1958
1959

UNIVERSITY OF MARYLAND

graduate school announcements

The provisions of this publication are not to be regarded as an irrevocable contract between the student and the University of Maryland. The University reserves the right to change any provision or requirement at any time within the student's term of residence. The University further reserves the right at any time, to ask a student to withdraw when it considers such action to be in the best interests of the University.

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GRADUATE SCHOOL ANNOUNCEMENTS

Catalog Series 1958-1959

UNIVERSITY OF MARYLAND

VOLUME 11 JANUARY 21, 1958 NO. 12

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BOARD OF REGENTS

and

MARYLAND STATE BOARD OF AGRICULTURE

	Term Expires
Charles P. McCormick *Chairman* McCormick and Company, 414 Light Street, Baltimore 2	1966
Edward F. Holter *Vice-Chairman* The National Grange, 744 Jackson Place, N.W., Washington 6	1959
B. Herbert Brown *Secretary* The Baltimore Institute, 12 West Madison Street, Baltimore 1	1960
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Louis L. Kaplan *Assistant Secretary* 1201 Eutaw Place, Baltimore 17	1961
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Thomas B. Symons Suburban Trust Company, 6950 Carroll Avenue, Takoma Park	1963
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*Effective October 29, 1957.

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1958-1959

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JOHN E. FABER, JR., *Professor and Head of Department of Bacteriology*
B.S., University of Maryland, 1926; M.S., 1927; PH.D., 1937.

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A.B., University of North Carolina, 1922; Certificate d'Etudes Francaises, University of Toulouse, 1926; M.A., Vanderbilt University, 1928; PH.D., University of Pennsylvania, 1932.

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A.B., Colorado College, 1927; PH.D., University of Maryland, 1934.

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JOHN E. FOSTER, *Professor and Head of Department of Animal Husbandry*
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B.S., University of Idaho, 1928; M.S., State College of Washington, 1930; PH.D., University of Maryland, 1933.

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R. LEE HORNBAKE, *Dean of the Faculty of the University*
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KENNETH O. HOVET, *Professor of Education*
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WILBERT J. HUFF, *Professor and Chairman of Department of Chemical Engineering*
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JAMES H. HUMPHREY, *Professor of Physical Education and Health*
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PH.G., University of Maryland, 1929; B.S., 1930; M.S., 1932; PH.D., 1936.

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A.B., Bates College, 1933; A.M., Harvard University, 1934; PH.D., 1937.

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B.A., University of Denver, 1942; M.A., 1946; ED.D., Boston University, 1950.

EARLE H. KENNARD, *Professor of Physics (P.T.)*
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B.S., Clemson College, 1921; M.S., University of Maryland, 1924; PH.D., Ohio State University, 1929.

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PH.M., University of Latvia, 1930; LL.M., 1933; PH.D., University of Chicago, 1938.

CONRAD B. LINK, *Professor of Floriculture*
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B.A., Earlham College, 1943; M.S., Johns Hopkins University, 1944; PH.D., 1947.

RALPH H. LONG, JR., *Professor of Mechanical Engineering*
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B.S., Lebanon Valley College, 1928; PH.D., Johns Hopkins University, 1932.

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JAMES G. MCMANAWAY, *Professor of English (P.T.)*
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B.E., Wisconsin State Teachers' College, River Falls, 1932; PH.M., University of Wisconsin, 1933; PH.D., 1942.

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B.S., Missouri State Teachers College, Springfield, 1930; M.A., Columbia University, 1939.

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SHIH-I PAI, *Associate Research Professor in Institute for Fluid Dynamics and Applied Mathematics*
B.SC., National Central University, China, 1935; M.S., Massachusetts Institute of Technology, 1938; PH.D., California Institute of Technology, 1940.

LAWRENCE E. PAYNE, *Associate Research Professor in Institute for Fluid Dynamics and Applied Mathematics*
B.S., Iowa State College, 1946; M.S., 1948; PH.D., 1950.

Assistant Professors

J. FRANCIS ALLEN, *Assistant Professor of Zoology*
B.S., Radford College, 1938; M.S., University of Maryland, 1948; PH.D., 1952.

FRANK GIBBS ANDERSON, *Assistant Professor of Sociology*
A.B., Cornell University, 1941; PH.D., University of New Mexico, 1951.

OTHO T. BEALL, JR., *Assistant Professor of English*
A.B., Williams College, 1930; M.A., University of Minnesota, 1933; PH.D., University of Pennsylvania, 1952.

EARL S. BEARD, *Assistant Professor of History*
A.B., Baylor University, 1948; M.A., University of Iowa, 1950; PH.D., 1953.

JOHN W. BRACE, *Assistant Professor of Mathematics*
B.A., Swarthmore College, 1949; A.M., Cornell University, 1951; PH.D., 1953.

DONALD M. BRITTON, *Assistant Professor of Horticulture*
B.A., University of Toronto, 1946; PH.D., University of Virginia, 1950.

F. ROBERT BRUSH, *Assistant Professor of Psychology*
B.A., Princeton University, 1951; M.A., Harvard University, 1953; PH.D., 1956.

CHARLES H. COATES, *Assistant Professor of Sociology*
B.S., United States Military Academy, 1924; M.A., Louisiana State University, 1952; PH.D., 1955.

MARGARET T. CUSSLER, *Assistant Professor of Sociology*
M.A., New York State College for Teachers, 1932; M.A., Radcliffe College, 1941; PH.D., 1943.

A. MORRIS DECKER, JR., *Assistant Professor of Agronomy*
B.S., Colorado Agricultural and Mechanical College, 1949; M.S., Utah State College, 1951; PH.D., University of Maryland, 1953.

CHARLES S. DEWEY, *Assistant Professor of Chemistry*
B.A., Pomona College, 1919; A.M., Harvard University, 1920; PH.D., 1924.

NORMAN JOHN DOORENBOS, *Assistant Professor of Pharmaceutical Chemistry*
B.S., University of Michigan, 1950; M.S., 1951; PH.D., 1953.

GERTRUDE EHRLICH, *Assistant Professor of Mathematics*
B.S., Georgia State College for Women, 1943; M.A., University of North Carolina, 1945; PH.D., University of Tennessee, 1953.

HENRY C. FREIMUTH, *Assistant Professor of Legal Medicine, School of Medicine*
B.S., College of the City of New York, 1932; M.S., New York University, 1933; PH.D., 1938.

WERNER H. GREUB, *Assistant Professor of Mathematics*
DIPLOMA IN MATHEMATICS, Heidelberg University, 1948; PHILOSOPHICAL DOCTOR, 1949; HABITATION, Zurich University, 1954.

SIDNEY GROLLMAN, *Assistant Professor of Zoology*
B.S., University of Maryland, 1947; M.S., 1949; PH.D., 1952.

HORACE V. HARRISON, *Assistant Professor of Government and Politics*
B.A., Trinity University, 1932; M.A., University of Texas, 1941; PH.D., 1951.

GUY B. HATHORN, *Assistant Professor of Government and Politics*
A.B., University of Mississippi, 1940; M.A., 1942; PH.D., Duke University, 1950.

ELIZABETH E. HAVILAND, *Assistant Professor of Entomology*
B.A., Wilmington College, 1923; M.A., Cornell University, 1926; M.S., University of Maryland, 1936; PH.D., 1945.

H. PALMER HOPKINS, *Assistant Professor of Agricultural Education*
B.S., Oklahoma Agricultural and Mechanical College, 1936; M.ED., University of Maryland, 1948.

SIDNEY ISHEE, *Assistant Professor of Agricultural Economics*
B.S., Mississippi, State College, 1950; M.S., Pennsylvania State College, 1952; PH.D., 1957.

RICHARD H. JAQUITH, *Assistant Professor of Chemistry*
B.S., University of Massachusetts, 1940; M.S., 1942; PH.D., Michigan State University, 1955.

WILHELMINA JASHEMSKI, *Assistant Professor of History*
A.B., York College, 1931; A.M., University of Nebraska, 1933; PH.D., University of Chicago, 1942.

WILLIAM ROBERT JENKINS, *Assistant Professor of Plant Pathology*
B.S., College of William and Mary, 1950; M.S., University of Virginia, 1952; PH.D., University of Maryland, 1954.

EMORY C. LEFFEL, *Assistant Professor of Animal Husbandry*
B.S., University of Maryland, 1943; M.S., 1947; PH.D., 1953.

THEODORE F. LEVEQUE, *Assistant Professor of Anatomy*
B.A., University of Denver, 1949; M.S., 1950; PH.D., University of Colorado, 1954.

WILLIAM V. LOVITT, JR., *Assistant Professor of Legal Medicine, School of Medicine*
B.S., University of Nebraska, 1941; M.D., University of Colorado, 1944.

LEONARD LUTWACK, *Assistant Professor of English*
B.A., Wesleyan University, 1939; M.A., 1940; PH.D., Ohio State University, 1950.

WILLIAM MCCULLOUGH MACDONALD, *Assistant Professor of Physics*
B.S., University of Pittsburgh, 1950; PH.D., Princeton University, 1955.

WALTER S. MEASDAY, *Assistant Professor of Economics*
A.B., College of William and Mary, 1941; PH.D., Massachusetts Institute of Technology, 1955.

BURTON R. POLLACK, *Assistant Professor of Physiology, School of Dentistry*
D.D.S., University of Maryland, 1946.

DONALD K. PUMROY, *Assistant Professor of Psychology*
B.A., University of Iowa, 1949; M.S., University of Wisconsin, 1951; PH.D., University of Washington, 1954.

GORDON M. RAMM, *Assistant Professor of Zoology*
B.A., University of Buffalo, 1949; M.A., 1950; PH.D., New York University, 1954.

MARGUERITE C. RAND, *Assistant Professor of Foreign Languages*
B.A., Pomona College, 1919; M.A., Stanford University, 1921; PH.D., University of Chicago, 1951.

PATRICK W. RIDDLEBERGER, *Assistant Professor of History*
B.A., Virginia Military Institute, 1939; M.A., University of California, 1949; PH.D., 1953.

JOHN M. ROBINSON, *Assistant Professor of Philosophy*
A.B., Middlebury College, 1945; PH.D., Cornell University, 1949.

WAYNE C. ROHRER, *Assistant Professor of Sociology*
B.S., Texas Agricultural and Mechanical College, 1946; M.S., 1948; PH.D., Michigan State University, 1955.

GEORGE L. ROMOSER, *Assistant Professor of Poultry Nutrition*
B.S., University of Maryland, 1950; M.S., 1951; PH.D., 1953.

LEONORA C. ROSENFIELD, *Assistant Professor of Foreign Languages*
B.A., Smith College, 1930; A.M., Columbia University, 1931; PH.D., 1940.

PAUL WILLIAM SANTELMANN, *Assistant Professor of Agronomy*
B.S., University of Maryland, 1950; M.S., Michigan State College, 1952; PH.D., Ohio State University, 1954.

CLIFFORD LEROY SAYRE, JR., *Assistant Professor of Mechanical Engineering*
B.S.M.E., Duke University, 1947; M.S., Stevens Institute of Technology, 1950.

WALTER E. SCHLARETZKI, *Assistant Professor of Philosophy*
A.B., Monmouth College, 1941; A.M., University of Illinois, 1942; PH.D., Cornell University, 1948.

E. RODERICK SHIPLEY, *Assistant Professor of Physiology, School of Dentistry*
A.B., Johns Hopkins University, 1938; M.D., University of Maryland, 1942; CERTIFICATE, University of Pennsylvania, 1947; DIPLOMATE, American Board of Surgery, 1948.

HUGH D. SISLER, *Assistant Professor of Botany*
B.S., University of Maryland, 1949; M.S., 1951; PH.D., 1953.

MERRILL J. SNYDER, *Assistant Professor of Medicine in Clinical Microbiology and Instructor in Microbiology, School of Medicine*
B.S., University of Pittsburgh, 1940; M.S., University of Maryland, 1950; PH.D., 1953.

DAVID S. SPARKS, *Assistant Professor of History*
A.B., Grinnell College, 1944; A.M., University of Chicago, 1945; PH.D., 1951.

GUILFORD L. SPENCER, II, *Assistant Professor of Mathematics*
B.A., Williams College, 1943; M.S., Massachusetts Institute of Technology, 1948; PH.D., University of Michigan, 1953.

