and evaluation procedures with reference to environmental hygiene programs. *Two lecture and two seminar hours a week, spring*. Shiffman.
- ENVR 215 **ENVIRONMENTAL ISSUES AND ASSESSMENT (2)**. Prerequisite, permission of the instructor. Concepts and methodologies for assessing the environmental, ecological and social consequences of technological development. The preparation of environmental impact statements will be considered as well as case studies of specific projects. *One lecture and two seminar hours a week, fall*. McJunkin, Shiffman, Weiss.
- ENVR 217 **SYSTEMS ANALYSIS IN ENVIRONMENTAL PLANNING (PLAN 217) (3)**. Prerequisite, calculus. Systems approach and scientific method. Various approaches to system design. Mathematical models. Production, benefit, loss and cost functions. Constrained optimization. Marginal analysis, Linear programming. Application of techniques to systems for the management of environmental quality. *Three lecture hours a week, fall*. Sherwani.
- ENVR 218 **ENVIRONMENTAL SYSTEMS ANALYSIS I: DETERMINISTIC MODELS (3)**. (PLAN 218). Prerequisite, calculus. Concepts of systems analysis. Modeling of environmental and urban systems. Elements of linear algebra. Classical optimization techniques. Marginal analysis models in economics. Mathematical programming models. Selected topics in linear, nonlinear, and dynamic programming. *Three lecture hours a week, spring*. Sherwani.
- ENVR 219 **ENVIRONMENTAL SYSTEMS ANALYSIS II: PROBABILISTIC MODELS (3)** (PLAN 219). Prerequisites, BIOS 135 or 150, STAT 101, ENVR 218 or equivalent and permission of instructor. Model construction and analysis in an uncertain environment. Elements of Markov processes, stochastic programming, stimulation, and response surface techniques. *Three lecture hours a week, fall*. Moreau.
- ENVR 220 **PROBLEMS IN ENVIRONMENTAL CHEMISTRY AND BIOLOGY (1 or more)**. The technical report requirement for the MSPH is usually met by experimental study of a selected problem in environmental chemistry or biology. This investigation may extend for more than one semester and credit is carried accordingly. *Fall, spring, and summer*. Staff.
- ENVR 221 **INSTRUMENTAL METHODS OF ANALYSIS (4)**. Prerequisites, inorganic and analytical chemistry or permission of the instructor. Principles and techniques of instrumental chemical

- analysis, including optical, electrical and separation methods. Laboratory sessions include absorption and emission spectrophotometry, polarography, potentiometry, amperometry, coulometry, and gas ion exchange and paper chromatography. *Two lecture and four laboratory hours a week, fall.* Johnson, Shuman.
- ENVR 222 **SPECIAL TOPICS IN AQUATIC CHEMISTRY** (2). Prerequisite, ENVR 122. Modern topics in aquatic chemistry, application of chemical concepts to the understanding and control of man's aquatic environment. This course may be taken for credit more than once, as the special topics change. *Two lecture hours a week, fall, spring.* Johnson, O'Melia.
- ENVR 223 **TRACE ANALYSIS** (3). Prerequisite, ENVR 221 or permission of the instructor. Sampling and sample preparation; electro-mechanical, spectrophotometric, and nuclear techniques; chemical speciation; precision and validation of results. Laboratory will deal with local environmental samples. *Two lecture and two laboratory hours a week, fall.* Shuman.
- ENVR 226 **ECOLOGICAL AND GENERAL SYSTEMS THEORY** (3). (ZOO 226). Prerequisite, calculus and ZOO 108 or equivalent. The ecosystem approach to ecology. General systems concepts. Mathematical modeling of ecological systems. Use of computers in ecology. *Fall.* Reice.
- ENVR 231 **LIMNOLOGICAL METHODS** (3). Prerequisites, basic limnology and statistics. Professional preparation for field study of freshwater aquatic systems. *Three lecture and eight laboratory hours a week, first summer session.* Francisco.
- ENVR 232 **SPECIAL TOPICS IN AQUATIC BIOLOGY** (2). Prerequisite, ENVR 132 or permission of instructor. Topics of contemporary concern to the management of the aquatic environment, e.g., movement of pesticides through aquatic food chains; growth of algal and nutrient levels, etc., will be discussed in depth. Course may be taken more than once as new topics are offered. *Two lecture hours a week, spring.* Weiss, Kuenzler, Sobsey.
- ENVR 233 **MICROBIAL ECOLOGY** (4). Prerequisite, ENVR 134 or permission of instructor. A consideration of the factors which influence the distribution and inter-relationships of microorganisms in their natural habitat, with emphasis on the non-pathogenic bacteria including enrichment principles and techniques for evaluation of the contribution of individual techniques for evaluation of the contribution of individual types to a selected environment. (1974 and alternate years.) *Two lecture and four laboratory hours a week, fall.* Pfaender.
- ENVR 235 **ECOLOGY OF PHYTOPLANKTON (BOTN 245)** (4). Prerequisites, environmental biology or general ecology. The relation-

ships of planktonic algae to their physical, chemical, and biotic environment, with emphasis on nutrition and primary productivity. *Three lecture and two laboratory hours a week, spring.* Kuenzler.

- ENVR 240 **PROBLEMS IN AIR AND INDUSTRIAL HYGIENE** (1 or more). The technical report requirement is satisfied by completion of a problem in some aspect of industrial hygiene of community air pollution. *Fall, spring, and summer.* Staff.
- ENVR 241 **INTRODUCTION TO AEROSOL SCIENCE** (3). 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, diffusion, evaporation and condensation, electrical and optical properties and particle coagulation, as well as the behavior of the cloud *in toto*. *Three lecture hours a week, fall.* Reist.
- ENVR 241L **AEROSOL SCIENCE LABORATORY** (1). Prerequisites, permission of the instructor; corequisite ENVR 241. Basic laboratory exercises in aerosol sciences. *Fall.* Reist, Jeffries.
- ENVR 242 **INDUSTRIAL HYGIENE PRACTICE** (3). Prerequisites, ENVR 241 and ENVR 143. Methodology and philosophy of evaluating the industrial environment for stresses and toxic substances which affect the health of the worker. The following topics are included: gases, vapors, fumes and dusts; radioactivity hazards; occupational diseases, thermal stress; illumination and exhaust ventilation. The laboratory periods are designed to provide practical experience in the use of the specialized instruments and techniques of this field. *Three lecture hours a week, spring.* Fraser.
- ENVR 243 **AIR AND ITS CONTAMINANTS** (3). Corequisite, ENVR 241. Behavior of atmospheric contaminants and the principles of making measurements in the air environment are studied. Fundamental concepts of meteorology are discussed. *Three lecture hours a week, fall.* Stern.
- ENVR 244 **INDUSTRIAL HYGIENE LABORATORY** (3). Prerequisite, ENVR 241; corequisite, ENVR 242. Demonstrates the principles of applying physical and chemical techniques to measure environmental exposures. Practical experiments and field studies will illustrate techniques applicable to the industrial hygiene survey. *One lecture and four laboratory hours a week, spring.* Reist.
- ENVR 245 **AIR POLLUTION CONTROL** (3). Prerequisite, ENVR 243. Sources of air pollution and their control are studied. Regulatory aspects and air pollution standards are discussed. *Three lecture hours a week, spring.* Stern, Harris.

- ENVR 246 **BIOLOGICAL EFFECTS OF AIR POLLUTION (3)**. Prerequisites, ENVR 143, ENVR 243 or permission of the instructor. Effects of community air pollutants on man, other animals, plants and microorganisms are studied. The "whole organism" response, the data relating to the biochemical response and the physiological mechanisms of responses are discussed. (1977 and alternate years.) *Three lecture hours a week, spring*. Fox.
- ENVR 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 are covered. Photochemical and other chemical aspects of the atmosphere are covered. Topics include photochemical modeling, plume chemistry, and "air pollution" chemistry. *Three lecture hours a week, fall*. Fox.
- ENVR 248 **INDUSTRIAL MEDICINE—PRACTICE AND MANAGEMENT (3)**. Prerequisites, ENVR 143 or equivalent. The technical factors to be considered in decision making and the roles and responsibilities of the industrial physician, nurse and industrial hygienist in the management of the work force. The etiology, diagnosis, treatment and prevention of diseases and stresses found in modern industry are discussed with applications for the use of general practitioners, health administrators, public health nurses and industrial professionals. *Three lecture hours a week, spring*. Fraser.
- ENVR 249 **AIR POLLUTION METEOROLOGY (3)**. Prerequisite, GEOG 110 or equivalent. Theory of transport and diffusion of air pollutants and its application to practical problems and computations involving both single sources and multiple sources, including urban communities; modeling of transport and diffusion, both in wind tunnels and computers; stack design from the meteorological point of view; the organization of meteorological network and field studies; the measurement, monitoring and equipment requirements of pertinent meteorological parameters, air pollution climatology; meteorological management of air pollution. *Three lecture hours a week, spring*. Staff.
- ENVR 250 **PROBLEMS IN ENVIRONMENTAL MANAGEMENT AND PROTECTION (1 or more)**. The technical report is satisfied by the completion of an extensive study of a problem in environmental management and protection. This study may extend over one or more semesters and credit is assigned accordingly. *Fall, spring, and summer*. Staff.
- ENVR 251 **ENVIRONMENTAL PROTECTION I (3)**. Prerequisite ENVR 118 or equivalent. The scientific rationale and technology of the control of semi-public and private water supplies, liquid and solid waste disposal, lighting, the thermal environment and ventilation are presented. First order reactions, the electromagnetic spectrum and fluid mechanics are applied to a series of environmental hygiene problems. *Two lecture and three lab/field hours a week, fall*. Chanlett.

- ENVR 252 **ENVIRONMENTAL PROTECTION II (3)**. Prerequisite, permission of the instructor. The scientific rationale and technology of the control of chemical and biological hazards in food and the quality of housing are presented. The principles, methods, and interpretation of laboratory and field tests for the evaluation of environmental contaminants are examined. The effect of environmental stress on behavior is studied. *Two lecture and two laboratory hours a week, fall*. Shiffman, Turner.
- ENVR 253 **ENVIRONMENTAL PROTECTION III (3)**. Prerequisite, permission of the instructor. The scientific rationale and technology of the control of pesticides, community noise, accidents and consumer products are presented. The principles of environmental hygiene are applied to health care and recreational facilities. *Two lecture and three lab/field hours a week, spring*. Turner.
- ENVR 255 **SOLID WASTES MANAGEMENT (2)**. Prerequisite, graduate standing in Department of Environmental Sciences and Engineering. Coverage includes the changing characteristics of solid wastes, relations to health, resources and land use, costs of collection and transportation. Current and experimental disposal processes and the interactions among water pollutants, air pollutants and solid wastes are studied. *Two lecture hours a week, spring*. Chanlett.
- ENVR 260 **PROBLEMS IN RADIOLOGICAL HYGIENE (1 or more)**. A laboratory or field problem requiring individual acquisition of data, its analysis and the preparation of the technical report. *Fall, spring, and summer*. Roseboro, Watson; staff.
- ENVR 261 **RADIATION BIOPHYSICS (3)**. Prerequisites, ENVR 162 or equivalent. The biophysical factors of radiation quality and the response of cell populations are discussed. Current models of the mechanisms of radiation action on biological systems are reviewed. Microdosimetry and dosimetry at interfaces are also covered. *Three lecture hours a week, spring*. Roseboro.
- ENVR 262 **HEALTH PHYSICS (3)**. Prerequisites, ENVR 163, ENVR 261, and ENVR 263. The principles of radiation protection are discussed and illustrated by laboratory and field exercises involving shielding, contamination control, waste disposal, radiation and contamination survey techniques, and legal and administrative procedures. The various isotope, x-ray, and other radiation facilities of the University are utilized in collaboration with the University Radiation Safety Office. *Two lecture and three laboratory hours a week, fall*. Staff.
- ENVR 263 **RADIATION HAZARDS EVALUATION I (3)**. Prerequisite, ENVR 162. The principles and techniques of external and internal radiation hazards evaluation are studied. The interaction of radiation with matter and the fundamentals of radiation dosimetry are presented. *Three lecture hours a week, spring*. Watson.