MABEL S. SPENCER, *Assistant Professor of Home Economics Education*
B.S., University of West Virginia, 1925; M.S., 1946.

DONALD STANGER, *Assistant Professor of Education*
B.S., New Jersey State Teachers College, 1948; M.A., Columbia University, 1949; ED.D., University of Maryland, 1954.

ROLAND N. STROMBERG, *Assistant Professor of History*
A.B., University of Kansas City, 1939; M.A., American University, 1946; PH.D., University of Maryland, 1952.

BENJAMIN H. SWEET, *Assistant Professor of Microbiology*
B.S., Tulane University, 1946; M.A., Boston University, 1949; PH.D., 1953.

JOSEPH T. VANDERSLICE, *Assistant Professor in the Institute of Molecular Physics*
B.S., Boston College, 1949; PH.D., Massachusetts Institute of Technology, 1953.

NORMA WEGNER, *Assistant Professor of Psychology*
A.B., Hunter College, 1944; A.M., Cornell University, 1946; PH.D., University of Connecticut, 1955.

JOHN I. WHITE, *Assistant Professor of Physiology, School of Medicine*
B.A., University of Illinois, 1939; PH.D., Rutgers University, 1950.

JUNE C. WILBER, *Assistant Professor of Textiles and Clothing*
B.S., University of Washington, 1936; EDUC., 1937; M.S., Syracuse University, 1940.

FRANK HERBERT WILCOX, JR., *Assistant Professor of Poultry Husbandry*
B.S., University of Connecticut, 1951; M.S., Cornell University, 1953; PH.D., 1955.

ROBERT C. WILEY, *Assistant Professor of Horticulture*
B.S., University of Maryland, 1949; M.S., 1950; PH.D., Oregon State College, 1953.

FRANCIS CHARLES WINGERT, *Assistant Professor of Animal Husbandry*
B. OF SCI., University of Minnesota, 1947; PH.D., 1955.

HOWARD E. WINN, *Assistant Professor of Zoology*
A.B., Bowdoin College, 1948; M.S., University of Michigan, 1950; PH.D., 1955.

Assistant Research Professors

FRANCIS R. HAMA, *Assistant Research Professor in Institute for Fluid Dynamics and Applied Mathematics*
M.ENGR., Tokyo Imperial University, 1940; D.SC., University of Tokyo, 1952.

MARTIN JAY SWETNICK, *Assistant Research Professor of Physics*
B.A., Brooklyn College, 1945; M.S., New York University, 1947; PH.D., 1951.

HANS F. WEINBERGER, *Assistant Research Professor in Institute for Fluid Dynamics and Applied Mathematics*
B.S., Carnegie Institute of Technology, 1948; M.S., 1948; SC.D., 1950.

Instructors

RAYMOND W. HAYWARD, JR., *Instructor in Physics*
B.S., Iowa State College, 1943; PH.D., University of California, 1950.

DAVID R. LIDE, JR., *Instructor in Physics (P.T.)*
B.S., Carnegie Institute of Technology, 1949; M.A., Harvard University, 1951; PH.D., 1952.

Lecturers

WILLIAM R. AHRENDT, *Lecturer in Electrical Engineering*
S.B., Massachusetts Institute of Technology, 1941; S.M., 1942.

ALFRED H. AITKEN, *Lecturer in Physics*
B.S., Lehigh University, 1949; M.S., Indiana University, 1950; PH.D., 1955.

ARNOLD M. BASS, *Lecturer in Physics*
B.S., City College of New York, 1942; M.A., Duke University, 1943; PH.D., 1949.

JOSEPH VINCENT BRADY, *Lecturer in Psychology*
B.S., Fordham University, 1943; PH.D., University of Chicago, 1951.

YAOHAN CHU, *Lecturer in Electrical Engineering*
B.S., Chiao-Tung University, 1942; M.S., Massachusetts Institute of Technology, 1945; SC.D., 1953.

RUTH M. DAVIS, *Lecturer in Mathematics*
A.B., American University, 1950; M.A., University of Maryland, 1952; PH.D., 1955.

JACOB J. FREEMAN, *Lecturer in Electrical Engineering*
B.S., College of William and Mary, 1933; M.A., Columbia University, 1935; PH.D., Catholic University, 1949.

ABRAHAM S. FRIEDMAN, *Lecturer in Physics*
A.B., Brooklyn College, 1943; PH.D., Ohio State University, 1950.

MELVILLE S. GREEN, *Lecturer in Physics*
B.A., Columbia College, 1944; M.A., Princeton University, 1947; PH.D., 1952.

MARSHALL CATHCART HARRINGTON, *Lecturer in Physics*
A.B., Princeton University, 1926; A.M., 1927; PH.D., 1932.

CHARLES M. HERZFELD, *Lecturer in Physics*
B.CH.E., Catholic University, 1945; PH.D., University of Chicago, 1951.

ROBERT JASTROW, *Lecturer in Physics*
A.B., Columbia College, 1944; A.M., Columbia University, 1945; PH.D., 1948.

HOYT LEMONS, *Lecturer in Geography*
B.I.D., Southern Illinois University, 1936; M.A., University of Nebraska, 1938; PH.D., 1941.

RICHARD LINDENBERG, *Lecturer in Anatomy, School of Dentistry*
GRADUATION, University of Munich Medical School, 1934; M.D., University of Berlin, 1944.

LADISLAUS L. MARTON, *Lecturer in Physics*
PH.D., University of Zurich, 1924.

FELIX W. MCBRYDE, *Lecturer in Geography*
B.A., Tulane University, 1930; PH.D., University of California, 1940.

IRWIN OPPENHEIM, *Lecturer in Physics*
A.B., Harvard University, 1949.

RAYMOND C. O'ROURKE, *Lecturer in Physics*
B.S., University of Michigan, 1945; M.S., 1947; PH.D., 1950.

WILLIAM C. OVERTON, JR., *Lecturer in Physics*
B.S., North Texas State College, 1941; PH.D., The Rice Institute, 1950.

RICHARD L. PETRITZ, *Lecturer in Physics*
B.S., Northwestern University, 1944; B.S.E.E., 1946; M.S.E.E., 1947; PH.D., 1950.

ALBERT W. SAENZ, *Lecturer in Physics*
B.S., University of Michigan, 1944; M.A., 1945; PH.D., 1949.

REECE I. SAILER, *Lecturer in Entomology*
B.A., University of Kansas, 1938; PH.D., 1942.

EARL A. SCHUCHARD, *Lecturer in Electrical Engineering*
B.S., University of Washington, 1933; M.S., 1934; PH.D., 1940.

MAURICE M. SHAPIRO, *Lecturer in Physics*
B.S., University of Chicago, 1936; M.S., 1940; PH.D., 1942.

R. EDWIN SHUTTS, *Lecturer in Audiology and Speech Pathology*
A.B., Indiana State Teachers' College, 1933; M.A., Northwestern University, 1947; PH.D., 1950.

MILTON M. SLAWSKY, *Lecturer in Physics*
B.S., Rensselaer Polytechnic Institute, 1933; M.S., California Institute of Technology, 1935; PH.D., University of Michigan, 1938.

BENJAMIN L. SNAVELY, *Lecturer in Physics*
B.S., Lehigh University, 1928; PH.D., Princeton University, 1935.

GEORGE ABRAHAM SNOW, *Lecturer in Physics*
B.S., City College of New York, 1945; M.A., Princeton University, 1947; PH.D., 1949.

FRANK STERN, *Lecturer in Physics*
B.S. Union College, 1949; PH.D., Princeton University, 1955.

WILLIAM H. SUMMERSON, *Lecturer in Biochemistry School of Medicine*
B.CHEM., Cornell University, 1927; M.A., 1928; PH.D., 1937.

HORACE M. TRENT, *Lecturer in Electrical Engineering*
B.A., Berea College, 1928; M.A., Indiana University, 1929; PH.D., 1934.

JOHN L. VANDERSLICE, *Lecturer in Electrical Engineering*
B.S., University of Pennsylvania, 1928; A.M., 1930; PH.D., Princeton University, 1934.

WALTER W. WADA, *Lecturer in Physics*
B.A., University of Utah, 1943; M.A., University of Michigan, 1946; PH.D., 1951.

J. HENRY WILLS, *Lecturer in Physiology, School of Medicine*
B.S., Virginia Polytechnic Institute, 1934; M.S., Medical College of Virginia, 1936; PH.D., University of Rochester, 1941.

NORMAN M. WOLCOTT, *Lecturer in Physics*
B.A., Harvard University, 1949; M.A., 1950; PH.D., Oxford University (England), 1955.

Research Associates

EINAR HINNOV, *Research Associate in Physics*
B.A., St. Olaf College, 1952; M.A., Duke University, 1954; PH.D., 1956.

AKIRA ISIHARA, *Research Associate in the Institute for Fluid Dynamics and Applied Mathematics*
M.S., University of Tokyo, 1942; D.SC., 1952.

GRADUATE SCHOOL SUPPLEMENT TO GENERAL CALENDAR

1958

October 3	Friday	Last day to file applications for admission to candidacy for Doctor's degrees on June 6, 1959 and Master's degrees on January 28, 1959.
October 7	Tuesday	Modern language examination for Ph.D. requirement.
December 3	Wednesday	Last day to file applications for diplomas at the office of the Registrar for degrees on January 28, 1959.

1959

January 7	Wednesday	Last day to deposit theses in the office of the Graduate School for students completing requirements for degrees on January 28, 1959.
February 10	Tuesday	Modern language examination for Ph.D. requirement.
February 13	Friday	Last day to file applications for admission to candidacy for Master's degrees on June 6, 1959.
April 10	Friday	Last day to file applications for diplomas at the office of the Registrar for degrees on June 6, 1959.
May 15	Friday	Last day to deposit theses in the office of the Graduate School for students completing requirements for degrees on June 6, 1959.
June 2	Tuesday	Modern language examination for Ph.D. requirement.
June 8	Monday	Last day to file applications for admission to candidacy at June meeting of the Graduate Council.
July 3	Friday	Last day to file applications for diplomas at the office of the Registrar for degrees on July 31, 1959.
July 17	Friday	Last day to deposit theses in the office of the Graduate School for students completing requirements for degrees on July 31, 1959.

THE GRADUATE COUNCIL

Ex-Officio Members

WILSON H. ELKINS, D.PHIL., *President of the University*

HARRY C. BYRD, LL.D., D.SC., *President Emeritus*

R. LEE HORNBAKE, PH.D., *Dean of the Faculty*

RONALD BAMFORD, PH.D., *Dean of the Graduate School*

CHARLES O. APPLEMAN, PH.D., *Dean Emeritus*

AUGUSTUS J. PRAHL, PH.D., *Associate Dean and Secretary of the Graduate Faculty Assembly*

Appointed Members

	Term Expires
NOEL E. FOSS, PH.D., *Professor of Pharmacy (Baltimore)*	1958
FREDERIC T. MAVIS, PH.D., *Professor of Civil Engineering*	1961
MICHAEL J. PELCZAR, PH.D., *Professor of Bacteriology*	1960
LEON P. SMITH, PH.D., *Professor of Foreign Languages*	1959

Elected Members

FRANKLIN D. COOLEY, PH.D., *Associate Professor of English*	1961
DUDLEY DILLARD, PH.D., *Professor of Economics*	1960
NATHAN L. DRAKE, PH.D., *Professor of Chemistry*	1961
FREDERICK P. FERGUSON, PH.D., *Professor of Physiology (Baltimore)*	1958
HUGH G. GAUCH, PH.D., *Professor of Botany*	1961
IRVING C. HAUT, PH.D., *Professor of Horticulture*	1960
MONROE H. MARTIN, PH.D., *Professor of Mathematics*	1958
BENJAMIN H. MASSEY, PH.D., *Professor of Physical Education*	1961
ROBERT H. OSTER, PH.D., *Professor of Physiology (Baltimore)*	1960
ELMER PLISCHKE, PH.D., *Professor of Government and Politics*	1959
HENRY R. REED, PH.D., *Professor of Electrical Engineering*	1959
CLYNE S. SHAFFNER, PH.D., *Professor of Poultry Physiology*	1958
GLADYS WIGGIN, PH.D., *Professor of Education*	1959

THE GRADUATE SCHOOL

THE GRADUATE SCHOOL was established in its present form in 1918 under the jurisdiction of the Graduate Council with the Dean of the Graduate School serving as chairman. It was created for the purpose of administering and developing programs of advanced study and research for graduate students in all branches of the University. Prior to the present organization some advanced degrees were awarded but they were under the jurisdiction of the individual departments subject to the supervision of the general faculty. Despite the large expansion of graduate programs into new areas as the University has grown, the spirit of each program is essentially that of individual study under competent supervision. The Graduate School is not an extension of the undergraduate program but was created rather for the preparation of those who in the future will carry on the spirit of individual inquiry. Thus it promotes and provides an atmosphere of research and scholarship for both the students and the faculty; in particular, it stimulates that harmonious relationship between the two which results in the advancement of learning. At the present time over fifty departments are authorized to offer graduate programs leading to one or more of the advanced degrees awarded by the University.