- ENVR 264 **RADIATION HAZARDS EVALUATION II** (3). Prerequisite, ENVR 263. The interaction of radiation with biological materials is studied. Internal and external hazards are evaluated. Laboratory experience in precise and low level radioactivity measurements is acquired. *One lecture and four laboratory hours a week, spring.* Watson.
- ENVR 270 **PROBLEMS IN SANITARY ENGINEERING AND WATER RESOURCES** (1 or more). The technical report is satisfied by individual study of a specific problem in sanitary engineering or water resources. 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.
- ENVR 271 **MODELING IN NATURAL 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 control. *Spring.* O'Melia, Lauria.
- ENVR 272 **TECHNOLOGY OF ENGINEERED WATER SYSTEMS** (3). Prerequisite, permission of instructor. An examination of technology and planning techniques for water and wastewater systems including pumping stations, reservoirs, water distribution and wastewater collection networks. *Three lecture hours a week, fall.* Lauria.
- ENVR 273 **WATER AND WASTEWATER TREATMENT PLANT DESIGN** (3). Prerequisite, ENVR 272. 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.* Brown.
- ENVR 274 **ADVANCED WATER AND WASTES TREATMENT PROCESSES I** (3). Prerequisites, ENVR 122 or permission of instructor. The first of a 2-course in-depth presentation of the applications of chemical, physical, and biological principles to water and wastewater treatment. Process considerations including equilibria, kinetics and reactor performance are presented. Physical and chemical processes are highlighted including sedimentation, filtration, adsorption, ion exchange, coagulation, precipitation. Laboratory exercises illustrate the process principles. *Three lecture hours a week, fall.* Singer, O'Melia.
- ENVR 275 **ADVANCED WATER AND WASTES TREATMENT PROCESSES II** (3). Prerequisites, ENVR 274, ENVR 131 or permission of instructor. Continuation of ENVR 274 with emphasis on wastewater treatment processes including aerobic and anaerobic biological treatment, gas transfer, solids handling, nutrient removal, and membrane processes. Laboratory exercises are included. *Three lecture hours a week, spring.* Singer, O'Melia.

- ENVR 276 **INDUSTRIAL WATER QUALITY MANAGEMENT (3).** Prerequisite, ENVR 171 and ENVR 174, or equivalent. Water supply and wastes disposal problems of industries. Special water quality requirements and treatment methods are reviewed in a comprehensive fashion. The nature of industrial wastes, pollutional difficulties resulting from their discharge, and methods of attacking wastes problems are discussed, including technical, administrative and regulatory aspects. Emphasis is placed on the diverse nature of these problems and the methodology employed in their solution. *Two lecture and two seminar hours a week, spring.* Lamb.
- ENVR 277 **ENGINEERING PROJECT DESIGN (3).** Prerequisites, ENVR 217 and BIOS 135. Decision model approach to project design. Demand analysis. Dynamic aspects: flexibility, sequence and timing. Water distribution systems. Waste management systems. Application of analog and digital computers to sanitary engineering design. *Six lecture hours a week, first summer session.* Sherwani.
- ENVR 278 **DEVELOPMENT OF A WATER PROJECT (3).** Prerequisite, degree in engineering. 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.* Okun.
- ENVR 281 **TOPICS IN ADVANCED HYDROLOGY (3).** Prerequisites, ENVR 272 and BIOS 135 or equivalent. Urban hydrology, hydrological frequency analysis, extreme value theory, analysis of low flows, problem of storage synthetic hydrology. *Three lecture hours a week, spring.* Sherwani.
- ENVR 282 **PUBLIC INVESTMENT THEORY AND TECHNIQUES (3).** (PLAN 232). Prerequisite, permission of the instructor. A study of new methods of economic, engineering, and governmental analysis in public investment planning. Techniques include those for converting broad community objectives into specific criteria to design public projects, with special emphasis on water resources. *Three lecture hours a week, fall.* Hufschmidt.
- ENVR 283 **NATURAL RESOURCE LAW AND POLICY (3).** (PLAN 233). Prerequisite, permission of instructor. An examination of the law of resource use and development, its administration and underlying policies. Particular attention to water rights law, regulatory law, and natural resource administration. Regulatory aspects of pollution control programs will be covered. *Three lecture hours a week, fall and spring.* Campbell, Heath.
- ENVR 284 **PLANNING OF WATER RESOURCES SYSTEMS (3).** Prerequisites, ENVR 217 and ENVR 282 and permission of instructor. Application of systems analysis techniques to the planning at field level of multi-unit, multi-purpose water resource developments. Integrated treatment of the theory, process, and techniques of water resource system design. River-system simulation

will be emphasized. *Three lecture hours a week, spring.* Hufschmidt.

- ENVR 285 **SPECIAL PROJECT IN WATER QUALITY PLANNING** (3). Prerequisites, a master's degree or two semesters residence in the Department of Environmental Sciences and Engineering. The course is built around a specific real project. The project will integrate the many elements that affect water quality and the decision that must be made in water management. Examples include: water planning for a new city, regional development in coastal and estuarine areas, industrial site developments, etc. *Second summer session.* Staff.
- ENVR 300 **RESEARCH IN ENVIRONMENTAL SCIENCES AND ENGINEERING** (2 or more). Prerequisite, consultation with the faculty and approval of subject and proposed program. Research in environmental sciences and engineering for students outside the Department. *Four or more hours a week, fall, spring, summer.* Staff.
- ENVR 301 **SEMINAR IN ENVIRONMENTAL SCIENCES AND ENGINEERING** (1 or more). Readings and discussions in Environmental Sciences and Engineering to provide opportunity to develop new concepts and topics in various aspects of Environmental Sciences and Engineering. *Fall, spring, and summer.* Staff.
- ENVR 311 **SEMINAR IN ENVIRONMENTAL HEALTH** (1). Open by special arrangement to students doing advanced graduate work. Directed readings and reports on recent advances concerned with environmental health. Reports of current research and review of principal journals in environmental health, sanitary engineering and sanitary sciences. *Two seminar hours a week, fall and spring.* Staff.
- ENVR 313 **ENVIRONMENTAL HEALTH PROBLEMS IN DEVELOPING COUNTRIES** (1). Selected problems relating to achievement of social, economic and technologic benefits in developing countries through improvement of the environment. Seminar topics: technical processes and innovation, institutions, modification of values and attitudes, planning and administration (general applications and specific case studies of environmental change). *Offered in alternate years beginning fall, 1976.* Shiffman.
- ENVR 320 **RESEARCH IN ENVIRONMENTAL CHEMISTRY** (2 or more). Research problems in environmental chemistry such as analytical methodology of inorganic and organic substances in water and wastewater, the chemical aspects of water and wastewater treatment. *Fall, spring, and summer.* Staff.
- ENVR 330 **RESEARCH IN ENVIRONMENTAL BIOLOGY** (2 or more). Research problems in environmental biology such as the ecology of natural and polluted waters, the macro- and microbiology of waste treatment. *Fall, spring, and summer.* Staff.

ENVR	340	RESEARCH IN AIR AND INDUSTRIAL HYGIENE (2 or more). Prerequisites, graduate standing and permission of instructor. <i>Fall, spring, and summer.</i> Staff.
ENVR	350	RESEARCH IN ENVIRONMENTAL MANAGEMENT AND PROTECTION (2 or more). Independent study and research in environmental management and protection. <i>Fall, spring, and summer.</i> Staff.
ENVR	360	RESEARCH IN RADIOLOGICAL HYGIENE (2 or more). Prerequisite, advanced standing in the Radiological Hygiene Program. The execution of independent investigation and the preparation of a paper. <i>Fall, spring, and summer.</i> Roseboro, Watson; staff.
ENVR	370	RESEARCH IN SANITARY ENGINEERING (2 or more). Prerequisite, consultation with the faculty and approval of subject and proposed program. Research in the engineering phases of problems relating to water supply, purification, wastes, waste treatment, and stream pollution. <i>Four or more hours a week, fall, spring, and summer.</i> Staff.
ENVR	380	RESEARCH IN WATER RESOURCES (2 or more). Prerequisite, consultation with the faculty and approval of subject and proposed program. Research relating to engineering aspects of water resources and their development. <i>Four or more hours a week, fall, spring, and summer.</i> Staff.
ENVR	393	MASTER'S THESIS (3-9).
ENVR	400	GENERAL REGISTRATION (0).

DEPARTMENT OF EPIDEMIOLOGY

EPID	140, 141	PROBLEMS IN EPIDEMIOLOGY (1 or more). A course for students who wish to make an intensive study of some special problem in epidemiology. <i>Two or more hours a week, fall and spring.</i> Staff.
EPID	160	PRINCIPLES OF EPIDEMIOLOGY (3). Pre (or) Corequisite BIOS 100 or permission of instructor required. An introductory course in which the meaning and scope of epidemiology are considered, having particular regard to its use in the scientific appraisal of community health and in elucidating various processes involved in determining the health of people. Lectures, seminars, and laboratory exercises are directed towards developing an appreciation of the relationships between health of a group, along with other characteristics of the group and its habitat. <i>One lecture and two laboratory hours a week, fall.</i> Cassel; staff.
EPID	161	EPIDEMIOLOGY IN POPULATION DYNAMICS AND FAMILY PLANNING PROGRAMS (3). Alternative to EPID 160 satisfying core requirements. The course includes four units. (1) Basic principles and methods of epidemiology as they apply

to population dynamics and family planning programs. (2) The epidemiology transition: the dynamics of changing patterns of health and disease with social and economic development. (3) Epidemiology in family health practice including the impact of family planning programs on the family itself. (4) Epidemiology of pregnancy outcome abortion and of the consequences of prolonged use of various contraceptive methods. *Two lectures and two laboratory hours a week, fall.* Omran.

- EPID 162 **EPIDEMIOLOGY IN ENVIRONMENTAL HEALTH** (3). Prerequisite or corequisite, BIOS 100 or permission of instructor. Alternative to EPID 160 satisfying core requirements. This is an introductory course in the history, principles and uses of epidemiology for the understanding and control of population health and disease in relation to man's environment. Illustrations will be presented on the use of epidemiology as a research technique (the identification of health and disease determinants in the environment), and the use of epidemiology for administrative purposes (surveillance, planning and evaluation for environment health programs). *One lecture and two laboratory hours a week, spring.* McMichael.
- EPID 211 **DETERMINANTS OF COMMUNICABLE DISEASE** (2). Biological determinants, changing patterns of communicable diseases, definition of high-risk sub-populations, methods of control. *Two lecture hours a week, fall.* Becker.
- EPID 230 **APPLIED METHODS IN EPIDEMIOLOGICAL RESEARCH** (3). Prerequisites, EPID 160, BIOS 105. This course involves the application of statistical techniques to health related data. It relates hypotheses being investigated with statistical methods for analysis. *Spring.* Cornoni.
- EPID 231 **EPIDEMIOLOGIC RESEARCH IN PERSONAL HEALTH SERVICES** (3). Emphasis will be placed on research methodology and techniques for measurement in the areas of quality of care and utilization of services. Studies currently in progress as well as selected examples from the literature will be presented for discussion. Students will formulate research proposals based on an existing problem or question of interest. *Fall.* Hulka.
- EPID 240 **ALCOHOL, BEHAVIOR AND HEALTH** (2). Major objective of this course is to acquaint the student with the variety of problems associated with alcohol usage. It is the interdisciplinary course providing lectures and discussions of many aspects related to alcohol abuse and alcoholism. *Fall.* Cornoni.
- EPID 241 **RESEARCH METHODOLOGY IN ALCOHOL USAGE** (2). Emphasis of this seminar will be on research skills, particularly applicable to epidemiology studies of alcohol usage. It will involve illustrations, design and planning of studies and analysis of data. Tutorial methods based on individual interests will be employed. *Spring.* Cornoni.

- EPID 251 **EPIDEMIOLOGIC METHODS IN POPULATION** (3). Prerequisites, EPID 161 and/or permission of instructor required. Uses, limitations of traditional epidemiologic strategies in population research. Advanced epidemiologic methodologies in the study of fertility and mortality correlates, abortion, sterilization, contraception, and sterility. Epidemiology in family planning evaluative research. Epidemiologic case studies in population. *Three lecture hours per week, fall.* Omran.
- EPID 260 **EPIDEMIOLOGICAL FOUNDATIONS AND DISEASE CONTROL PROGRAMS** (3). This course covers issues surrounding selected health problems, with emphasis on the current knowledge of the epidemiology and the related clinical aspects of the disorders. The implications of this knowledge for health programs, and further research endeavors are covered. *Spring.* Slome.
- EPID 262 **EPIDEMIOLOGY OF PROGRAM ACCEPTANCE** (2). Prerequisite, EPID 160 or equivalent. This course uses the epidemiological method to consider problems of the social, (including familial) cultural and psychological determinants of the response to health programs. Emphasis is placed on the concepts and methods useful in predicting the patterns of acceptance or rejection of health programs. *Two lecture hours a week, spring.* Patrick.
- EPID 264 **CULTURE AND HEALTH** (3). Prerequisite, EPID 160 or equivalent. This course considers the role of social, cultural and psychological factors in the etiology of various disorders. Emphasis is placed upon the development of useful frameworks and on the methods required to investigate these correlates of health. *Three seminar hours a week, spring.* Kaplan.
- EPID 265 **HISTORY OF EPIDEMIOLOGY** (3). Prerequisite, EPID 260 or 262 or 264. This course considers the historical development or epidemiological knowledge and method in relation to changing patterns of health and the existing scientific "climate." *Six lecture hours a week, first session, summer.* Staff.
- EPID 266 **EPIDEMIOLOGICAL INVESTIGATION** (3). Prerequisite, EPID 160 or equivalent. This course is designed to familiarize the student with the application of contemporary epidemiologic methods. Emphasis will be placed on original problem formulation and solution using records of field investigation on file in the Department of Epidemiology. Formal lectures will be supplemented by laboratory periods for data processing and seminars for analysis and interpretation. *Three lecture hours a week, spring.* Tyroler.
- EPID 268 **ADVANCED METHODS IN EPIDEMIOLOGY** (3). 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. *Fall.* Staff.

- EPID 270 **APPLICATION OF PSYCHOLOGICAL THEORY AND RESEARCH TO HEALTH (3)**. Prerequisites, EPID 160, BIOS 105. Reviews contributions of clinical and social psychology to health, with emphasis on evaluation and use of behavioral measures. *Spring*. James.
- EPID 275 **SOCIAL PSYCHOLOGY OF WORK (3)**. Prerequisite, permission of instructor. This course covers the major theoretical and empirical literature relating social psychological aspects of work to health through a brief overview of the main substantive and methodological issues in this area. *Four lecture hours per week, first summer session*. House.
- EPID 276 **ADVANCED ENVIRONMENTAL EPIDEMIOLOGY (3)**. Designed for epidemiology majors, this course investigates various application of the principles of epidemiologic research to the evaluation and identification of environmental and occupational health hazards. *Spring*. Shy.
- EPID 287 **STATISTICAL METHODS IN EPIDEMIOLOGY (Biostatistics 287) (3)**. Prerequisites, BIOS 100 and EPID 160, or equivalents. Lectures, discussions, and laboratory work on the principles and methods of epidemiological investigation, with laboratory work in assembling and analyzing crude data resulting from field investigations of epidemics. Consideration of the theory of epidemics, and models that have been used to demonstrate the effects of varying factors which influence the course of epidemics. *Two lecture and two laboratory hours a week, spring*.
- EPID 315 **FIELD TRAINING IN EPIDEMIOLOGY (6-10)**. Prerequisite, advanced standing. This course is designed to give epidemiology majors a supervised field experience in population health research. Field fee \$450.00. *Summer*. Graduate faculty.
- EPID 360, 361 **RESEARCH IN EPIDEMIOLOGY (2 or more)**. A research course for those qualified to do independent investigation under supervision. Admission to this course is granted only for consultation with the instructor who must assign or approve the subject of research. A student may spend part or all of his time in research. *Four or more laboratory hours a week, fall and spring*. Graduate faculty.
- EPID 362 **ENVIRONMENTAL EPIDEMIOLOGY SEMINAR (3)**. Prerequisite, EPID 160 or equivalent and a course in BIOS or equivalent. Detailed and critical reviews of selected topics in environmental epidemiology are carried out by students working collaboratively with faculty members who are doing research in these areas. Diseases are studied for their environmental determinants, and alternatively the health consequences of selected environmental conditions are analyzed. *Three seminar hours a week, spring*. Tyroler.
- EPID 368 **EVALUATIVE RESEARCH METHODS (2)**. Prerequisites, basic course in epidemiology and biostatistics; preference to students with practical experience in a public health agency. An introduction to principles, research methods and indexes of program

evaluation. The natural history encompassing identification of a health problem, the epidemiological foundation of planning and evaluation of a program and implementation of research findings. Review of ethical considerations. Examples will be drawn from ongoing evaluative studies. *Two seminar hours a week, spring.* Ibrahim.

- EPID 393 **MASTER'S THESIS** (3-6). *Fall, spring, and summer.*
- EPID 394 **DOCTORAL DISSERTATION** (3-9). *Fall, spring, and summer.* Staff.
- EPID 400 **GENERAL REGISTRATION** (0).

DEPARTMENT OF HEALTH ADMINISTRATION

- HADM 104 **HEALTH AND DISEASE** (3). Description and interpretation of normal physiology, disease processes, and management of representative illnesses and injuries. Special attention is directed to the implications of specific disease processes for the nature and rationale of patient care standards and support services. (For persons without prior health background). *Spring.* Spruyt.
- HADM 105 **CONCEPTS OF HEALTH ADMINISTRATION** (3). No prerequisite. Application of administrative theory and methods to the field of health and human services. Topics such as concepts of administrative systems; governmental, legal and public interest aspects; organizational and interorganizational behavior and relations in the settings of human service agencies; alternative models of administrative process. *Fall.* Staff.
- HADM 106 **QUANTITATIVE AND ANALYTICAL METHODS FOR HEALTH ADMINISTRATION** (3). Prerequisite, HADM 105 or permission of instructor. Introduction to the use of management science and alternative problem-solving methods in health planning, evaluation, and management. Topics include problem modeling and analysis, generic concepts and methods of planning and systems analysis and selected techniques such as network and decision analysis. *Spring.* Zalkind, Schaefer, Allen.
- HADM 107 **ORGANIZATION, FINANCING AND DELIVERY OF HEALTH SERVICES I** (3). No prerequisite. Evaluation and current status of health service with special emphasis on financing the purchase of services, organizing the delivery of health services, regulating and improving standards of care, developing and allocating resources, planning and coordinating relationships. *Fall.* Spruyt, Phillips.
- HADM 108 **U.S. HEALTH SYSTEM: EVOLUTION AND FUTURE TRENDS** (3). No prerequisites. Historical, societal, and political forces shaping the U.S. health system covering topics such as: the public policy process; changing societal and group definitions of health and disease; medical care, professional dominance and

- consumer movement; the public health perspective; emergence of a federal health role. *Fall and spring*. Flash, Beauchamp.
- HADM 109 **CONCURRENT FIELD TRAINING IN HEALTH ADMINISTRATION (1)**. Orientation to health service organizations under faculty supervision leading to development of acceptable work plans for summer internship. *Fall and spring*. Staff.
- HADM 110 **ELEMENTS OF HEALTH ADMINISTRATION (2)**. No prerequisite. A survey of the theory and practice of health administration within the context of the American health system (not open to HADM majors). *Spring*. Staff.
- HADM 113 **CASES AND ISSUES IN HOSPITAL ADMINISTRATION (3)**. Prerequisites, HADM 105 and 107 or HADM 108, or permission of the instructor. Hospital care, organization, monitoring, costs and financing. Exploration of trends and trends and issues such as cost controls, productivity, quality assurance, medical staffing and organization, regional organization, other countries' experiences. *Fall*. Rosenfeld.
- HADM 117 **THE ECONOMICS OF HEALTH CARE (3)**. Prerequisite, permission of instructor. Attention is directed to the demand for health services, supply, and costs of services, economic implications of the distribution and alternative uses of health care resources, and insurance and other methods of paying for health care. Consideration is given to applicable tools of economic analysis. *Spring*. Coulter.
- HADM 124 **SEMINAR IN POPULATION AND FAMILY PLANNING (1)**. Interdisciplinary lecture-discussion approach to understanding population patterns and problems in the world, community and the family. Viewpoints of different basic sciences and professional groups on population dynamics and population programs. *Fall and spring*. Freymann.
- HADM 126 **INTRODUCTION OF POPULATION POLICY (3)**. Corequisite, PUBH 310. 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, Allen.
- HADM 140 **READINGS IN HEALTH ADMINISTRATION (1 or more)**. Staff.
- HADM 148 **CONCEPTS OF MODELING PROBLEMS IN HEALTH SERVICES DELIVERY (3)**. Prerequisites, High School algebra and HADM 106. Philosophy and concepts of mathematical modeling. Emphasis on modeling as a "way of thinking" not on mathematics. Purpose is to enhance communication between administrators and "quantitative types." *Fall*. Zalkind.
- HADM 153 **HEALTH CARE COSTS AND FINANCING (3)**. No prerequisites. Analysis of trends in utilization of services, costs, sources and methods of health financing. Extensive review of multiple socioeconomic and geographic factors affecting costs. Examin-

ation of the evolution and trends in third party payment (insurance) mechanisms. *Fall and spring*. Rosenfeld, Coulter.