The Graduate Council consists of ex-officio, elected and appointed members of the Graduate Faculty and is charged with the formulation of the overall policies of the Graduate School. It meets regularly in March, June and November to consider all matters relating to graduate work brought to its attention by the University Administration, the Graduate Faculty and the Dean of the Graduate School. It may also be called for special meetings throughout the year if urgent business must be transacted.

The Graduate Faculty consists of regular and associate members chosen in accordance with the Plan of Organization of the Graduate Faculty and is listed in the front of this catalog. The direction of individual programs and theses is primarily assigned to the regular members of the Graduate Faculty.

The Graduate Faculty Assembly consists of the regular members of the Graduate Faculty and meets once each year. Special meetings may be called by the Dean of the Graduate School if necessary. In accordance with the University Faculty Organization Plan, it has authority over the educational policy of the Graduate School, may review actions taken by the Graduate Council and serves as a referendum body on questions referred to it by the Graduate Council.

The Dean of the Graduate School serves as chairman and executive officer of both the Graduate Council and the Graduate Faculty Assembly.

The following standing committees are appointed by the Dean of the Graduate School: The Committee on Publications, Committee on Language Requirements, Committee on Graduate Programs and Standards for Graduate

Work, Committee on Fellowships and Student Welfare, Committee on Research, Committee on Procedures, Committee on the Graduate Faculty, and the Committee on Elections. They report annually to the Graduate Council and reports may be requested by the Dean of the Graduate School or by the Graduate Faculty Assembly.

LOCATION

The office of the Graduate School is located on the second floor of the Skinner Building on the College Park campus. This campus is located in Prince Georges County on a large tract of rolling wooded land less than eight miles from Washington, D. C. and approximately thirty-two miles from Baltimore and is served by excellent transportation.

The Baltimore campus of the University is located at the corner of Lombard and Green Streets, and on this campus the various departments in the Schools of Medicine, Dentistry, Pharmacy and Nursing offer their graduate programs.

LIBRARIES

The libraries of the University are located on both the College Park and Baltimore campuses. They consist of the General Library, the Library Annex and the many college and departmental libraries which house special collections. Because of the location of the university the large libraries of Baltimore and Washington are a valuable asset to graduate work. Arrangements can be made for personal work in the Enoch Pratt Library of Baltimore, the Library of Congress, the United States Department of Agriculture Library and the many fine collections of other government agencies in Washington.

MISCELLANEOUS INFORMATION

For information in reference to the University grounds, buildings, equipment, transcripts of records, off-campus housing, meals, athletics and recreation, religious denominational clubs, fraternities, sororities, societies and special clubs, student publications, University supply store, write to the Director of University Relations for the *General Information Catalog*.

Academic Information

ADMISSION

An applicant for admission to the Graduate School must hold a Bachelor's or a Master's degree from a college or university of recognized standing. The applicant shall furnish an official transcript of his collegiate record which for unconditional admission must show creditable completion of an adequate amount of undergraduate preparation of high quality for graduate work in his chosen field. Application for admission to the Graduate School should be

made not later than September 1 for the fall term and not later than January 1 for the spring term on blanks obtained from the office of the Dean. Admission to the summer session is governed by the date listed in the Summer School bulletin, which is generally soon after June 1.

After approval of the application a matriculation card, signed by the Dean, is issued to the student. This card permits him to register in the Graduate School. It is his certificate of membership in the Graduate School and should be retained by the student to present at each succeeding registration.

Admission to the Graduate School does not necessarily imply admission to candidacy for an advanced degree.

REGISTRATION

All students pursuing graduate work in the University, even though they are not candidates for higher degrees, are required to register in the Graduate School at the beginning of each session. *Graduate credit will not be given unless the student matriculates and registers in the Graduate School.* This applies especially to those students who register through the College of Special and Continuation Studies at locations away from the campus.

The program of work for each session is arranged by the student with the major department and entered upon two course cards which are signed first by the professor in charge of the student's major subject and then by the Dean of the Graduate School. One card is retained by the Dean. The student takes the other card, and his matriculation card, to the Registrar's office, where the registration is completed. Students will not be admitted to graduate courses until the Registrar has certified to the instructor that registration has been completed. Course cards may be obtained at the Registrar's office or at the Dean's office. The heads of departments usually keep a supply of these cards in their respective offices.

A time schedule, supplementing this catalog, is issued shortly before the beginning of each semester, showing the hours and location of class meetings. This schedule is available at the office of the Registrar.

GRADUATE COURSES

Graduate students must elect for credit in partial fulfillment of the requirements for higher degrees only courses designated *For Graduates* or *For Graduates and Advanced Undergraduates.* Students who are inadequately prepared for graduate work in their chosen fields or who lack prerequisites for minor courses may elect a limited number of courses numbered from 1 to 99 in the general catalogue, but graduate credit will not be allowed for these courses. Courses that are audited are registered for in the same way as other courses, and the fees are the same.

PROGRAM OF WORK

The professor who is selected to direct a student's thesis work is the student's adviser in the formulation of a graduate program, including suitable minor work, which is arranged in cooperation with the instructors. To encourage thoroughness in scholarship through intensive application, graduate students in the regular sessions are limited to a program of fifteen credit hours per semester. If a student is preparing a thesis during the minimum residence for the Master's degree, the registration in graduate courses should not exceed twelve hours for the semester since registration in research is required.

SUMMER SESSION

The University conducts a six-weeks summer session at College Park, with a comprehensive undergraduate and graduate program. The University publishes a separate bulletin giving full information on this summer session. This bulletin is available upon application to the Director of the Summer Session, University of Maryland, College Park.

GRADUATE WORK IN PROFESSIONAL SCHOOLS AT BALTIMORE

Graduate courses and opportunities for research are offered in the professional schools at Baltimore. Students pursuing graduate work in the professional schools must register in the Graduate School and meet the same requirements and proceed in the same way as do graduate students in the other departments of the University.

OAK RIDGE INSTITUTE

The University is one of the sponsoring institutions of the Oak Ridge Institute of Nuclear Studies located at Oak Ridge, Tennessee. One of the features of this affiliation is the opportunity, in the appropriate fields, for graduate students to do their research problems and prepare their theses under a cooperative arrangement. Such opportunity is limited to those who have completed their course work on the campus, are working in a field where facilities are available, and generally are candidates for the doctoral degree. Successful applicants will receive Oak Ridge Graduate Fellowships with varying stipends depending upon their marital status and dependents. Detailed information can be obtained from the Graduate School office or from Dr. N. L. Drake, Department of Chemistry, Councilor for the University.

FOREIGN STUDENTS

Graduate students from foreign countries where English is not the native tongue should be adequately prepared to read and write in this language. Admission to graduate study implies that the student is aware of this requirement and is prepared to fully participate in the course of study and research work that is assigned. A foreign student adviser is available to all graduate students from other countries to discuss matters of immigration.

Since the admission and stay of foreign students are in part dependent on regulations issued by the United States Immigration and Naturalization Service, it is advisable for all graduate students who have been admitted to the Graduate School to consult the Foreign Student Adviser in regard to their immigration status. Students wishing to come to the United States with a student visa must secure an Immigration I-20 Form from the Dean of the Graduate School in order to secure the proper visa from the American consul. Students with student visas already studying in the United States who wish to transfer to the University of Maryland must also secure an I-20 Form from the Dean of the Graduate School in order to request the Immigration and Naturalization Service to grant permission for the transfer.

Every foreign student is expected to see the Foreign Student Adviser as soon as possible after arriving at the University. The Adviser will be able to assist not only with various problems regarding immigration, housing, fees, etc., but also with more general problems of orientation to life in the University and the community.

GRADUATE WORK BY SENIORS IN THIS UNIVERSITY

A senior of this University who has nearly completed the requirements for the undergraduate degree may, with the approval of his undergraduate dean, the head of the department concerned, and the Dean of the Graduate School, register in the undergraduate college for graduate courses, which may later be transferred for graduate credit toward an advanced degree at this University, but the student must be within seven credit hours of completing his undergraduate work and the total of undergraduate and graduate courses must not exceed fifteen credits for the semester. Excess credits in the senior year cannot later be used for graduate credit unless such pre-arrangement is made. Seniors who wish to register for graduate credit should apply to the Dean of the Graduate School for information about procedure.

ADMISSION TO CANDIDACY FOR ADVANCED DEGREES

Application for admission to candidacy for the Master's and for the Doctor's degree is made on application blanks which are obtained at the office of the Dean of the Graduate School. These are filled out in duplicate by the student and submitted to his major department for further action and transmission to the Dean of the Graduate School. All applications for admission to candidacy must be approved by the Graduate Council.

Admission to candidacy in no case assures the student of a degree, but merely signifies he has met all the formal requirements and is considered by his instructors sufficiently prepared and able to pursue such graduate study and research as are demanded by the requirements of the degree sought. The candidate must show superior scholarship in graduate work already completed.

Application for admission to candidacy is made at the time stated in the sections dealing with the requirements for the degree sought.

REQUIREMENTS FOR THE DEGREES OF MASTER OF ARTS AND MASTER OF SCIENCE

ADVANCEMENT TO CANDIDACY. Each prospective candidate for the Master's degree is required to make application for admission to candidacy not later than the date on the calendar for the semester in which the degree is sought. (See Graduate School Supplement to the General Calendar in the front of this Catalog.) He must have completed at least twelve semester hours of graduate work at the University of Maryland. An average grade of "B" in all major and minor subjects is the minimum requirement.

MINIMUM RESIDENCE. A residence of at least two semesters, or equivalent, at this institution, is required.

COURSE REQUIREMENTS. A minimum of twenty-four semester hours, exclusive of thesis and registration for research, with a minimum average grade of "B" in courses approved for graduate credit, is required for the degrees of Master of Arts and Master of Science. The student is also required to register for six semester hours for research and thesis work. The total number of credit hours required for the degree is thirty. If the student is inadequately prepared for the required graduate courses, either in the major or minor subjects, additional courses may be required to supplement the undergraduate work. Of the twenty-four hours required in graduate courses, not less than twelve and not more than sixteen semester hours must be earned in the major subject. The remaining credits must be outside the major subject and must comprise a group of coherent courses intended to supplement and support the major work. Not less than one-half of the total required course credits for the degree, or a minimum of twelve, must be selected from courses numbered 200 or above. No credit for the degree of Master of Arts or Master of Science may be obtained for correspondence courses or those taken by examination. The entire course of study must constitute a unified program approved by the student's major adviser and by the Dean of the Graduate School. All requirements for the degree must be completed within an eight-year period.

TRANSFER OF CREDIT. Credit not to exceed six semester hours, obtained at other recognized institutions, may be transferred and applied to the course requirements of the Master's degree, provided that the work was of graduate character, and provided that it is approved for inclusion in the student's graduate program at the University of Maryland. This transfer of credit is submitted to the Graduate Council for approval when the student applies for admission to candidacy for the degree. Acceptance of the transferred credits does not reduce the minimum residence requirement. The candidate is subject to final examination by this institution in all work offered for the degree.

THESIS. In addition to the twenty-four semester hours in graduate courses, a satisfactory thesis is required of all candidates for the degrees of Master of Arts and Master of Science. (Exceptions may be made in the cases of candidates for the degree of Master of Arts in American Civilization. See page 40). The thesis

must demonstrate the student's ability to do independent work and it must be acceptable in literary style and composition. With the approval of the student's major professor and the Dean of the Graduate School, the thesis in certain cases may be prepared *in absentia* under direction and supervision of a member of the faculty of this institution.