- HADM 167 **INTRODUCTION TO DENTAL PUBLIC HEALTH: BASIC KNOWLEDGE AND SKILLS (2)**. Survey of the theory practice of dental public health, epidemiology and natural history of dental disease, dental indices, methods of prevention and control on population groups. *Fall*. Hughes, Douglass.
- HADM 168 **STRUCTURE AND FUNCTIONS OF COMMUNITY HEALTH SYSTEMS (3)**. Study of local human services systems, surveying political, economic, demographic, social, and other aspects of community organization and governance. Study of intra-and inter-organizational relationships, responsibility and accountability of community and administrators, staff role identification, including inter-personal and inter-role relationships. *Fall or spring (Alternate years)*. Holley, Phillips.
- HADM 182 **BUDGETING AND FINANCIAL MANAGEMENT (2)**. Structural, process, and functional aspects of budgeting and finance related to health, focusing on review estimation, budgeting, and accounting purposes and processes. *Spring*. Moorhead.
- HADM 183 **PERSONNEL ADMINISTRATION (2)**. Philosophy, structure and processes of personnel administration in health organizations, including position classification, job allocation, orientation and training, performance evaluation and related elements. *Spring*. Harper.
- HADM 187 **SURVEY OF MENTAL HEALTH PROGRAMS (3)**. A survey of the development and organization of mental health services available to the public. Selected reading and field observation. *Fall*. Staff.
- HADM 188 **HEALTH LAW (2)**. Familiarization with nature, perspective and objects of the legal process. Provides skills in understanding legal terminology, legal reasoning and the tools of law, particularly for application to health care management and in making health policy decision. *Spring*. Warren.
- HADM 189 **DEVELOPMENT OF PERSONAL EFFECTIVENESS (3)**. Prerequisite, permission of instructor. To increase, (a) awareness of how personal feelings and those of others affect the ability to behave rationally and (b) ability to deal with those feelings. Approach used is a peer, self-help method. Emphasis is on capacity to respond awarely to others and deal effectively with the environment. *Spring and summer*. Staff.
- HADM 196 **ORGANIZATIONAL BEHAVIOR OF HEALTH INSTITUTIONS (3)**. Review of theory and empirical findings providing a contingency approach to management and organizational behavior. Topics included: effect of technology and size on organizational structure, process and performance; roles of professionals, leadership styles, motivation; organizational change and innovation. *Fall*. Kaluzny.

- HADM 197 **INTRODUCTION TO INJURY CONTROL (2).** An examination of the biological, psychological, and social factors associated with injury. Conceptual frameworks for understanding injury etiology and intervention strategies. *Fall.* Barry, Waller.
- HADM 201 **RESEARCH METHODS IN HEALTH AND HEALTH SERVICES. (3).** Prerequisite, BIOS 100. Examination of available methodology in terms of its application to researchable problems in health administration. Provides directed supervision of students carrying out empirical research. *Spring.* Veney.
- HADM 204 **POLICY FOR ALCOHOL AND OTHER DRUGS (3).** Examination of the issues in formulating and implementing policy for drug problems, including alcohol. Conceptual frameworks for understanding the etiology of drug problems and intervention strategies. *Fall.* Beauchamp.
- HADM 206 **FIELD WORK IN HEALTH ADMINISTRATION (1 or more).** Staff.
- HADM 217 **THEORY AND METHODS OF HEALTH PLANNING AND EVALUATION I (3).** Full year sequence. Prerequisites, HADM 105, 106, 107, and 108 or permission of instructor. A two semester learning simulation to develop a community health plan. Covers the phases of role and health problem analysis considering community and group perceptions; resource inventorying; program objective setting; selection of program strategies; initial planning for program control and review. *Spring.* Schaefer, Phillips, Spruyt.
- HADM 218 **THEORY AND METHODS OF HEALTH PLANNING AND EVALUATION II (3).** Prerequisite, HADM 217. Includes setting of administrative objectives and program standards; program activity specification; budgeting and project grant formulation; implementation planning by network analysis; specification of records and reports and other information system elements; plan for control and evaluation. *Fall.* Schaefer, Zalkind.
- HADM 219 **PLANNING OF COMMUNITY HEALTH SERVICES (3).** Prerequisites, HADM 105, HADM 107, or permission of instructor. A simulation exercise in developing a community health program supported by lectures and seminars leading to class presentation and critiques. *Spring.* Phillips.
- HADM 221 **HEALTH MANPOWER PLANNING: METHODS AND ISSUES (3).** Prerequisites, permission of instructor. Topics include: Manpower study design, planning methods, new careers, distribution, productivity, training and manpower utilization. Case examples and practical exercise in planning. *Spring.* Hall.
- HADM 222 **ORGANIZATIONAL PATHOLOGY (3).** Prerequisites, HADM 105, 107 and permission of instructor. Deals with malfunctions of individuals as well as organized work systems. *Fall or spring.* (*Alternate years.*) Jain, Hollister.
- HADM 223 **THE POLITICS OF HEALTH ORGANIZATIONS (3).** Prerequisite, HADM 108 or permission of instructor. A view of health

agencies from the perspective of the competitive struggle for public support. Topics covered include: the concept of public support; the constituencies of health organizations; leadership, expertise, values and public policies as generators of public support. *Fall*. Beauchamp, Flash.

- HADM 227 **ORGANIZATION, FINANCING, AND DELIVERY OF HEALTH SERVICES II (3)**. Prerequisite, HADM 107 or permission of instructor. Focus is the health delivery system as a whole, with emphasis on delivery models such as HMO'S, neighborhood health centers and others. Through cases organizational goal achievement is examined and approaches to strengthening health agencies are reviewed. *Spring and summer*. Rosenfeld, Phillips.
- HADM 228 **ADMINISTRATIVE EPIDEMIOLOGY (3)**. Review and analysis of cases dealing with the process of how community problem and technological data are used in the development of program strategies, evaluations and plans. Sections may be organized around minority group needs, mental health, family planning, animal-related health problems, and similar interest area. *Spring*. Hines; staff.
- HADM 229 **HEALTH FACILITIES PLANNING (3)**. Prerequisite, permission of instructor. This course has two objectives; (1) to acquaint students with areawide facility planning methods and to help students gain skills applying these methods; (2) to introduce students to functional and architectural criteria upon which facility designs are based. *Fall and spring*. Rosenfeld, Phillips.
- HADM 233 **ISSUES IN HEALTH CARE (1)**. 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*. Rosenfeld.
- HADM 234 **INJURY CONTROL POLICY AND PROGRAM ADMINISTRATION (3)**. Social economic and political issues in injury control. Course material drawn from federal, state and local intervention programs including occupational safety, highway safety, product safety, and poison control. *Spring*. Barry, Waller.
- HADM 237 **LOCAL PUBLIC HEALTH PROGRAMMING (2)**. Description and analysis of trends in local public health activities on a program basis. Uses student interests and experience to select topics to be developed. *Spring*. Jones, Holley, Phillips.
- HADM 241 **QUANTITATIVE METHODS FOR PLANNING AND EVALUATING HEALTH SERVICES (BIOS 241). (3)**. Prerequisites, HADM 105, 106, 107 or permission of instructor. Selected quantitative methods used in planning and evaluating health services, includes formation of indices, cost, benefit and cost effectiveness analyses, measurement of objectives, PERT, MBO, PPBS, parameters of evaluation such as efficiency, balance, adequacy, and consistency. *Spring*. Douglass, Gillings, Stewart.

- HADM 243 **LONG TERM ILLNESS AND DISABILITY (3).** Prerequisites, HADM 104 and EPID 160, or permission of instructor. Examines the impact of chronic disease and disability on the individual, family, community and nation. Phillips, Spruyt, Hall.
- HADM 247 **POPULATION PROGRAM DEVELOPMENT AND ADMINISTRATION (3).** Prerequisite, HADM 105 or permission of instructor. 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. *Three lecture hours a week, spring.* Jain, Gooch, Loddengaard; staff.
- HADM 248 **ORGANIZATIONAL ANALYSIS AND DEVELOPMENT (3).** Prerequisites, HADM 105 and 107, or permission of instructor. The concepts of organizational effectiveness are defined and an analytical framework for identifying differential roles of various factors bearing on effectiveness is discussed. Alternate strategies for improving organizational performance explored. *Fall.* Jain.
- HADM 252 **EMERGENCY MEDICAL SERVICES PLANNING AND ADMINISTRATION (3).** Emergency medical services systems planning and evaluation processes; characteristics and determinants of EMS systems; indepth consideration of manpower, facilities, and technological resources, including quality, performance, and related specifications; analysis of selected EMS system models. *Fall.* Barry, Waller.
- HADM 253 **OPERATIONS RESEARCH AND THE HEALTH SYSTEM (3).** Prerequisite, permission of instructor. Critique of current operations research health applications literature. Detailed analysis of implications of mathematical assumptions of several applied health service models. *Spring. (Alternate years.)* Zalkind.
- HADM 255 **PUBLIC POLICY ANALYSIS FOR HEALTH (3).** Prerequisite, HADM 108 or permission of instructor. This course reviews issues in the analysis and design of public policy for health. Topics will include: policy and ideology; public vs. private, majority vs. minority, individual vs. collective issues; the uses and assumptions of formal techniques, such as cost benefit analysis, systems analysis and social policy analysis. *Spring.* Beauchamp, Flash.
- HADM 258 **ETHICAL ISSUES IN HEALTH POLICY (2).** The nature of ethical issues, ethical reasoning, and relationship is ethics to public policy. Ethical dilemmas found in current and proposed health policy. *Spring.* Beauchamp.
- HADM 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.* Douglass, Hughes.