The original copy of the thesis must be deposited in the office of the Graduate School not later than the date specified in the calendar in the front of this catalog. The date published is the deadline for the acceptance of theses but they may be deposited earlier. The thesis should not be bound by the student, as the University later binds all theses uniformly. An abstract of the contents of the thesis, not to exceed 250 words in length, must accompany it. A manual giving full directions for the physical make-up of the thesis should be consulted by the student before the typing of the manuscript is begun. Students may obtain copies of this manual from the Student's Supply Store at nominal cost.

FINAL EXAMINATION. The final oral examination is conducted by a committee appointed by the Dean of the Graduate School. The student's adviser acts as the chairman of the committee. The other members of the committee are persons under whom the student has taken most of his major and minor courses. The chairman and the candidate are notified of the personnel of the examining committee at least one week prior to the period set for oral examinations unless an emergency arises. The chairman of the committee selects the exact time and place for the examination and notifies the other members of the committee and the candidate. The examination is normally conducted at the end of the semester, but upon recommendation of the student's adviser, an examing committe may be appointed by the Dean of the Graduate School at any time when all other requirements for the degree have been completed. A report of the committee is sent to the Dean as soon as possible after the examination. A special form for this purpose is supplied to the chairman of the committee and the approval must be unanimous. Such report is the basis upon which recommendation is made to the faculty that the candidate be granted the degree sought. The period for the oral examination is usually about one hour, but the time should be long enough to insure an adequate examination.

The examining committee also approves the thesis, and it is the candidate's obligation to see that each member of the committee has ample opportunity to examine a copy of the thesis prior to the date of the examination.

A student will not be admitted to final examination until all other requirements for the degree have been met. In addition to the oral examination a comprehensive written examination may be required at the option of the major department.

REQUIREMENTS FOR THE DEGREES IN AMERICAN CIVILIZATION

Studies in the American Civilization program are intended to prepare the candidate for teaching and research in American culture. The program is par-

ticularly designed for the teacher or student whose intellectual interest is not limited to a single academic department. For instance, the historian who likes literature, the literary critic who wishes to study the social background of literature, the political scientist who wishes to know more about the history of this country, and the sociologist who wants to study the roots of sociology in America, all may find the American Civilization program the proper one for them. The four cooperating departments of English, History, Government and Politics, and Sociology offer the basic work in the program, and the student will stress the work of one of those departments when he determines his course of graduate studies. All students, however, will be expected to understand the development of American institutions and to show some proficiency in the literary, social, economic, and political history of the United States.

The study of American Civilization brings in many different fields, so a student has an unusually wide opportunity to plan a program suited to his individual need. To help him do this, a committee representing the departments whose American fields he intends to study is set up shortly after he registers. The chairman of the committee is from the department of the student's greatest interest and acts as his adviser. The committee also prepares and reads the student's comprehensive examination and reads the thesis if one is submitted.

The candidate for a degree must pass a final written examination testing his understanding of American Civilization in terms of his individual program of studies.

MASTER OF ARTS. With the approval of his advisers and committee, a candidate for the Master of Arts degree with a major in American Civilization may elect in lieu of the thesis six additional hours of course work, to include at least two substantial seminar papers. The total number of credit hours required for the degree would then be thirty semester hours.

Each candidate must present credits for at least fifteen semester hours of work in two of the four cooperating departments, and credits for at least fifteen semester hours in supporting courses (nine hours if a thesis is elected). Supporting courses will normally be in such fields as European or Latin-American history, English literature, comparative literature, philosophy, art, education, sociology, economics, and government and politics.

Each candidate must demonstrate in a written examination that he possesses a reading knowledge of one foreign language.

All other requirements are the same as for the degrees of Master of Arts and Master of Science in other fields.

DOCTOR OF PHILOSOPHY. The American Civilization program cuts across several fields; therefore, a faculty committee representing the departments in which the student plans to study will be appointed shortly after the student registers. The chairman of the committee is from the department of the student's major interest and acts as his adviser. The committee is responsible for helping

the student to integrate his program. Working through the student's adviser, the committee aids in planning the student's over-all program, prepares and grades any comprehensive examinations, and reads the dissertation.

The general requirements for the degree of Doctor of Philosophy in American Civilization are the same as those for the doctoral degree in other fields.

REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION

The Master of Education degree is designed to increase competency in applied areas within the general field of education. Thirty semester hours of course work are required. Of the thirty hours, one-half must be in courses numbered 200 and above, and one-half must be in Education. Subject to the foregoing limitations, courses in departments other than Education may be selected by the student and his adviser.

In connection with course work there are required two seminar papers, the nature and form of which are prescribed in a Statement of Policy issued by the Department of Education.

The procedure for advancement to candidacy and the transfer of credits, is the same as for the degrees of Master of Arts and Master of Science. The nature of the comprehensive examination, and other matters pertaining to degree requirements, are described elsewhere in these announcements and in the Statement of Policy referred to above.

REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

The Master of Business Administration program is designed primarily to train students for positions of responsibility in business and government. The aim is to develop technical competence plus a thorough knowledge and appreciation of the art of management. The study of administrative policies and practices encourages interest and realistic thinking in management problems and responsibilities.

The program leading to the degree of Master of Business Administration includes advanced study of business organization and administration in the fields of accounting and statistics, finance, general business, industrial management, insurance and real estate, marketing, personnel relations, public utilities and transportation.

Those students whose major undergraduate work has been in arts, agriculture, science, education, or engineering subjects are required to complete certain basic core course requirements in business and economics before undertaking specialized graduate work for the degree of Master of Business Admin-

istration. The core course requirements are listed below. Responsible experience of exceptional value and importance may be substituted for specific courses.

Principles of Economics.....6 hours	Marketing Management ....3 hours
Principles of Accounting...6 or 8 hours	Personnel Management .....3 hours
Statistics .....3 hours	Money and Banking .....3 hours
Business Law .....3 or 4 hours	

The other requirements for the degree are the same as for the degrees of Master of Arts and Master of Science.

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

ADVANCEMENT TO CANDIDACY. Candidates for the Doctor's degree must be admitted to candidacy at least one academic year before the final examination. Applications for admission to candidacy for the Doctor's degree are made in duplicate by the student and submitted to his major department for further action and transmission to the Dean of the Graduate School. Blanks may be obtained at the office of the Graduate School.

Before admission to candidacy the applicant must have demonstrated to the head of the Foreign Language Department that he possesses a reading knowledge of at least two foreign languages from the list approved by his major department, one of which must be either French or German. Preliminary examinations or such other substantial tests as the departments may elect are also required for admission to candidacy.

The student must complete all of his program for the degree, including the thesis and final examination, during a four-year period after admission to candidacy. Failure to do so requires another application for admission to candidacy with the usual preliminary examination unless the Graduate Council rules otherwise.

RESIDENCE. The equivalent of three years of full-time graduate study and research is the minimum required. Of the three years the equivalent of at least one year must be spent in residence at the University. On a part-time basis the time needed will be correspondingly increased. All work at other institutions offered in partial fulfillment of the requirements for the Doctor of Philosophy degree is submitted to the Graduate Council for approval, upon recommendation of the department concerned, when the student applies for admission to candidacy for the degree.

The Doctor's degree is not given merely as a certificate of residence and work, but is granted only upon sufficient evidence of high attainments in scholarship, and ability to carry on independent research in the special field in which the major work is done.

MAJOR AND MINOR SUBJECTS. The candidate must select a major and one or two closely related minor subjects. At least twenty-four semester hours of course work, exclusive of research, are required in the minor. Of the

twenty-four semester hours at least eight hours must be at the 200-level unless special permission is granted beforehand. If two areas are chosen for the minor requirement, not less than nine semester credit hours may be presented in either area. The remainder of the required residence is devoted to intensive study and research in the major field. The amount of required course work in the major subject will vary with the department and the individual candidate. The candidate must register for a minimum of twelve semester hours of research.

THESIS. The ability to do independent research must be shown by a dissertation on some topic connected with the major subject. An original typewritten copy and one clear, plain carbon copy of the thesis, together with an abstract of the contents, not to exceed 600 words in length, must be deposited in the office of the Dean not later than the date specified in the calendar in the front of this catalog. The date published is the deadline for the acceptance of theses but they may be deposited earlier. It is the responsibility of the student also to provide copies of the thesis for the use of the members of the examining committee prior to the date of the final examination.

The original copy should not be bound by the student, as the University later binds uniformly all theses for the general University library. The carbon copies are bound by the student in cardboard covers which may be obtained at the Students' Supply Store. The abstracts are published by University Microfilms.

A manual giving full directions for the physical make-up of the thesis should be consulted by the student before typing of the thesis is begun. Students may obtain copies of this manual at the Students' Supply Store.

FINAL EXAMINATION. The final oral examination is held before a committee appointed by the Dean. One member of this committee is a representative of the graduate faculty who is not directly concerned with the student's graduate work. One or more members of the committee may be persons from other institutions who are distinguished scholars in the student's major field.

The duration of the examination is approximately three hours, and covers the research work of the candidate as embodied in his thesis, and his attainments in the fields of his major and minor subjects. The other detailed procedures are the same as those stated for the Master's examination.

RULES GOVERNING LANGUAGE EXAMINATIONS FOR CANDIDATES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

1. A candidate for the Doctor's degree must show in a written examination that he possesses a reading knowledge of French and German. With the approval of the major department and the Graduate Council, in special cases another foreign language may be substituted for either French or German. *The passages to be translated will be taken from books and journals approved by the student's major department. The Foreign Language Department*

will select material amounting to approximately 500 words from the literature submitted and present to the students in each field a common examination in mimeographed form. The examination aims to test ability to use the foreign language so that the student may be able to read some of the original basic literature in the field. It is presumed that the candidate will know sufficient grammar to distinguish inflectional forms and that he will be able to translate readily in two hours 500 words with the aid of a dictionary.

2. *Students planning to take the examination must register personally in the office of the Department of Foreign Languages at least three weeks in advance of the test.*

3. Examinations are held at the office of the Department of Foreign Languages on the first Tuesday of October, February and June, at 2:00 P.M.

4. There is no limitation on the number of times the examination may be taken but a $5.00 fee will be charged for the second and subsequent examinations.

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

The Doctor of Education degree is offered for students who hold or expect to hold teaching or administrative positions in education and who desire to develop exceptional competence in special areas. The ability to explore and solve practical educational problems is emphasized. The requirements are the same as for the degree of Doctor of Philosophy except as specified below.

FOREIGN LANGUAGES. When the program of study and research does not involve the use of foreign languages the requirement may be waived by the Department of Education.

MAJOR AND MINOR SUBJECTS. The candidate must select one major area and one minor area in which he expects to develop exceptional competence. The minor may be a single area or may consist of a group of related areas selected to broaden the candidate's understanding of education. In addition to the major and minor, other areas if desired may be included in the program also. The amount of course work required in the major, minor, and related areas will vary according to the needs of each individual candidate.

PROJECT. Instead of completing a thesis as required for a candidate for the degree of Doctor of Philosophy, a candidate for this degree must demonstrate exceptional competence to work through field problems by completing a project in the major area. A Committee on Doctoral Research is appointed for each candidate. The committee is composed of three members, at least two of whom are from the faculty of the College of Education. The committee passes upon the student's plans for research. The specialist in the student's major area serves as sponsor and provides detailed guidance for the project.

The regulations governing submission and form of copies of the project are the same as for the thesis submitted for the degree of Doctor of Philosophy.

WRITTEN EXAMINATIONS. Written examinations for the degree of Doctor of Education parallel those for the degree of Doctor of Philosophy in education.

FINAL ORAL EXAMINATION. The final examination covers the project and its relationship to the general field in which it lies and the candidate's attainments in related areas.

GRADUATE FEES

The fees paid by graduate students are as follows:

Matriculation fee of $10.00. This is paid once only, upon first registration in the Graduate School.

Diploma fee for Master's degree, $10.00.

Graduation fee for Doctor's degree including a hood, microfilming and binding of thesis, $50.00.

At College Park

A fixed charge, each semester, of $10.00 per semester credit hour for students carrying ten hours or less; for students carrying more than ten hours, $100.00 for the semester.

Foreign Language Examination (first examination without charge), $5.00.

Testing fee for Education majors, $5.00.

Laboratory fees, where charged, range from $1.00 to $20.00 per course per semester.

Infirmary Fee, (Voluntary) $5.00.

The Infirmary services normally furnished the undergraduate students are available to graduate students who elect to pay the fee of $5.00 for the year (not including Summer School), provided that the fee is paid not later than the end of the first week of classes in the regular academic session. A graduate student entering in February may benefit in the same manner by the payment of $2.50. This fee will not be remitted for Graduate Assistants, Scholarship or Fellowship students.

There is a $3.00 fine for violation of the University parking regulations. All graduate students are expected to abide by these regulations, regardless of full-time or part-time attendance. The failure to register for a parking permit entails a $5.00 fee.

At Baltimore

The fees for graduate work at the professional schools in Baltimore are determined by the individual school concerned. Students should consult the catalog of the respective school in which they intend to pursue their work.

LIVING EXPENSES AND SELF-HELP. The University in no way assumes responsibility for the housing of graduate students.

Board and lodging are available in many private homes in College Park and vicinity. The cost of board and room varies from about $105.00 to $140.00 a month, depending upon the desires of the individual. A list of accommodations is maintained by the housing bureau in the office of the Dean of Men.

Application for student employment, aside from fellowships and assistantships, may be made through the offices of the Dean of Men and the Dean of Women, or to department heads.

FELLOWSHIPS AND ASSISTANTSHIPS

FELLOWSHIPS. A number of fellowships have been established by the University. The stipend for the University fellows is $800.00 for nine months and the remission of all graduate fees except the diploma fee. Several industrial and special fellowships, with varying stipends, are also available in certain departments.

University Fellows are permitted to carry a full graduate program, and they may satisfy the residence requirement for higher degrees in the normal time.

Applications for fellowships are made on blanks which may be obtained from the office of the Graduate School. The application, with the necessary credentials, is sent by the applicant directly to the Dean of the Graduate School.

Applications are forwarded by the Dean to the departments for their consideration and recommendation. The awards of University fellowships are on a competitive basis.

GRADUATE ASSISTANTSHIPS. A number of teaching and research assistantships are available in several departments. The compensation is $180.00 per month unless otherwise specified and varies with the nature and amount of service required and with the terms of appointment. The amount of credit allowed toward a degree is normally a maximum of ten credit hours in a regular semester. The research assistants usually participate in research that meets the requirements for a Master's or a Doctor's degree.

Applications for graduate assistantships are made directly to the departments concerned and appointments are made through the regular channels for staff appointments. Further information regarding these assistantships may be obtained from the departments concerned.

COMMENCEMENT

Attendance is required at the June commencement if the degree is conferred at that time.

Application for diploma must be filed in the office of the Registrar eight weeks before the date at which the candidate expects to obtain a degree except during the Summer Session.

Academic costume is required of all candidates at the June commencement. Those who so desire may purchase or rent caps and gowns at the Students' Supply Store. Orders must be filed eight weeks before the date of convocation but may be cancelled later if the student finds himself unable to complete his work for the degree.

METHOD OF NUMBERING COURSES AND COUNTING CREDIT HOURS

Courses for Advanced Undergraduates and Graduates are numbered 100 to 199; courses for Graduates only are numbered 200 and upward.

A course with a single number extends through one semester.

A course with a double number extends through two semesters.

The number of semester hour credits is shown by the arabic numerals in parentheses after the title of the course. Examples:
Course 101. Title (3). First semester.

If a laboratory course:

Course 101. Title (3). One lecture and two laboratory periods a week, first semester.

(This is a semester course: offered once a year.)

Course 101. Title (3). First and second semester.

(This is a semester course, repeated each semester, and except for research, seminar, and certain problem courses, must be taken only one semester.)

Course 103, 104. Title (3, 3). Three hours a week, first and second semesters.

If a laboratory course:

Course 103, 104. Title (3, 3). One lecture and two laboratory periods a week, first and second semesters.

(This is a course extending through two semesters and carrying three semester credits each semester.)

Course 103, 104. Title (3, 3). Three hours a week, second and first semesters.

(This is a course extending through two semesters, but it begins with the second semester.)

Course 105, f, s. Title (3, 3). Three hours a week, first and second semesters.

(This is alternate way of listing a two-semester course.)

GRADES

The following symbols are used for grades: A, B, C and S—Passing; D and F—Failure; I—Incomplete. Since graduate students must maintain an overall B average, every credit hour of C in course work must be balanced by a credit hour of A. A grade of A in thesis research will not balance a grade of C in a course. All incomplete grades must be removed before the degree is conferred.

CURRICULA AND REQUIRED COURSES

AERONAUTICAL ENGINEERING

Professors: *Sherwood, Corning and Shen.*
Associate Professor: *Rivello.*
Lecturers: *Pai, Hama and Kurzweg.*

The Department of Aeronautical Engineering offers courses and opportunities for research leading to the degree of Master of Science in Aeronautical Engineering. Steps are being taken toward the expansion of graduate work to include programs leading to the degree of Doctor of Philosophy.

Admission to the Graduate School for study in this department is based primarily on the student having a Bachelor of Science degree in Aeronautical Engineering in addition to the requirements for admission under General Regulations. However, a student without the Bachelor of Science degree in Aeronautical Engineering may be accepted for graduate study if he has a Bachelor of Science degree in an allied field of science and shows evidence of sufficient preparation for graduate work in his chosen field of Aeronautical Engineering.

Students may elect off-campus graduate courses given by the University, but off-campus credit may count toward the course requirement only if taken after graduate admission has been obtained. For the degree of Master of Science, a minimum of six semester hours of graduate instruction, exclusive of research, from resident faculty members of this department must be included in the student's program and passed with a grade of "B" or higher. An acceptable thesis written under the guidance of the graduate faculty is also required.

Facilities for graduate research include a complete subsonic laboratory consisting of a 7.75 x 11 ft., wind tunnel and related shops, offices and photographic equipment. For high speed research, a 6" x 6" supersonic wind tunnel is available with Schlieren optical system, instantaneous strain-gauge type pressure pick-ups, remote angle of attack control and other accessories. A 100 h. p. rotary vacuum pump provides adequate pumping capacity for 10 second runs at 2 minute intervals.

The general aerodynamics laboratory is equipped with the following major items: a two foot subsonic wind tunnel, a ballistics range for measuring supersonic drag of projectile-shaped bodies, a water table for simulating compressible flow by hydraulic analogy, a large electrolytic tank for the solution of potential flow problems, manometer boards, and high speed flash photographic equipment.

The structures laboratory has a 400,000 pound capacity universal testing machine, hydraulic tension-compression jacks and pumps, and lead shot bags for applying structural loading. Traction dynamometers and SR4 tension-compression load cells are available to measure loads. The laboratory has SR-4

strain indication equipment, extensometers, compressometers, Huggenberger extensometers, and a recording oscillograph for measuring strain. Dial gages and a transit are available for measuring deflections.

For Graduates and Advanced Undergraduates

Aero. E. 101. Aerodynamics I. (3)
Three lectures a week, second semester. Sherwood.

Aero. E. 102. Aerodynamics II. (2)
Two lectures a week, first semester. Continuation of Aero. E. 101. Sherwood.

Aero. E. 105. Airplane Fabrication Shop. (1)
One laboratory period a week. Prerequisite, Shop 2. Schreier.

Aero. E. 106. Airplane Fabrication. (1)
One lecture a week. Prerequisite, Aero. E. 105. Schreier.

Aero. E. 107, 108. Airplane Design. (4, 4)
Two lectures and two supervised calculation periods per week, first and second semesters. Prerequisites, Aero. E. 101, Aero. E. 104, and M. E. 22, 23. Aero E. 102 and Aero. E. 113 to be taken concurrently. Corning.

Aero. E. 109, 110. Aircraft Power Plants (3, 3)
Three lectures and one laboratory period a week, first and second semesters. Prerequisite, M. E. 100. Schreier.

Aero E. 111, 112. Aeronautical Laboratory (2, 2)
One lecture and one laboratory period a week, first and second semesters. Prerequisite, Aero. E. 101. To be taken concurrently with Aero. E. 102 and Aero. E. 113. Staff.

Aero. E. 113, 114. Mechanics of Aircraft Structures. (3, 4)
First and second semesters. Prerequisites, M. E. 22, 23 and Math. 64. Rivello.

Aero. E. 115. Aerodynamics III. (3)
Second semester. Elementary theory of the flow of a compressible gas at subsonic and supersonic speeds. Prerequisite, Aero. E. 102. Sherwood.

Aero. E. 117. Aircraft Vibrations. (3)
Second semester. Prerequisites, Aero. E. 113, Math. 64. Rivello.

For Graduates

Aero. E. 200, 201. Advanced Aerodynamics. (3, 3)
Three lectures a week, first and second semesters. Prerequisites, Aero. E. 101, 102, 115, Math. 64. Pai.

Aero. E. 202, 203. Advanced Aircraft Structures. (3, 3)
First and second semesters. Prerequisites, Aero. E. 113, 114. Rivello.

Aero. E. 204. Aircraft Dynamics. (3)
First semester. Prerequisites, Math. 64 and Aero. E. 114. Shen.

Aero. E. 205. Aircraft Dynamics. (3)
Second semester. Prerequisites, Math. 64, Aero. E. 114 and Aero. E. 101. Shen.

Aero. E. 206, 207. Advanced Aircraft Power Plants. (3, 3)
Two lectures and one laboratory period a week, first and second semesters. Prerequisites, M. E. 100; Aero. E. 109, 110.

Aero. E. 208. Advanced Aircraft Design. (3)
Three lectures a week, first semester. Prerequisites, Aero. E. 107, 108; Math. 64. Corning.

Aero. E. 209. Stability and Control. (3)
Three lectures a week, second semester. Prerequisites, Aero. E. 101, 102, 115. Corning.

Aero. E. 210. Aerodynamic Theory. (3)
First semester. Prerequisites, Aero. E. 101, 102, Math. 64. Shen.

Aero. E. 211. The Design and Use of Wind Tunnels (Supersonic). (3)
First and second semesters. Kurzweg.

Aero. E. 212, 213. Bodies at Supersonic Speeds. (3, 3)
First and second semesters. Prerequisites, degree in Aero. E. or M. E. or equivalent, and consent of instructor. Kurzweg.

Aero. E. 214. Seminar.
(Credit in accordance with work outlined by Aero. Engr. staff.) First and second semesters. Prerequisite, graduate standing.

Aero. E. 215. Research.
(Credit in accordance with work outlined by Aero Engr. staff.) First and second semesters. Prerequisite, graduate standing.

Aero. E. 216. Selected Aeroballistics Problems. (3)
First semester. Prerequisite, degree in Aero. E. or M. E. or equivalent and consent of instructor. Kurzweg.

Aero. E. 217. Aerodynamics of Viscous Fluids. (3)
Second semester. Prerequisite, Aero. E. 101, 115, Math. 64. Shen.

Aero. E. 218. Selected Topics in Aerodynamic Theory. (3)
First or second semesters. Topics of current interest and recent advances in the field of aerodynamics. Prerequisites, Aero. E. 210, 115. Shen.

AGRICULTURE

Associate Professor: *Schultz.*

Agr. 100. Introductory Agricultural Biometrics. (3)
First semester. Two lectures and one laboratory period per week. Introduction to fundamental concepts underlying the application of biometrical methods to agricultural problems with emphasis on graphical presentation of data, descriptive statistics, chi-square and t-tests, and linear regression and correlation. Schultz.

Agr. 200. Agricultural Biometrics. (3)
Second semester. Two lectures and one laboratory period per week. Prerequisite, Agr. Biom. 100 or equivalent. A continuation of Agr. 100 with emphasis on analysis of variance and co-variance, multiple and curvilinear regression, sampling, experimental design and miscellaneous statistical techniques as applied to agricultural problems. Schultz.

Agr. 202, 203. Advanced Biological Statistics. (2, 2)
First and second semesters. Prerequisite, approval of instructor. An advanced course dealing with specialized experimental designs, sampling techniques and elaborations of standard statistical procedures as applied to the animal and plant sciences. Schultz.