- HADM 276 **LONG TERM CARE AND REHABILITATION (3).** Prerequisite, HADM 243 or special permission. Meeting needs of the chronically ill and disabled. Philosophy of rehabilitation and institutional rehabilitation centers, and non-institutional alternatives for long-term care. *Spring.*
- HADM 282 **COMPARATIVE NATIONAL HEALTH SERVICES SYSTEMS (3).** Prerequisites, HADM 105, 106, 107, 108 or permission of instructor. Analytical descriptions of the national health services system of selected countries, in comparison with each other and the U.S. Exploration of common issues and problems and study of how these have been handled. *Spring. (Alternate years.)* Schaefer, Smith; staff.
- HADM 287 **MENTAL HEALTH PROGRAM LEADERSHIP (3).** Explores knowledge, skill, and materials for planning, operating and administering community psychiatry programs and community mental health centers. *Fall.* Hollister.
- HADM 292 **PSYCHOSOCIAL PROBLEMS AFFECTING MENTAL HEALTH PROGRAM ADMINISTRATION (3).** Prerequisite, permission of instructor. Seminars on the impacts of widespread social problems (such as disasters, poverty, morality changes, race conflicts) on mental health programs and their administration. *Summer.* Hollister.
- HADM 293 **HEALTH POLICY AND THE GOVERNING PROCESS: EXECUTIVE, LEGISLATIVE, AND JUDICIAL (3).** Prerequisite, HADM 108 or permission of instructor. This course examines the political ideology, structures, and processes through which health policy issues are generated, legislated, adjudicated and administered at local, state, national, and international levels of governance. *Spring.* Flash.
- HADM 296 **UNITED STATES HEALTH POLICY (Maternal and Child Health 266) (2).** Examination of policy issues pertaining to delivery of health services in the U.S. Evolution and current development are examined in an effort to evaluate the administrative implications of current and proposed systems of health delivery in the U.S. *Spring.* Miller, Allen.
- HADM 298 **FAMILY PLANNING PROGRAM EVALUATION (3).** Theoretical structure covers effort, adequacy of performance, efficiency, effectiveness and process. Program issues include costs, recruitment, educational programs, administration, reduction of unwanted births, maternal deaths and high risk pregnancies. Lectures, cases, seminars are used. *Spring.* Loddengaard, Hall.
- HADM 304 **SEMINAR IN TEACHING OF HEALTH ADMINISTRATION (3).** Problems and processes of teaching health administration, including supervised practicum experience. *Fall, spring, and summer.* Schaefer; staff.
- HADM 317 **MANAGEMENT AND ORGANIZATIONAL ISSUES IN MENTAL HEALTH (3).** Prerequisites, HADM 105, 187, 287 or permission of instructor. Deals with selected issues like inte-

- gration or mental health in human services departments, federal-state-local funding mix, changing professional roles and similar other issues. *Spring*. Jain; staff.
- HADM 319 **ADVANCED METHODOLOGY IN HEALTH ADMINISTRATION RESEARCH (3)**. Prerequisites, Doctoral standings and BIOS 145. Research methodology as applied to understanding problems in health care delivery. Consideration is given to experimental design, data collection and application of appropriate modes of analysis of data. *Fall and spring*. Kaluzny, Veney.
- HADM 331 **INTERORGANIZATIONAL RELATIONS IN HEALTH AND HUMAN SERVICES (3)**. Prerequisites, HADM 105, 107 or permission of instructor. The primary focus of this course is the inter-relationships among provider agencies in human services. Emphasis is given to conceptual models that relate to various interorganizational networks and various factors affecting these interdependencies. *Spring*. (*Alternate years.*) Jain, Schaefer.
- HADM 332 **ORGANIZATIONAL MEASUREMENT (3)**. Prerequisite, Doctoral standing. Application of measurement theory to problems associated with organizational assessment. Principles of validity and reliability as well as associated techniques of application are reviewed. Indices used to assess organizational context, structure, function and performance are considered with special application to health. *Spring*. Veney, Kaluzny.
- HADM 333 **DOCTORAL SEMINAR IN HEALTH ADMINISTRATION STUDIES (2)**. Prerequisite, Doctoral standing. Provides a forum for discussion at an advanced level of selected topics in health administration. Student presents a paper on dissertation oriented topic of his choice. Departmental and school faculty as well as visiting scholars discuss recent policy and research developments in the administration of health care organizations. *Fall, spring, and summer*. Staff.
- HADM 334 **SELECTED TOPICS IN HEALTH ADMINISTRATION: ADVANCED SEMINAR (2)**. 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 students' specific interests and needs. *Spring*. Kaluzny.
- HADM 373 **SEMINAR IN HEALTH ADMINISTRATION (1 or more)**. *Fall, spring and summer*. Staff.
- HADM 384 **ADVANCED STUDIES IN POPULATION POLICY (3)**. Prerequisites, 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. *Fall or spring*. Staff.
- HADM 393 **MASTERS PAPER (1-6)**. Staff.
- HADM 394 **DOCTORAL DISSERTATION (3-9)**. Staff.
- HADM 400 **GENERAL REGISTRATION (0)**. Staff.

DEPARTMENT OF HEALTH EDUCATION

- HEED 9 **FRESHMAN SEMINAR** (3). For freshmen only. A review of the nature of modern health problems and the roles of the individual, the community, the health professions and agencies in medical care and health maintenance. *Two and one-half lecture hours per week, fall.* Boatman, Hochbaum.
- HEED 33 **TOPICS IN HUMAN SEXUALITY** (3). Open to undergraduates and graduates by permission of instructor. Interpersonal relationships, abortion and contraception; psycho-sexual development, marriage and responsibility; legal aspects of contraception, sex and abortion. *Three hours a week, fall and spring.* Hochbaum; staff.
- HEED 104 **SCHOOL AND COMMUNITY ORGANIZATION FOR HEALTH EDUCATION** (4). The influence of school administration and the curriculum upon the evolution and development of school health programs, factors in the total school health program, community health agencies and organizations, school-community health agencies and organizations, school-community relationships, representative programs, and the organization and administration of health education in communities and schools. Required for undergraduate majors in health education. *Three lecture and two laboratory hours a week, spring.* Barr.
- HEED 105 **METHODS AND MATERIALS IN TEACHING PUBLIC HEALTH EDUCATION** (EDUC 93) (6). The description for this course is the same as that for the other methods and materials courses in the School of Education in the 61 through 95 series. *Two lecture and two laboratory hours a week, spring.* Barr.
- HEED 106 **STUDENT TEACHING IN COMMUNITY HEALTH EDUCATION** (EDUC 94) (6). The description for this course is the same as that for other student teaching courses in the School of Education in the 62 through 94 series. *Spring.* Staff.
- HEED 108 **THE BLACK EXPERIENCE AND HEALTH SERVICES** (2). Prerequisite, permission of instructor. The life experience of black Americans with special reference to the implications for their participation in health programs. *Two hours a week, spring.* Hatch; staff.
- HEED 130 **PRINCIPLES OF HEALTH EDUCATION** (2). Permission of instructor. 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, spring.* Hochbaum.
- HEED 133 **INTERPERSONAL AND GROUP RELATIONS** (2). Prerequisite, 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, inter-group cooperation and conflict. *Six hours a week for ten weeks, fall and spring.* Staff.

- HEED 140,
141,
142 **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.
- HEED 150 **DISCUSSION LEADERSHIP: HUMAN SEXUALITY** (3). Permission of instructor required. Study of the theoretical framework for understanding of interpersonal and group interaction; experientially based learning opportunities in leadership role with small groups of university students enrolled in course "Topics in Human Sexuality." Emphasis on analysis of interpersonal and group interaction with effective use of intervention modalities in group setting. Design and application of training exercises for human sexuality discussion groups. *One lecture and four seminar hours per week, fall and spring.* Hochbaum; staff.
- HEED 200,
201,
202,
203,
204 **SPECIAL STUDIES IN BEHAVIOR CHANGE** (1 or more). Prerequisite, permission of instructor. HEED 200—natural change process in health-related behavior; HEED 201—planned change; personal and non-personal methods; HEED 202—program design and evaluation; HEED 203—personal development and community action; HEED 204—social class and culture variations in planned change. *Fall, spring, and summer.* Staff.
- HEED 206 **EDUCATION AND SOCIAL CHANGE IN POPULATION PLANNING** (2). Permission of instructor. The study of social and behavioral factors in the adoption of new practices; cross-cultural analyses and planning for the educational aspects of population control programs including implementation, evaluation, and training of personnel. *Two laboratory hours per week, spring.* Dawson.
- HEED 209 **UNITS OF PRACTICE I: INDIVIDUAL, SMALL GROUP AND NETWORK** (1-3). Corequisite, enrollment in HEED 241 or permission of instructor. Behavior systems in the individual, small group, family and other styles for planned change in personal health-related behavior, interpersonal and non-personal methods. *Three lecture hours a week, fall and spring.* Staff.
- HEED 210 **UNITS OF PRACTICE II: THE COMMUNITY** (1-3). Corequisite, enrollment in HEED 241, or permission of instructor. The nature and delineation of communities 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, spring, and summer.* Dawson.

- HEED 211 **UNITS OF PRACTICE III: LARGE POPULATION UNITS** (1-3). Corequisite, enrollment in HEED 241 or permission of instructor. The nature and delineation of large population units ranging from county through national levels; the planning and implementation of social and cultural strategies in terms of their implications for health. *Two lecture hours per week, fall, spring, and summer.* Stuart.
- HEED 222,
223 **PROFESSIONAL PRACTICE** (1 or 2). Corequisite, enrollment in HEED 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, summer.* Stuart; staff.
- HEED 230,
231,
232 **CROSS-CULTURAL CONSULTATION** (1-3). Permission of instructor. Enrollment required in total series. 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. *Two or more lecture hours per week, fall, spring and summer.* Stuart.
- HEED 234 **TEAM PROBLEM SOLVING** (1 or more). Prerequisites, HEED 133 or permission of instructor. An experimental study of interpersonal relations in professional team settings; intra- and inter-team relationship process to large social systems with emphasis on intervention techniques. *Two or more hours a week, spring.* Staff.
- HEED 235,
236 **INSTRUCTIONAL MATERIALS AND DEVELOPMENT** (1-3). Permission of instructor. Independent projects in the design production, validation and utilization of self-instructional training materials for use in college courses, in-service training programs, 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.* Flair, Stritter; staff.
- HEED 240 **FIELD WORK: INTRODUCTION TO COMMUNITY ACTION** (2 or more). Corequisites, HEED 130, HEED 133 or permission of instructor. Establishing client-professional relations; community group development and participation in planning; preliminary analysis of selected demographic, social, cultural and epidemiological features of the community needs. Field fee, \$450. *Fall.* Dawson; staff.
- HEED 241 **FIELD WORK: PROGRAM PLANNING AND DESIGN** (2 or more). Prerequisite, HEED 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.
- HEED 242 **FIELD WORK: PROGRAM DEVELOPMENT AND COMMUNITY ACTION** (2 or more). Prerequisite, HEED 241 or permission of instructor. Client-professional partnership in com-

munity action in selection and design of techniques for health related behavior change and in program evaluation. *Summer.* Dawson; staff.