AGRICULTURAL ECONOMICS AND MARKETING

Professors: *Beal and Walker.*
Visiting Professor: *Taylor.*
Associate Professors: *Hamilton, Murray, Shull and Smith.*
Assistant Professor: *Ishee.*
Lecturer: *Whipple.*

The Department offers a course of study leading to the degree of Master of Science and Doctor of Philosophy. Although the major field is Agricultural Economics, thesis topics may be selected and courses concentrated in Farm Management, Farm Taxation, Farm Finance, Marketing, Land Economics, Agricultural Policy and Foreign Agricultural Trade.

Department requirements, supplementary to the Graduate School, have been formulated for the guidance of candidates for graduate degrees. Copies of these requirements may be obtained from the Department of Agricultural Economics and Marketing.

For Graduates and Advanced Undergraduates

A. E. 101. Marketing of Farm Products. (3)
First semester. Prerequisites, Econ. 31, 32, or Econ. 37. Taylor.

A. E. 103. Cooperation in Agriculture. (3)
First semester. Smith.

A. E. 104. Farm Finance. (3)
Second semester. Ishee.

A. E. 106. Prices of Farm Products. (3)
Second semester.

A. E. 107. Analysis of the Farm Business. (3)
First semester. Hamilton.

A. E. 108. Farm Management. (3)
Second semester. Hamilton.

A. E. 109. Research Problem. (1-2)
First and second semesters. Staff.

A. E. 110. Seminar. (1, 1)
First and second semesters. Hamilton.

A. E. 111. Land Economics. (3)
First semester. Ishee.

A. E. 112. Economic Development of American Agriculture. (3)
First semester. Beal.

A. E. 114. Foreign Trade in Farm Products. (3)
First semester. Taylor.

A. E. 115. Marketing of Dairy Products. (3)
First semester. Beal.

A. E. 116. Marketing of Fruits and Vegetables. (3)
Second semester.

A. E. 117. Economics of Marketing Eggs and Poultry. (3)
Second semester. Smith.

A. E. 118. Foreign Agricultural Policies. (3)
First semester. Whipple.

A. E. 119. Foreign Agricultural Economics. (3)
Second semester. Whipple.

Technology of Market Eggs and Poultry.
See Poultry Husbandry, P. H. 104.

Poultry Industrial and Economic Problems.
See Poultry Husbandry, P. H. 107.

Market Milk.
See Dairy, Dairy 109.

Livestock Markets and Marketing.
See Animal Husbandry, A. H. 150.

Meat and Meat Products.
See Animal Husbandry, A. H. 160.

Advertising.
See Business Administration, B. A. 151.

Retail Store Management.
See Business Administration, B. A. 154.

For Graduates

A. E. 200, 201. Special Problems in Farm Economics. (2, 2)
First and second semesters. **Staff.**

A. E. 202. Seminar. (1, 1)
First and second semesters. **Staff.**

A. E. 203. Research.
Credit according to work accomplished. **Staff.**

A. E. 208. Agricultural Policy. (3)
Second semester. **Beal.**

A. E. 210. Agricultural Taxation. (3)
First semester. **Walker.**

A. E. 211. Functional Aspects of Farm Taxation. (3)
Second semester. Two lectures and one laboratory period a week. **Walker.**

A. E. 214. Advanced Agricultural Marketing. (3)
First semester.

A. E. 215. Advanced Agricultural Cooperation. (3)
First semester.

A. E. 216. Advanced Farm Management. (3)
Second semester. **Ishee.**

A. E. 218. Agricultural Economics Research Techniques. (3)
First semester.

A. E. 219. Advanced Land Economics. (3)
Second semester.

A. E. 220. World Agricultural Production. (3)
First semester. **Taylor.**

AGRICULTURAL EDUCATION AND RURAL LIFE

Professor: *Ahalt.*
Assistant Professor: *Hopkins.*

This department offers work leading to the degree of Master of Science. Students may work full-time towards a degree or they may complete the requirements on a part-time basis, taking the special courses offered for agricultural teachers in summer, regular six-week summer school courses, and courses offered in the evenings and on Saturday during the school year.

Some students profitably elect special problems courses, mostly in agriculture, in which they work on problems in their local school and community. All students are required to enroll in a minimum of twelve semester hours in course work on the campus at College Park.

For Graduates and Advanced Undergraduates

R. Ed. 107. Observation and Analysis of Teaching in Agriculture. (3)
Second semester. Two lectures and one laboratory period a week. Hopkins.

R. Ed. 109. Teaching Secondary Vocational Agriculture. (3)
First semester. Ahalt, Hopkins.

R. Ed. 111. Teaching Young and Adult Farmer Groups. (1)
First semester. Hopkins.

R. Ed. 112. Departmental Management. (1)
Second semester. One laboratory period a week. Prerequisites, R. Ed. 107, 109.
Ahalt, Hopkins.

R. Ed. 114. Rural Life and Education. (3)
Second semester. **Ahalt.**

R. Ed. 150. Extension Education. (2)
Second semester. **Warner.**

R. Ed. 160. Agricultural Information Methods. (2)
First semester. **Warner.**

For Graduates

R. Ed. 201, 202. Rural Life and Education. (3, 3)
First and second semesters, alternate years. Prerequisite, R. Ed. 114, or equivalent.
Ahalt, Hopkins.

R. Ed. 207, 208. Problems in Vocational Agriculture. (2, 2)
First and second semesters, alternate years. Ahalt, Hopkins.

R. Ed. S207 A-B. Problems in Teaching Vocational Agriculture. (1-1)
Summer session only.

R. Ed. S208 A-B. Problems in Teaching Farm Mechanics. (1, 1)
Summer session only.

R. Ed. S209 A-B. Adult Education in Agriculture. (1-1)
Summer session only.

R. Ed. S210 A-B. Land Grant College Education. (1-1)
Summer session only.

R. Ed. S211 A-B. Agricultural Extension Service Education. (1-1)
Summer session only.

R. Ed. S212 A-B. Educational Functions of Rural Institutions. (1-1)
Summer session only.

R. Ed. S213 A-B. Supervision and Administration of Vocational Agriculture (1-1)
Summer session only.

R. Ed. 215. Supervision of Student Teaching. (1)
Arranged. Ahalt.

R. Ed. 220. Field Problems in Rural Education. (1-3)
Second semester. Summer session. Prerequisite, six semester hours of graduate study. Ahalt, Hopkins.

R. Ed. 240. Agricultural College Instruction. (1)
Second semester. Ahalt.

R. Ed. 250. Seminar in Rural Education. (1-1)
First and second semesters. Staff.

R. Ed. S250 A-B. Seminar in Rural Education. (1-1)
Summer session only.

R. Ed. 251. Research.
Credit according to work done. First and second semesters and summer session. Staff.

AGRONOMY—CROPS AND SOILS

Professors: *Wagner, Rothgeb and Street.*
Associate Professors: *Axley, Bourbeau and Strickling.*
Assistant Professors: *Decker, Santelmann.*

The Department of Agronomy offers a graduate course of study leading to the degree of Master of Science and to the degree of Doctor of Philosophy. The student may pursue major work in the Crops Division or in the Soils Division of the Department. A thesis based on original research is required

for each degree. Ample laboratory and greenhouse facilities for graduate work are available on the campus. The Plant Research Farm, the Forage Research Farm, and the Tobacco Experimental Farm offer adequate nearby field research facilities. Many projects of the Department are conducted in cooperation with the Agricultural Research Service of the United States Department of Agriculture with headquarters located three miles from the campus.

A. CROPS

For Graduates and Advanced Undergraduates

Agron. 103. Crop Breeding. (2)
Second semester. Prerequisite, Bot. 117 or Zool. 104. (Not offered 1959-60). Leffel.

Agron. 104. Tobacco Production. (3)
Second semester. Three lectures a week. Prerequisite, Bot. 1. Street.

Agron. 107. Cereal Crop Production. (3)
First semester. Two lectures and one laboratory period a week. Prerequisite, Bot. 1. (Not offered 1959-60). Santelmann.

Agron. 108. Forage Crop Production. (3)
Second semester. Two lectures and one laboratory period a week. Prerequisite, Bot. 1. Decker.

Agron. 109. Turf Management. (2)
First semester. Two lectures a week. Prerequisite, Bot. 1. (Not offered 1958-59). (———).

Agron. 151. Cropping Systems. (2)
Second semester. Two lectures a week. Prerequisite, Agron. 1 or equivalent. Wagner.

Agron. 152. Seed Production and Distribution. (3)
First semester. Two lectures and one laboratory period a week. Prerequisite, Agron. 1 or equivalent. (Not offered 1959-60). Newcomer.

Agron. 154. Weed Control. (3)
First semester. Two lectures and one laboratory period a week. Prerequisite, Agron. 1 or equivalent. (Not offered 1958-59). Santelmann.

For Graduates

Agron. 201. Advanced Crop Breeding. (2)
First semester. Prerequisite, permission of instructor. (Not offered 1958-59). Leffel.

Agron. 203. Crop Seminar. (*1, 1*)
First and second semesters. Street.

Agron. 204. Technic in Field Crop Research. (2)
Second semester. (Not offered 1959-60). (———).

Agron. 205. Biogenesis of Tobacco. (2)
First semester. Two lectures a week. Prerequisite, permission of instructor. (Not offered 1959-60). Street.

Agron. 206, 207. Recent Advances in Crop Production. (2, 2)
First semester. Two lectures a week. Prerequisite, permission of instructor. (Agron. 206; not offered in 1958-59). Staff.

Agron. 208. Research Methods. (2-4)
Second semester. Prerequisite, permission of staff. Staff.

Agron. 209. Research in Crops. (1-8)
First and second semesters. Credit according to work accomplished. Staff.

Agron. S210. Cropping Systems. (1)
Summer session only. Wagner.

Agron. 211. Biosynthesis of Tobacco. (2)
First semester. Two lectures a week. Prerequisite, permission of instructor. (Not offered 1958-59). Street.

B. SOILS

For Graduates and Advanced Undergraduates

Agron. S110. Soil Management. (1)
Summer session only. Strickling.

Agron. 111. Soil Fertility Principles. (3)
First semester. Three lectures a week. Prerequisite, Agron. 10. Not offered 1959-60). Strickling.

Agron. 112. Commercial Fertilizers. (3)
Second semester. Three lectures a week. Prerequisite, Agron. 10 or permission of instructor. Axley.

Agron. 113. Soil Conservation. (3)
First semester. Two lectures and one laboratory period a week. Prerequisite, Agron. 10 or permission of instructor. (Not offered 1959-60). Bentz.

Agron. 114. Soil Classification and Geography. (4)
Second semester. Three lectures and one laboratory period a week. Prerequisite, Agron. 10, or permission of instructor. Bourbeau.

Agron. 116. Soil Chemistry. (3)
First semester. One lecture and two laboratory periods a week. Prerequisite Agron. 10, or permission of instructor. (Not offered 1959-60). Axley.

Agron. 117. Soil Physics. (3)
First semester. Two lectures and one laboratory period a week. Prerequisite, Agron. 10 and a course in Physics, or permission of instructor. (Not offered 1958-59). Strickling.

Agron. 118. Special Problems in Soils. (*1*)
Second semester. Prerequisite, Agron. 10 and permission of instructor. Staff.

Agron. 119. Soil Mineralogy. (*4*)
First semester. Two lectures and two laboratory periods a week. Prerequisite, permission of instructor. (Not offered 1958-59). Bourbeau.

For Graduates

Agron. 250. Advanced Soil Mineralogy. (3)
First semester. Three lectures a week. Prerequisite, Agron. 10, Agron. 119 and permission of instructor. (Not offered 1959-60). Bourbeau.

Agron. 251. Advanced Methods of Soil Investigation. (3)
First semester. Three lectures a week. Prerequisite, Agron. 10 and permission of instructor. (Not offered 1958-59). Axley.

Agron. 252. Advanced Soil Physics. (3)
Second semester. Two lectures and one laboratory period a week. Prerequisite, Agron. 10 and permission of instructor. (Not offered 1958-59). Strickling.