- HEED 243 **FIELD WORK: ADVANCED COMMUNITY HEALTH DEVELOPMENT** (2 or more). Prerequisite, HEED 242 or permission of instructor. Client and professional consultation in community health development, in personnel development and supervision of non-professional and professional community health workers. *Summer.* Dawson; staff.
- HEED 244 **FIELD WORK: EVALUATION** (2 or more). Prerequisite HEED 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. *Fall.* Dawson; staff.
- HEED 250, 251, 252 **RESEARCH METHODS IN HEALTH EDUCATION** (1-3). Corequisite, enrollment in HEED 241, 242, 243, or permission of instructor. Introduction to research and evaluation methods of particular relevance to planned change in health-related behavior. Two or more hours per week. *Fall, spring, and summer.* Earp, Hochbaum.
- HEED 253 **NATURAL CHANGE DETERMINANTS IN HEALTH-RELATED BEHAVIOR** (3). Permission of instructor. An integrated behavioral science approach to unplanned determinants of change in the health-related behavior systems of the individual, small group and community. *Three lecture hours per week, fall.* Stuart.
- HEED 254, 255 **PERSONNEL DEVELOPMENT** (1-3). Corequisite, enrollment in HEED 234, or permission of instructor. The study of training and supervision as 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. *Three hours a week, fall and summer.* Staff.
- HEED 310, 311, 312, 313, 314, 315, 316, 317 **SEMINAR IN BEHAVIOR CHANGE** (2 or more). Prerequisite permission of instructor. HEED 310—social epidemiology and health education; HEED 311—the behavioral science foundations of health education; HEED 312—cultural change processes and health; HEED 313—behavior change processes in the individual and small network; HEED 314—power structure, leadership and community action; HEED 315—the dynamics of planned change; HEED 316—health personnel and the client; HEED 317—cross-cultural and international aspects of health programs. *Four or more hours a week, fall, spring and summer.* Staff.
- HEED 340 **ADVANCED FIELD TRAINING IN HEALTH EDUCATION** (8). Under the guidance of faculty and field counselors, students in this course may assume major responsibility in field centers for a special phase of public health education—program planning and development, intensive studies and surveys of problem situations, evaluations, inservice training, etc.—or for a community-wide program on a temporary basis. Open only to

advanced graduate students who have been engaged in public health education at least two years beyond completion of the master's program. Field fee \$450. *Fall and spring.* Staff.

HEED	350, 351, 352	ADVANCED RESEARCH IN HEALTH EDUCATION (2-9). Permission of instructor. Available only to students capable of pursuing independent research projects under supervision. <i>Four laboratory hours per week, fall, spring and summer.</i> Staff.
HEED	393	MASTER'S THESIS (3-6). <i>Fall, spring, and summer.</i> Staff.
HEED	394	DOCTORAL DISSERTATION (3-9). <i>Fall, spring, and summer.</i>
HEED	400	GENERAL REGISTRATION (0).

DEPARTMENT OF MATERNAL AND CHILD HEALTH

MHCH	103	REPRODUCTIVE PHYSIOLOGY AND CONCEPTION CONTROL (2). No prerequisite. Male and female reproductive physiology and methods of regulating these processes will be presented in detail. Other aspects of the reproductive process; pregnancy, fetal wastage, infertility, sterilization, abortion and community responsibilities will also be discussed, with case histories, field trips and clinical illustration utilized when applicable. <i>Two lecture hours a week, fall.</i> Hulka.
MHCH	105	DISORDERS OF DEVELOPMENT AND LEARNING IN CHILDHOOD (PHYT 105) (2). Interdisciplinary approach to developmental problems in children. Overview of etiological factors, diagnostic and management techniques. Lecture and discussion. Individual and group projects. <i>Two lecture hours a week, fall, spring, summer.</i> C. Knobeloch; DDDL Staff.
MHCH	140, 141, 142	PROBLEMS IN MATERNAL AND CHILD HEALTH (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 in public health who wish to make an intensive study of some special problem in public health. <i>Fall, spring, and summer.</i> Staff.
MHCH	200	ISSUES AND TRENDS IN MCH AND FAMILY PLANNING (3). For students outside the department of MCH who desire an overview of content and programs in maternal and child health and family planning. Emphasis will be on current developments and trends in providing services for families. <i>Four seminar hours a week, spring.</i> Miller, Edmands.
MHCH	201	FOUNDATIONS FOR MENTAL HEALTH PRACTICE (PHNU 201) (2) Permission of instructor. Exploration of problems, issues, services, and needs in the field of mental health; implications of mental health education roles. Field observations. <i>Two lecture, two seminar hours per week, fall.</i> Cline
MHCH	202	FOUNDATIONS FOR MENTAL HEALTH PRACTICE (PHNU 202) (3) Permission of instructor. A continuation of 201, with participation in community mental health programs; relevant

concepts and theories from the behavioral sciences; role delineation. *Two seminar, four laboratory hours, spring.* Cline.

- MHCH 203 **FOUNDATIONS FOR MENTAL HEALTH PRACTICE (PHNU 203)** (2). Permission of instructor. A continuation of 202; continued involvement in community mental health programs, emphasis on evaluation, research. *Two seminar, two laboratory hours, summer.* Cline.
- MHCH 209 **PROCESSES OF HEALTH SERVICE PROGRAM DEVELOPMENT (HADM 209)** (2). Non-majors require permission of instructor. Through review of health service program characteristics, and analysis of the processes by which they came about, students will acquire understandings for preparation of a proposal for an MCH program, or some aspect of one, for a specific community. *One lecture and two seminar hours per week, fall.* Miller, Jenkins.
- MHCH 210 **MATERNAL AND INFANT HEALTH AND FAMILY PLANNING** (2). Non-majors require permission of instructor. Health needs, problems and programmatic issues in maternal-infant health and family planning. Includes biologic, sociocultural and psychological factors. *One lecture, two seminar hours, fall.* Morris, Siegel.
- MHCH 211 **MATERNAL AND CHILD HEALTH II** (3). Non-majors require permission of instructor. Continuation of MHCH 210 and is concerned with a review of basic factors related to development and health of children from infancy through adolescence. The organization and program planning of community health services for children are emphasized. *Two lecture and two seminar hours a week, spring.* Stocking, Schaefer.
- MHCH 213 **RESEARCH UTILIZATION IN MATERNAL AND CHILD HEALTH** (2). This course is designed to provide each student with major interest 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 lecture hours a week, spring.* Bauman.
- MHCH 214 **FIELD TRAINING IN MATERNAL AND CHILD HEALTH** (2-8). Field experience in community maternal and child health services will be required of selected students in terms of their background of experience, special interests, and future professional plans. An additional field fee of \$450.00 will be assessed for this supervised field training. *Summer, 6-10 week.* Morris; staff.
- MHCH 215 **CHILD HEALTH ASSESSMENT** (2-3). Permission of instructor required. Designed primarily for nurses with community health orientation and career goals; also for physicians, physical therapists, and others with appropriate professional background and professional objectives. Focuses upon wellness care. Emphasizes development of assessment knowledge and skills within the

framework of normal individual and family growth and development. Four seminar hours a week; nurses who elect additional credit hour will be provided opportunities for clinical practice in area of developmental assessment. *Variable number of hours a week, spring.* Stocking.

- MHCH 217 **CHILD HEALTH: NURSING INTERVENTION (3-6).** Course designed primarily for nurses with community health nursing orientation and career goals. Builds upon content developed in MHCH 215. Course emphasis is upon nursing practice with infants, young children and their families in a variety of community settings throughout North Carolina. Provides opportunity for synthesis of knowledge and skills in child health assessment, appropriate decision making regarding care and application of this knowledge to planning for nursing services in community settings. Permission of instructor required. *Variable number of hours weekly, summer (other time by special arrangement.)* Stocking.
- MHCH 255 **CONSULTATION: A PUBLIC HEALTH METHOD (PHNU 255)** (2) Delineates skills, problems, and potentialities of consultation. Role, functions, process and relationships in consultation are analyzed with attention to utilization of this knowledge in special fields of interest. *Spring and summer.* Cline.
- MHCH 266 **UNITED STATES HEALTH POLICY (HADM 296) (2-3).** An examination of policy issues pertaining to delivery of health services in the United States. 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. *Two hours a week, spring.* Allen, Miller.
- MHCH 300 **RESEARCH IN MATERNAL AND CHILD HEALTH (2 or more).** Open by special arrangement to students desiring to initiate and pursue an original investigation of a selected problem. *Four or more hours a week, fall, spring, or summer.* Udry; staff.
- MHCH 307 **SEMINAR IN DISORDERS OF DEVELOPMENT AND LEARNING IN CHILDHOOD (PHYT 307) (2).** 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. *Two seminar hours a week, spring.* C. Knobloch; DDDL Staff.
- MHCH 310 **SEMINAR IN CURRENT ISSUES IN WOMEN'S HEALTH (1)** Seminar course dealing with issues relating to changing roles of women and parents, with implications for individual, family and community and for the wellbeing of children. Consideration is given to women health providers and developments in health care. *Two seminar hours per week, spring.* Morris; staff.
- MHCH 315 **SEMINAR IN MATERNAL AND CHILD HEALTH (1).** For students whose major is maternal and child health. This seminar provides an opportunity for students and faculty to explore in

greater depth selected subjects within the field of maternal and child health. *Two seminars a week, summer.* Siegel; staff.

- MHCH 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, fall.* Udry, Morris.
- MHCH 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, spring.* Schaefer, Siegel.
- MHCH 393 **MASTER'S THESIS** (3-6). *Fall, spring, and summer.* Staff.
- MHCH 394 **DOCTORAL DISSERTATION** (3-9). *Fall, spring, and summer.* Staff.
- MHCH 400 **GENERAL REGISTRATION** (0).

DEPARTMENT OF NUTRITION

- NUTR 50 **INTRODUCTION TO HUMAN NUTRITION** (3). Presented as an integrated body of knowledge derived from several disciplines. Functions and sources of man's food. Nutrient requirements and their relation to health and disease. The relevance of nutrition to individual well being, social welfare and economic development. *Three lecture hours per week, fall.* Edozien, Anderson.
- NUTR 100 **FOOD AND MAN.** (2). A nutrition course designed for the non-specialist. History of nutrition. The biochemical and physiological foundations of modern nutrition science. Human nutritional requirement. Biological, physiological, social, cultural and economic determinants of food habits. Nutritional aspects of human health and disease. Food politics and human welfare. National and international nutrition problems. Food, family planning and population growth. Nutrition of the future. *Two lecture hours per week, spring.* Edozien, Anderson.
- NUTR 105 **ASPECTS OF INTERNATIONAL NUTRITION** (3). Critical review of world problems in nutrition, with special emphasis on the food-population-energy equation, ethnography, economic development, food production, nutrition education and health. *Three lecture hours per week, fall, spring, and summer.* Teitelbaum, Anderson, Wight.
- NUTR 140 **READING IN NUTRITION** (1 or more). Prerequisite, permission of instructor. Reading and tutorial guidance in special areas of nutrition such as international nutrition and nutrition and population. *Fall, spring, and summer.* Staff.

- NUTR 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.
- NUTR 151 **CELL BIOLOGY LABORATORY** (3). Prerequisites, concurrent registration in NUTR 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.* Anderson, Switzer.
- NUTR 154 **HUMAN NUTRITION** (3). Prerequisites, NUTR 50 or equivalent and a course in Biochemistry 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, spring.* Edozien, Anderson, Switzer, Bazarre.
- NUTR 155 **INTRODUCTION TO COMMUNITY NUTRITION** (3). Prerequisites, NUTR 50, NUTR 150 or equivalent and NUTR 154. The functions of the nutritionist in the community, including an assessment of nutritional needs and an examination of existing food and nutrition programs and services and their relationship to other health and social programs. Occasional field trips to agencies. *Four seminar hours per week, spring.* Staff.
- NUTR 157 **THERAPEUTIC NUTRITION** (3). Prerequisites, NUTR 150 or equivalent. A study of the relationship of diet to diseases of man and of dietary intervention in the prevention and/or treatment of these conditions. *Two lecture hours and two seminar hours or clinical demonstrations per week, spring.* McLachlan.
- NUTR 202 **NUTRITIONAL BIOCHEMISTRY** (3). A review of recent developments in nutritional science. Designed to acquaint students with laboratory procedures in nutritional biochemistry and physiology, including the identification and measurement of nutrients and their metabolites in foods, tissues, and body fluids. Human and animal experiments in nutrition. *Six laboratory hours per week, fall, spring.* Edozien, Anderson, Switzer.
- NUTR 204 **NUTRITION AND HUMAN HEALTH** (3). A critical review of human nutritional requirements and the relation of diet to human health and well being. Topics for discussion will include dietary requirements, food habits and their determinants, the politics of food, national and international nutrition problems, the food-people equation, nutrition of the future, nutrition in relation to regulation of metabolism, reproduction, growth and development, morbidity and mortality, deficiency diseases, obesity, dental health, and chronic degenerative diseases. *Two lecture hours and two seminar hours per week, spring.* Edozien.

- NUTR 205 **COMMUNITY NUTRITION (3).** This course is designed to acquaint students with the roles and functions of the nutritionist in community health and to assist them, through classroom work and practical experience in the community, to acquire the basic knowledge and skills required to perform these functions. *Four seminar hours and concurrent field work per week, fall.* Staff.
- NUTR 206 **FOOD HABITS: DETERMINANTS AND TECHNIQUES FOR MODIFICATION (3).** This course will review the psychological, sociological and cultural determinants of food habits including both normal and abnormal patterns. Attention will be paid to those attitudes towards food actually encountered in the field. A critical review of materials and methods used for nutrition education including approaches for individuals and various age and interest groups. Development and use of effective teaching aids. Methods of evaluating the effectiveness of education programs. *Two lecture hours and two hours of seminar or laboratory sessions per week, spring.* Staff.
- NUTR 208 **NUTRITION PROGRAMS AND SERVICES (3).** This course is designed to illustrate the need, planning, delivery and evaluation of community nutrition programs and services. Each student will be required to make an in-depth study of the application of the principles of program planning and evaluation to meeting the needs of a high-risk group such as mothers and infants, the chronically ill and aging or the handicapped. *Four hours of seminar and concurrent field work each week, spring.* Bryan, Brannon, McLachlan.
- NUTR 210 **ADVANCED NUTRITION (3).** Prerequisite, NUTR 150. Experimental evidence is examined in relation to current understanding of the nutritional requirements of man throughout the life cycle. Emphasis is placed on the effects of diet on cellular metabolism. *Three lecture hours per week, fall.* Bazzarre; staff.
- NUTR 211 **METHODS OF ADVANCED NUTRITION (3).** Prerequisite, NUTR 150 or co-requisite of NUTR 210. Advanced laboratory methods and techniques in nutrition will be examined. Topics included are the determination of protein synthesis and turnover with radiotracers, blood lipids, vitamins, hormones, and minerals. *Six laboratory hours per week, fall.* Bazzarre; staff.
- NUTR 212 **NUTRITIONAL ASSESSMENT (3).** This course develops the theory and rationale of nutritional assessment of individuals and communities with various techniques including clinical, anthropometric, dietary and laboratory methods. Emphasis is given to experimental design. *Two lecture hours and two laboratory hours per week, spring.* Edozien; staff.
- NUTR 240 **PROBLEM IN NUTRITION. (1 or more).** Prerequisite, permission of the 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.

- NUTR 250 **CLINICAL NUTRITION PRACTICE (6)**. Prerequisites, NUTR 157 or equivalent. Students are assigned to a medical facility where, under supervision of registered dietitians, they participate in nutritional care of patients. *Forty hours per week for twelve weeks, fall, spring, and summer.* Staff.
- NUTR 251 **FIELD EXPERIENCE (6-8)**. Students are assigned to a local or district health department or other appropriate agency for six to eight weeks of supervised field experience. Field fee \$450.00. An abridged report of activities undertaken during this period is required. Students must consult their faculty advisors for guidelines in preparing the report. Those who wish to do so may submit an extended report in lieu of a master's thesis. *Fall, spring, and summer.* Staff and field preceptors.
- NUTR 252 **FIELD EXPERIENCE SEMINAR (2 or more)**. Student seminars based on field experience are presented. Other sessions are devoted to specific topics relating to nutrition program development, behavior modification, communication processes and media, and other educational techniques. *Four or more hours per week, fall, spring, and summer.* Staff.
- NUTR 340 **SEMINAR IN NUTRITION (1 or more)**. Prerequisites, a minimum of one year of graduate work in nutrition and permission of the instructor. Seminars and/or laboratory work, according to the special area under study. *Two or more hours per week, fall, spring, and summer.* Staff.
- NUTR 390 **NUTRITION RESEARCH (2 or more)**. Individual arrangements may be made by the student to spend part or all of his time in supervised investigation of selected problems in nutrition. *Four or more laboratory or field hours a week, fall, spring, and summer.* Staff.
- NUTR 391 **NUTRITION RESEARCH SEMINAR (1 or more)**. Students registered for NUTR 390 shall present at least one formal seminar each term on some aspect of their research project (community or laboratory). *Two or more hours per week, spring.* Staff.
- NUTR 393 **MASTER'S THESIS (3-6)**. *Fall, spring, and summer.* Staff.
- NUTR 400 **GENERAL REGISTRATION (0)**.

DEPARTMENT OF PARASITOLOGY AND LABORATORY PRACTICE

- PALP 131 **PARASITISM AND HUMAN DISEASE (2)**. A course consisting of lectures, demonstrations, and laboratory work given as an introduction to the principles of infectious diseases. *One lecture and two laboratory hours a week, fall.* Klaas, Goulson.

- PALP 134 **HUMAN PARASITOLOGY** (4). Prerequisite, permission of the instructor. Lectures, demonstrations, and laboratory work on the most common animal parasites of man with special emphasis on their life cycles, host responses, and laboratory diagnosis. *Two lecture and four laboratory hours a week, fall.* Larsh, Weatherly, Goulson
- PALP 140, 141 **PROBLEMS IN PARASITOLOGY** (1 or more). A course for students who wish to make an intensive study of some special problem in human parasitology. *Two or more hours a week, fall and spring.* Staff.
- PALP 142, 143 **PROBLEMS IN PUBLIC HEALTH LABORATORY PRACTICE** (1 or more). A 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.
- PALP 150 **PUBLIC HEALTH BACTERIOLOGY** (3). Prerequisite, permission of the 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. *One lecture and four laboratory hours a week, fall.* Read.
- PALP 151 **PUBLIC HEALTH VIROLOGY** (3). Prerequisites, PALP 150 and permission of the instructor. Lectures and laboratory studies on isolation and identification techniques. *Two lecture and two laboratory hours a week, spring.* Read.
- PALP 230 **THE NATURE OF PARASITISM** (3). Prerequisite, permission of instructor. A consideration of such factors as the influence of external and internal environments on parasites, effects of parasites on their hosts, parasite functional morphology, nutrition, reproduction, and development. *Three lecture hours a week, spring.* Weatherly.
- PALP 232 **PARASITOLOGICAL METHODS** (4). Prerequisite, PALP 134. An introduction to research methods employed in the laboratory studies of various protozoan and helminth parasites. *Two lecture and four laboratory hours a week, spring.* Goulson, Weatherly.
- PALP 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 mosquitos are also considered. *Two lecture and two laboratory hours a week, fall.* Hendricks.
- PALP 234 **MEDICAL ENTOMOLOGY** (3). Prerequisites, Zoology 11 and PALP 134, or equivalents. Lectures, demonstrations, and laboratory studies on the insects, ticks, mites, and other arthropods that transmit and/or cause diseases of man. Methods of identifying these forms are emphasized in the laboratory. *Two lecture and two laboratory hours a week, spring.* Hendricks.

PALP	235, 236	PROBLEMS IN PUBLIC HEALTH LABORATORY METHODOLOGY (1 or more). Prerequisites, PALP 142 or 143, and permission of the instructor. <i>Two or more hours a week, fall, and spring.</i> Larsh.
PALP	250	PUBLIC HEALTH LABORATORY METHODS I (2). Prerequisite, permission of the instructor. Lectures and seminars pertaining to current diagnostic techniques in Public Health Bacteriology and Mycology. <i>One lecture and two seminar hours a week, fall.</i> Chaffee.
PALP	251	PUBLIC HEALTH LABORATORY METHODS II (5). Prerequisite, permission of the instructor. Lectures, demonstration and laboratory work on the most important microbiological diagnostic procedures, e.g., immunoserology, used in the modern public health laboratory. <i>Two lecture and six laboratory hours a week, spring.</i> Chaffee, Klaas.
PALP	260	PUBLIC HEALTH LABORATORY MANAGEMENT I (2). Prerequisite, permission of instructor. A study of the broad responsibilities and activities of the public health laboratory, its relations to other divisions of the Health Department and its role in comprehensive health planning. <i>One lecture and two seminar hours a week, fall.</i> Maddy.
PALP	261	PUBLIC HEALTH LABORATORY MANAGEMENT II (3). Prerequisite, permission of the instructor. A continuing study in depth of the responsibilities and activities of the public health laboratory. <i>Two lectures and two seminar hours per week, spring.</i> Maddy.
PALP	331	SEMINAR IN PARASITOLOGY (1). Prerequisite, permission of staff. Discussion of selected topics in Parasitology. <i>One seminar hour a week, spring.</i> Staff.
PALP	333	SEMINAR IN PUBLIC HEALTH LABORATORY PRACTICE (1). Prerequisite, permission of staff. Discussion of selected topics in the public health laboratory field. <i>One seminar hour a week, spring.</i> Staff.
PALP	334, 335	RESEARCH IN PARASITOLOGY (2 or more). Open to advanced students only. <i>Four or more laboratory hours a week, to be arranged, fall and spring.</i> Larsh, Goulson, Hendricks, Weatherly, Chaffee.
PALP	336, 337	RESEARCH IN PUBLIC HEALTH LABORATORY METHODOLOGY (2 or more). Open to advanced students only. <i>Four or more laboratory hours a week, to be arranged, fall and spring.</i> Larsh, Weatherly, Chaffee, Read.
PALP	393	MASTER'S THESIS (3-6). <i>Fall and spring.</i> Staff.
PALP	394	DOCTORAL DISSERTATION (3-9). <i>Fall and spring.</i> Staff.
PALP	400	GENERAL REGISTRATION (0).