Agron. 253. Advanced Soil Chemistry. (3)
First semester. One lecture and two laboratory periods a week. Prerequisite, Agron. 10 and permission of instructor. (Not offered 1959-60). Axley.

Agron. 255. Soil Seminar. (*1, 1*)
First and second semesters. Prerequisite, Agron. 10 and permission of instructor. Axley, Bentz.

Agron. 256. Soil Research. (*1-12*)
First and second semesters. Credit according to work done. Staff.

AMERICAN CIVILIZATION

Professor: *Bode and cooperating specialists.*

The American Civilization program offers work leading to both the degrees of Master of Arts and Doctor of Philosophy. The departments of English, History, Government and Politics, and Sociology join to offer integrated plans of study. In his class work the student will emphasize the offerings of any one of these departments. For lists of courses from which his particular program is to be developed, he is to see principally the listings of the four departments just mentioned. His adviser will be the chairman of the department whose work the student plans to emphasize, or if not the chairman then someone appointed by him.

Amer. Civ. 137, 138. Conference Course in American Civilization. (3, 3)
First and second semesters. Four American classics, drawn from the fields of the cooperating departments, are studied in detail each semester. Specialists from the appropriate departments lecture on these books. The classics for this year are Franklin's *Autobiography, The Life and Writings of Thomas Jefferson,* De Tocqueville's *Democracy in America,* Schlesinger's *The Age of Jackson,* for the first semester; and for the second semester, Thoreau's *Walden,* Howells' *The Rise of Silas Lapham,* Veblen's *The Theory of the Leisure Class,* and Warner's *Democracy in Jonesville.* The Conference course, or either semester of it, may be chosen by a student outside the program as an elective. It also counts as major credit for the four cooperating departments. The course meets like a seminar, once a week.

ANIMAL HUSBANDRY

Professors: *Foster and Green.*
Assistant Professors: *Leffel and Wingert.*

The Department of Animal Husbandry offers work leading to the degree of Master of Science and Doctor of Philosophy. Although the major field is Animal Husbandry, course work and thesis problems are offered in the fields of animal breeding, nutrition, livestock management, and meats.

For Graduates and Advanced Undergraduates

A. H. 111. Animal Nutrition. (3)
Three lectures a week, first semester. Prerequisite, Chem. 31, 32, 33, 34; A. H. 110 or permission of instructor. Graduate credit allowed with permission of instructor. **Leffel.**

A. H. 120. Principles of Breeding. (3)
Three lectures a week, second semester. Prerequisites, Zool. 104 and A. H. 130 or A. H. 131 or A. H. 132 or Dairy 101. Graduate credit (1-3 hours) allowed with permission of instructor. **Green.**

A. H. S130. Beef Cattle. (1)
Summer session only. This course is designed primarily for teachers of Vocational Agriculture and Extension Service Workers. Prerequisite, permission of instructor. **Foster.**

A. H. 150. Livestock Markets and Marketing. (2)
Two lectures a week, first semester. Prerequisite, A. H. 1. Graduate credit allowed with permission of instructor. **Wingert.**

For Graduates

A. H. 200, 201. Special Problems in Animal Husbandry. (1-2, 1-2)
First and second semesters. Work assigned in proportion to amount of credit. Prerequisite, approval of staff. **Staff.**

A H. 202, 203. Seminar. (1, 1)
First and second semesters. **Staff.**

A. H. 204. Research. (1-6)
First and second semesters. Credit to be determined by amount and character of work done. Staff.

A. H. 205. Advanced Breeding. (2)
Two lectures a week, second semester. Prerequisites, A. H. 120 or equivalent and biological statistics. Green.

A. H. 206. Advanced Livestock Management. (3)
Two lectures and one laboratory period a week, first semester. Prerequisite, approval of staff. Staff.

BOTANY

Professors: *Bamford, Gauch, Cox, Appleman (Emeritus), and Norton, (Emeritus).*
Associate Professors: *Brown, Krauss, D. T. Morgan, and Rappleye.*
Assistant Professors: *Sisler and Jenkins.*

The Department of Botany offers a graduate course of study leading to the degree of Master of Science and to the degree of Doctor of Philosophy. The student may pursue major work in any one of the three main divisions of the department, namely: Plant Physiology, Plant Pathology, or Plant Morphology, Cytology and Cytogenetics. Since a thesis based on original research is required for each degree, a qualified student may be allowed to pursue a problem of his own choosing, but it is more probable that the subject of his research will be that already in progress since the department is devoted to a study of basic agricultural problems as well as projects of a more fundamental nature.

An individual employed at a nearby institution may submit a thesis on his research work at the institution under the direction of, and approved by, a member of the faculty. Laboratory facilities are available for research in each division, and there are ample greenhouses and plot space available on the campus or adjacent University farm land.

In addition to the normal requirements of the Graduate School, one must possess a reading knowledge of either French or German, before the Master of Science degree is granted.

A. PLANT PHYSIOLOGY

For Graduates and Advanced Undergraduates

Bot. 101. Plant Physiology. (4)
First semester. Two lectures and two laboratory periods a week. Prerequisites, Bot. 1, and general chemistry. Laboratory fee, $5.00. Krauss.

Bot. 102. Plant Ecology. (3)
Second semester. Two lectures and one laboratory period a week. Prerequisite, Bot. 11, or equivalent. Laboratory fee, $5.00. Brown.

For Graduates

Bot. 200. Plant Biochemistry. (2)
First semester. Prerequisites, Bot. 101 and elementary organic chemistry. Wetherell.

Bot. 201. Plant Biochemistry Laboratory. (2)
First semester. Two laboratory periods a week. Prerequisite, Bot. 200 or concurrent registration therein. Laboratory fee $10.00. Wetherell.

Bot. 202. Plant Biophysics. (2)
Second semester. Prerequisites, Bot. 101, and elementary physics, or equivalent. (Not offered 1958-1959.) Wetherell.

Bot. 203. Biophysical Methods. (2)
Second semester. To accompany Bot. 202. Same prerequisites. Laboratory fee $10.00. (Not offered 1958-1959.) Wetherell.

Bot. 204. Growth and Development. (2)
First semester. Prerequisite, 12 semester hours of plant science. (Not offered 1958-1959.) Krauss.

Bot. 205. Mineral Nutrition of Plants. (2)
Second semester. Prerequisite, Bot. 101, or equivalent. Krauss.

Bot. 206. Research in Plant Physiology.
Credit according to work done. Gauch, Krauss.

Bot. 207. Special Topics in Plant Physiology. (2)
Second semester. Prerequisite, permission of instructor.

Bot. 208. Seminar in Plant Physiology. (1)
First and second semesters. Prerequisite, permission of instructor. Gauch, Krauss.

Bot. 209. Physiology of Algae. (3)
First semester. Two lectures and one laboratory a week. Prerequisite, Bot. 201, the equivalent in allied fields or permission of instructor. Laboratory fee $10.00. (Not offered 1958-1959.) Krauss.

B. GENERAL BOTANY AND MORPHOLOGY

For Graduates and Advanced Undergraduates

Bot. 111. Plant Anatomy. (3)
First semester. One lecture and two laboratory periods a week. Prerequisite, Bot. 110, or equivalent. Laboratory fee, $5.00. Rappleye.

Bot. 113. Plant Geography. (2)
First semester. Prerequisite, Bot. 1, or equivalent. Brown.

Bot. 114. Advanced Plant Taxonomy. (3)
First semester. One lecture and two laboratory periods a week. Prerequisite, Bot. 11, or permission of instructor. Laboratory fee, $5.00. Brown.

Bot. 115. Structure of Economic Plants. (3)
Second semester. One lecture and two laboratory periods a week. Prerequisite, Bot. 111. Laboratory fee, $5.00. Rappleye.

Bot. 116. History and Philosophy of Botany. (1)
First semester. Prerequisite, 15 semester hours of botany. Bamford.

Bot. 117. General Plant Genetics. (2)
Second semester. Prerequisite, Bot. 1, or equivalent. D. T. Morgan.

Bot. 135. Aquatic Plants. (3)
First semester. One lecture and two laboratory periods a week. Prerequisites, Bot. 1, Bot. 11 or equivalent. Laboratory fee, $5.00. (Not offered 1958-1959.)

Bot. 136. Plants and Mankind. (2)
First semester. Prerequisite, Bot. 1 or equivalent. Rappleye.

Bot. 151S. Teaching Methods in Botany. (2)
Summer. Prerequisite, Bot. 1, or equivalent. Laboratory fee, $5.00.

For Graduates

Bot. 211. Cytology. (4)
Second semester. Two lectures and two laboratory periods a week. Prerequisite, Introductory Genetics. Laboratory fee, $10.00. Bamford, D. T. Morgan.

Bot. 212. Plant Morphology. (3)
First semester. One lecture and two laboratory periods a week. Prerequisites, Bot. 11, Bot. 111, or equivalent. Laboratory fee, $5.00. Rappleye.

Bot. 213. Seminar in Plant Cytology and Morphology. (1)
First and second semesters. Prerequisite, permission of instructor.
D. T. Morgan, Rappleye.

Bot. 214. Research in Plant Cytology and Morphology.
Credit according to work done. Bamford, D. T. Morgan, Rappleye.

Bot. 215. Plant Cytogenetics. (3)
First semester. Prerequisite, Introductory Genetics. Laboratory fee, $10.00. (Not offered 1958-1959.) D. T. Morgan.

Bot. 219. Special Topics in Plant Morphology and Cytology. (2)
First semester. Prerequisite, permission of instructor.

C. PLANT PATHOLOGY

For Graduates and Advanced Undergraduates

Bot. 122. Research Methods in Plant Pathology. (2)
First or second semester. Two laboratory periods a week. Prerequisite, Bot. 20, or equivalent. Laboratory fee, $5.00. Jenkins.

Bot. 123. Disease of Ornamental Plants. (2)
Second semester. Prerequisite, Bot. 20, or equivalent. (Not offered 1958-1959.) Wilson.

Bot. 124. Diseases of Tobacco and Agronomic Crops. (2)
First semester. Prerequisite, Bot. 20, or equivalent. O. D. Morgan.

Bot. 125. Diseases of Fruit Crops. (2)
First semester. Prerequisite. Bot. 20, or equivalent. (Not offered 1958-1959.) Weaver.

Bot. 126. Disease of Vegetable Crops. (2)
Second semester. Prerequisite, Bot. 20, or equivalent. Cox.

Bot. 128. Mycology. (4)
Second semester. Two lectures and two laboratory periods a week. Prerequisite, Bot. 2, or equivalent. Laboratory fee, $5.00. Wilson.

Bot. 141. Nematode Diseases of Plants. (2)
First semester. Prerequisite, Bot. 20 or permission of instructor. (Not offered 1958-1959). Jenkins.

Bot. 152S. Field Plant Pathology. (1)
Summer, first three weeks, Laboratory fee, $5.00. Prerequisite, Bot. 20, or equivalent. (Not offered 1958.) Cox, Staff.

For Graduates

Bot. 221. Virus Diseases. (3)
Two lectures and one laboratory period a week, second semester. Prerequisites, Bot. 20, 101. Laboratory fee, $10.00. Sisler.

Bot. 223. Physiology of Fungi. (2)
First semester. Prerequisites, Organic Chemistry and Botany 101 or the equivalent in bacterial or animal physiology. Sisler.

Bot. 224. Physiology of Fungi Laboratory. (1)
First semester. One laboratory period a week. Prerequisite, Bot. 223 or concurrent registration therein. Laboratory fee, $10.00. Sisler.

Bot. 225. Research in Plant Pathology.
Credit according to work done. Staff.

Bot. 226. Plant Disease Control. (3)
First semester. Prerequisite, Bot. 20, or equivalent. Cox.

Bot. 228. Special Topics in Plant Pathology. (2)
Second semester. Prerequisite, permission of instructor.

Bot. 229. Seminar in Plant Pathology. (1)
First and second semesters. Prerequisite, permission of instructor. Cox.

Bot. 241. Plant Nematology. (3)
Second semester. Two lectures and one laboratory period a week. Prerequisite, permission of instructor. Laboratory fee $10.00. (Not offered 1958-1959.) Jenkins.