PUBLIC HEALTH

- PUBH 100 **ECOLOGY OF HUMAN HEALTH (3)**. A consideration of biological, environmental and behavioral premises needed for an understanding of health and disease. A variety of roles of public health professionals, as well as public health programs designed to reduce disease, will be considered. At least one course taken in general biology or zoology is strongly recommended and, preferably, an additional advanced course in an area of biology is advisable. *Three lectures or two lectures and two seminars per week, fall*. Anderson.

DEPARTMENT OF PUBLIC HEALTH NURSING

- PHNU 140,
141,
142 **READINGS IN PUBLIC HEALTH NURSING (1 or more)**. Prerequisites to be arranged with the faculty. A course for students in public health nursing. Reading and tutorial guidance in a selected area of public health nursing or mental health. *Two or more hours per week, fall, spring, and summer*. Staff.
- PHNU 174 **INSTRUCTIONAL METHODOLOGIES FOR PUBLIC HEALTH NURSING EDUCATION OR PRACTICE (3)**. Permission of instructor. This course is designed to provide learning experiences in the planning, producing and evaluating of instructional materials pertinent to public health nursing education or practice. Examples of the following formats to be explored are: slide, audio tape, video tape recording, gaming and simulation. Supplies and materials will cost each student approximately \$25.00. *Two seminar and four laboratory hours a week, spring*. Brown.
- PHNU 180 **READINGS IN OCCUPATIONAL HEALTH NURSING (1 or more)**. A course for students in occupational health nursing. Reading and tutorial guidance in a selected area of occupational health nursing. *Two or more hours per week, fall, spring, and summer*. Courtenay; staff.
- PHNU 181 **OCCUPATIONAL HEALTH NURSING I (3)**. Prerequisite, experience in occupational health nursing or permission of instructor. This course is concerned with factors influencing the development of occupational health nursing programs on a full-time, part-time, or selective service basis. Consideration will be given to the general and special health services required because of potential health problems within the work environment or inherent health problems in the employed population. An opportunity will be provided to identify areas requiring greater in-depth study and to explore the expanding role of the occupational health nurse. *Six hours a week, fall*. Courtenay; staff.
- PHNU 193 **INNOVATION AND CHANGE IN PUBLIC HEALTH NURSING (3)**. Analysis of selected factors and approaches considered in innovation and change. These include the various alternatives involved and educational approaches that effect innovation and change in public health nursing. *Six laboratory hours a week, fall, spring, or summer*. Talbot; staff.

- PHNU 197 **PHILOSOPHY AND PRINCIPLES OF SUPERVISION (3).** For public health nursing students or permission of instructor. Consideration is given to the philosophy, principles and methods of supervision in the field of public health nursing with emphasis on the supervisor's responsibility for improving nursing service through the professional development of the individual nurse. *Two lectures and two seminar hours a week, spring.* Cline.
- PHNU 198 **COMMUNITY NURSING SERVICE ADMINISTRATION I (3).** Prerequisite, permission of instructor. Analysis of patterns of organization of public health nursing services and relationships to the medical care system. Consideration of the role of nursing administrator in various types of organizations. Special emphasis on relationships with other disciplines, lay groups, and other organizations, official, voluntary, and combination agencies at local, state and federal level. Analysis of role in various organizations. Consideration of above in context of social change. *Two lecture and two seminar hours a week, spring.* Staff.
- PHNU 201 **FOUNDATIONS FOR MENTAL HEALTH PRACTICE (MHCH 201) (2).** Permission of instructor. Exploration of problems, issues, services, and needs in the field of mental health; implications of mental health education roles. Field observations. *Three hours a week, fall.* Cline.
- PHNU 202 **FOUNDATIONS FOR MENTAL HEALTH PRACTICE (MHCH 202) (3).** Permission of instructor. A continuation of 201, with participation in community mental health programs; relevant concepts and theories from the behavioral sciences; role delineation. *Four hours a week, spring.* Cline.
- PHNU 203 **FOUNDATIONS FOR MENTAL HEALTH PRACTICE (MHCH 203) (2).** Permission of instructor. A continuation of 202; continued involvement in community mental health programs, emphasis on evaluation, research. *Four hours a week, summer.* Cline.
- PHNU 216 **NURSING AND FAMILY PLANNING (MHCH 216) (2).** This course for nurses is designed to provide the student with knowledge of current developments, trends, and content in maternal health and family planning. Emphasis is on the opportunities and responsibilities of nurses in these particular areas. Content will include discussion and exploration of many factors which will affect utilization of maternal health and family planning services. *Four seminar hours a week, spring.* Edmands.
- PHNU 237 **MENTAL HEALTH AND PUBLIC HEALTH NURSING (2).** Mental health and other behavioral concepts are utilized with family case material for the study of health maintenance; prevention and treatment of emotional-social dysfunction. *Spring.* Cline.

- PHNU 240, 241, 242 **PROBLEMS IN PUBLIC HEALTH NURSING** (3 or more). Prerequisite, PHNU 299 or the equivalent or permission of the instructor. 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 result in a paper which demonstrates the application of research principles. *Fall, spring, and summer.* Staff.
- PHNU 255 **CONSULTATION: A PUBLIC HEALTH METHOD** (MHCH 255) (2). Delineates skills, problems, and potentialities of consultation. Role, functions, process, and relationships in consultation are analyzed with attention to utilization of this knowledge in special fields of interest. *Spring and summer.* Cline.
- PHNU 271 **PRACTICUM IN TEACHING COMMUNITY HEALTH NURSING** (3-6). Permission of instructor. Educational issues involved in preparation for public health nursing practice. Study and evaluation of public health nursing content in nursing curricula. Strategies of instructional approaches involving innovation and change. Field fee, \$300.00. *One hour biweekly seminar and 18 laboratory hours a week, fall, spring.* McIntyre.
- PHNU 272 **INSTRUCTIONAL APPROACHES IN PUBLIC HEALTH NURSING** (3). Permission of instructor. Educational issues involved in preparation for public health nursing practice and education. Study and evaluation of public health — community nursing content in nursing curricula. Strategies of instructional approaches involving innovation and change. *Three lecture hours a week, fall and spring.* McIntyre.
- PHNU 281 **OCCUPATIONAL HEALTH NURSING II** (3). Prerequisite, PHNU 181. Continuation of Occupational Health Nursing I. During this course consideration will be given to the leadership roles in occupational health nursing and to factors influencing the organization, implementation and evaluation of occupational health nursing programs. *Six hours a week, spring.* Courtenay; staff.
- PHNU 282 **PROBLEMS IN OCCUPATIONAL HEALTH NURSING** (3 or more). Prerequisites, PHNU 181 and BIOS 100 or the equivalent. A course for students majoring in occupational health nursing. Students will make an intensive study of some special problems in occupational health relevant to occupational health nursing. The study will result in a paper which demonstrates the application of research principles. *Hours to be arranged. Fall, spring, and summer.* Courtenay, Highriter, Mongeau.
- PHNU 290 **PUBLIC HEALTH NURSING SERVICES** (1). For non-nurse graduate students in public health. The course provides an introduction and orientation to the philosophy and principles of public health nursing. Emphasis is given to supervision and administration of public health nursing services. Current practices, trends and problems in public health nursing are explored in light of the multidiscipline approach to community health programs. *Two seminar hours a week, spring and summer.* Talbot.

- PHNU 291 **PLANNING COMMUNITY NURSING SERVICES I (3).** Co-requisites, EPID 160, BIOS 100, or permission of instructor. Methods of assessment of community nursing needs including collection and analysis of existing data, identification of additional data needed for community nursing diagnosis and collection of these data. *Six hours a week, fall.* Nelson; staff.
- PHNU 292 **PLANNING COMMUNITY NURSING SERVICES II (3).** Prerequisite, PHNU 291. Continuation of PHNU 291. Identification of community nursing needs based on data collected and analyzed in PHNU 291. Consideration will be given to the processes involved in the solution of identified needs. *Six hours a week, spring.* Nelson; staff.
- PHNU 296 **ADVANCED PUBLIC HEALTH NURSING PRACTICE I (3).** Exploration of concepts of family and-group behavior in relation to family health and illness. Selected experiences with families or other groups. Analysis of case material and the nursing process. *Six hours a week, spring.* Cline.
- PHNU 297 **ADVANCED SUPERVISION IN PUBLIC HEALTH NURSING (3).** Prerequisite, PHNU 197 or equivalent. For graduate students in public health nursing. This course includes the administrative functions of the supervisor, concepts, theories and principles of administration as related to public health nursing services. Program planning and evaluation, consultation and current trends in public health nursing are included. *One lecture and four seminar hours a week, summer.* Talbot.
- PHNU 298 **COMMUNITY NURSING SERVICE ADMINISTRATION II (3).** Prerequisite, permission of instructor. Concepts and methods of administering public health nursing services. Consideration will be given to community structure, assessment, program planning, priorities, evaluation of services, fiscal management, personnel management, work measurement, time and cost studies, control measures, records and reports. This course coordinated with PHNU 398 and field experience. *Two lecture and two seminar hours a week, summer.* Staff.
- PHNU 299 **RESEARCH METHODS IN PUBLIC HEALTH NURSING (3).** Prerequisite, BIOS 100 or the equivalent. Primarily for graduate students in public health nursing. Selection of the research problem, development of the research design, collection and analysis of data and interpretation of results. Students will develop a problem, collect and analyze data and interpret the results. *Two lecture and two laboratory hours a week, spring.* Mongeau, Highriter.
- PHNU 300 **SEMINAR IN PUBLIC HEALTH NURSING (1).** Prerequisite, permission of staff. Discussion of selected topics in public health nursing. *Two hours a week, fall.* Staff.

PHNU	340, 341, 342	RESEARCH IN PUBLIC HEALTH NURSING (3 or more). Prerequisites, PHNU 299 or the equivalent and permission of the instructor. A course for students in public health nursing. Independent research under supervision. <i>Hours to be arranged, fall, spring, summer.</i> Mongeau, Highriter, Talbot.
PHNU	381	ADVANCED PRACTICE IN OCCUPATIONAL HEALTH NURSING (3-6). Prerequisites, PHNU 181, PHNU 281. A combination seminar and field course designed to meet the career needs and interests of each student. An opportunity will be provided to study occupational health nursing administration at the national or corporate level; or occupational health nursing consultation at the local, state, regional or national level as provided by governmental or insurance agencies. Field fee, \$450.00. <i>Hours to be arranged. Summer.</i> Courtenay; staff.
PHNU	393	MASTER'S THESIS (3-9). <i>Fall, spring, and summer.</i> Staff.
PHNU	396	ADVANCED PUBLIC HEALTH NURSING PRACTICE II (3). Prerequisite, PHNU 296. Use and evaluation of various approaches and methods in relation to the nurse's role in maintaining and promoting family health. Field fee, \$450.00. <i>Six hours a week, first and second summer terms.</i> Staff.
PHNU	398	PROBLEMS IN COMMUNITY NURSING ADMINISTRATION (3). Prerequisite, permission of instructor. Study and observation of a problem(s) related to the administration of public health nursing services to be carried out in a selected agency under faculty guidance. Field fee \$450.00. <i>Six hours a week, summer.</i> Nelson.
PHNU	400	GENERAL REGISTRATION (0).