BUSINESS ADMINISTRATION

Professors: *Frederick, Clemens, Cook, Fisher, Pyle, Sweeney, Sylvester, Taff, Wedeberg and Wright.*
Associate Professors: *Dawson and Gentry.*

The degrees of Master of Business Administration is conferred on those students who satisfactorily complete the requirements which are set forth in the section of this catalog entitled, "Requirements for the Degree of Master of Business Administration."

For Graduates and Advanced Undergraduates

B. A. 110, 111. Intermediate Accounting. (3, 3)
Prerequisite, a grade of "B" or better in B. A. 21, or consent of instructor. Daiker.

B. A. 116. Public Budgeting. (3)
Prerequisites, B. A. 21 and Econ. 32. Wright.

B. A. 118. Governmental Accounting. (3)
Prerequisite, B. A. 111.

B. A. 121. Cost Accounting. (4)
Prerequisite, a grade of "B" or better in B. A. 21, or consent of instructor. Sweeney.

B. A. 122. Auditing Theory and Practice. (3)
Prerequisite, B. A. 111. Wright.

B. A. 123. Income Tax Accounting. (4)
Prerequisite, a grade of "B" or better in B. A. 21, or consent of instructor. Wedeberg.

B. A. 124, 126. Advanced Accounting. (3, 3)
Prerequisite, B. A. 111. Wedeberg.

B. A. 125. C. P. A. Problems. (3)
Prerequisite, B. A. 124, or consent of instructor. Wedeberg.

B. A. 127. Advanced Auditing Theory and Practice. (3)
Prerequisite, B. A. 122. Wright.

B. A. 130. Elements of Business Statistics. (3)
Laboratory fee, $3.50. Nelson, Cluse, Calhoun.

B. A. 131. Statistics Laboratory.

B. A. 132, 133. Advanced Business Statistics. (3, 3)
Prerequisite, B. A. 130. Laboratory fee, $3.50. Nelson.

B. A. 140. Financial Management. (3)
Prerequisite, B. A. 21, Econ, 140. Calhoun.

B. A. 141. Investment Management. (3)
Prerequisite, B. A. 140. Calhoun.

B. A. 142. Banking Policies and Practices. (3)
Prerequisite, Econ. 140. Calhoun.

B. A. 143. Credit Management. (3)
Prerequisite, B. A. 140. Calhoun.

B. A. 148. Advanced Financial Management. (3)
Prerequisite, B. A. 140. Fisher.

B. A. 149. Analysis of Financial Statements. (3)
Prerequisite, B. A. 140. Fisher.

B. A. 150a. Marketing Principles and Organization. (3)
Prerequisite, Econ. 32 or 37. Reid and Staff.

B. A. 150. Marketing Management. (3)
Prerequisite, B. A. 150a. Cook, Reid.

B. A. 151. Advertising Programs and Campaigns. (3)
Prerequisite, B. A. 150. Gentry.

B. A. 152. Advertising Copy Writing and Layout. (3)
Prerequisite, B. A. 151. Gentry.

B. A. 153. Purchasing Management. (3)
Prerequisite, B. A. 150. Gentry.

B. A. 154. Retail Store Management. (3)
Prerequisite. Econ. 150. Cook.

B. A. 155. Problems in Retail Merchandising. (3)
Prerequisite, B. A. 154. Cook.

B. A. 156. Marketing Research Methods. (3)
Prerequisite, B. A. 130, B. A. 150. Cook.

B. A. 157. Foreign Trade Procedure. (3)
Prerequisite, B. A. 150. Dawson.

B. A. 158. Advertising Problems. (3)
Prerequisites, B. A. 151 and B. A. 152. Gentry.

B. A. 159. Newspaper Advertising. (3)
Prerequisite, B. A. 151. Gentry.

B. A. 160. Personnel Management. (3)
Prerequisite, Econ. 160. Tierney.

B. A. 163. Industrial Relations. (3)
Prerequisite, Econ. 160. Tierney.

B. A. 164. Recent Labor Legislation and Court Decisions. (3)
Prerequisite, B. A. 160. Tierney.

B. A. 165. Office Management. (3)
Patrick.

B. A. 166. Business Communications. (3)

B. A. 167. Job Evaluation and Merit Rating. (2)
Prerequisite, B. A. 160. Tierney.

B. A. 168. Advanced Office Management. (3)
Prerequisite, B. A. 165. Tierney.

B. A. 169. Industrial Management. (3)
Prerequisites, B. A. 11 and 160. Mueller.

B. A. 170. Transportation Services and Regulation. (3)
Prerequisite, Econ. 32 or 37. Taff.

B. A. 171. Industrial and Commercial Traffic Management. (3)
Prerequisite, B. A. 170. Taff.

B. A. 172. Motor Transportation. (3)
Prerequisite, B. A. 170. Taff.

B. A. 173. Overseas Shipping. (3)
Prerequisite, B. A. 170. Dawson.

B. A. 174. Commercial Air Transportation. (3)
Prerequisite, B. A. 170. Frederick.

B. A. 175. Airline Administration. (3)
Prerequisite, B. A. 174. Frederick.

B. A. 176. Problems in Airport Management. (3)
Prerequisite, B. A. 174. Frederick.

B. A. 177. Motion Economy and Time Study. (3)
Prerequisite, B. A. 169. Mueller.

B. A. 178. Production Planning and Control. (2)
Prerequisite, B. A. 169. Mueller.

B. A. 179. Problems in Supervision. (3)
Prerequisite, B. A. 169. Mueller.

B. A. 180, 181. Business Law. (4, 4) Mounce.

B. A. 184. Public Utilities. (3)
Prerequisites, Econ. 32 and 37. Clemens.

B. A. 189. Business and Government. (3)
Prerequisite, Econ. 32 or 37. Nelson.

B. A. 190. Life Insurance. (3)
Prerequisite, Econ. 32 or 37.

B. A. 191. Property Insurance. (3)
Prerequisite, Econ. 32 or 37.

B. A. 194. Insurance Agency Management. (3)
Prerequisite, B. A. 190 or 191.

B. A. 195. Real Estate Principles. (3)
Prerequisite, Econ. 32 or 37.

B. A. 196. Real Estate Finance. (3)
Prerequisite, Econ. 32 or 37.

B. A. 197. Real Estate Management. (3)
Prerequisite, B. A. 195 or 196.

For Graduates

B. A. 210. Advanced Accounting Theory. (2, 3)
Prerequisite, B. A. 111. Wedeberg, Fisher.

B. A. 220. Managerial Accounting. (3) Wedeberg, Wright.

B. A. 221, 222. Seminar in Accounting. Wedeberg, Wright.

B. A. 226. Accounting Systems. Wedeberg, Sweeney.

B. A. 228. Research in Accounting. Wedeberg.

B. A. 229. Studies of Special Problems in the Fields of Control and Organization.
Mueller.

B. A. 240. Seminar in Financial Management. (1-3)
Prerequisite, B. A. 140. Calhoun, Fisher.

B. A. 249. Studies of Special Problems in the Field of Financial Administration.
Fisher.

B. A. 250. Problems in Sales Management. (1-3)
Cook, Reid.

B. A. 251. Problems in Advertising. (3)
Gentry.

B. A. 252. Problems in Retail Store Management. (3)
Cook.

B. A. 257. Seminar in Marketing Management.
Cook, Gentry, Reid.

B. A. 258. Research in Marketing.
Cook, Gentry.

B. A. 262. Seminar in Contemporary Trends in Labor Relations. (3)

B. A. 265. Development and Trends in Industrial Management. (3)
Mueller.

B. A. 266. Research in Personal Management.

B. A. 267. Research in Industrial Relations.

B. A. 269. Studies of Special Problems in Employer-Employee Relationships.

B. A. 270. Seminar in Air Transportation. (3)
Frederick.

B. A. 271. Theory of Organization. (3)
Mueller.

B. A. 275. Seminar in Motor Transportation. (3)
Taff.

B. A. 277. Seminar in Transportation. (3)
Frederick.

B. A. 280. Seminar in Business and Government Relationships.
Staff.

B. A. 284. Seminar in Public Utilities. (3)
Clemens.

B. A. 290. Seminar in Insurance. (3)

B. A. 295. Seminar in Real Estate. (3)

B. A. 299. Thesis.
Staff.

CHEMICAL ENGINEERING

Professors: *Huff, Bonney, Pennington and Schroeder.*
Associate Professor: *Duffey.*

This Department directs the programs of graduate students who plan to qualify for the degree of Master of Science or Doctor of Philosophy in Chemical Engineering, Nuclear Engineering or in Metallurgy.

Departmental regulations have been assembled for the guidance of candidates for graduate degrees in Chemical Engineering and in the Metallurgical Option. Copies of these regulations are available on request from the Department of Chemical Engineering.

For Graduates and Advanced Undergraduates

Ch. E. 103 f,s. Elements of Chemical Engineering. (3, 3)
Three hours a week, both semesters. Prerequisites, Chem. 1, 3; Phys. 21; Math. 21.
Huff.

Ch. E. 104. Chemical Engineering Seminar. (1)
One hour a week, both semesters. Prerequisite, permission of the Department. The content of this course is constantly changing so a student may receive a number of credits by re-registering.
Reid.

Ch. E. 105 f,s. Advanced Unit Operations. (5, 5)
Two lectures and one all-day laboratory a week, both semesters. Prerequisites, Ch. E. 103 f,s; Chem. 187, 188, 189, 190. Laboratory fee, $8.00 per semester.
Bonney and Staff.

Ch. E. 107. Fuels and Their Utilization. (3)
Three hours a week, second semester. Prerequisite, Ch. E. 103 f,s, or permission of the department.
Huff.

Ch. E. 109 f,s. Chemical Engineering Thermodynamics. (3, 3)
Three hours a week, both semesters. Prerequisites, Ch. E. 103 f,s; Chem. 187, 189, or permission of the department.
Bonney.

Ch. E. 112, 113. Industrial Chemical Technology. (3, 3)
Three hours a week, both semesters. Prerequisite, Ch. E. 103 f,s, or simultaneous registration therein, or permission of the department.
Schroeder.

Ch. E. 116. Applications of Advanced Mathematical Analysis in Chemical Engineering. (3)
First semester. Three lectures a week. Prerequisities, Math. 20, 21 and Ch. E. 103 f,s.
Reid.

Ch. E. 123. Elements of Plant Design. (3)
Second semester. Two lectures and one laboratory period a week. Prerequisites, Ch. E. 103 f,s, Ch. E. 110 or Ch. E. 116; Chem. 189.
Schroeder.

Ch. E. 131. Chemical Engineering Economics. (2)
Second semester, two lectures a week. Prerequisites, simultaneous registration in or completion of Ch. E. 108 f,s, or Ch. E. 112, 113, 109 f,s, and 123, or permission of instructor. Schroeder.

Ch. E. 140. Introduction of Nuclear Technology. (2)
First semester, two lectures a week. Prerequisites, Math. 21 and Phys. 21, or consent of instructor. Duffey.

Ch. E. 142. Environmental Considerations of Nuclear Engineering. (3)
First semester. Three lectures a week. Prerequisite, permission of instructor. Lieberman.

Ch. E. 145. Applications of Differential Equations and Statistics in Chemical Engineering. (3)
Second semester, one lecture, two laboratory periods a week. Prerequisites, Ch. E. 103 f,s, Ch. E. 110 or Ch. E. 116 or permission of instructor.

Ch. E. 148. Nuclear Technology Laboratory. (3)
One lecture, two laboratory periods a week. Prerequisites Chem. 3, Physics 21, Math. 21, Ch. E. 140 or equivalents and permission of instructor. Laboratory fee $8.00. Duffey and Bonney.

For Graduates

Ch. E. 201. Graduate Unit Operations. (5)
One hour conference, three or more three-hour laboratory periods a week, first semester. Prerequisite, permission of the department. Laboratory fee, $8.00. Bonney.

Ch. E. 202 f,s. Gas Analysis. (3)
One lecture and two three-hour laboratory periods a week, one semester, to be arranged. Prerequisite, permission of the department. Laboratory fee, $8.00. Bonney.

Ch. E. 203. Graduate Seminar. (1)
One hour a week, each semester. The content of this course is constantly changing, so a student may receive a number of credits by re-registering. Prerequisite, permission of the department. Huff.

Ch. E. 205. Research in Chemical Engineering.
Prerequisites and credits to be arranged for individuals. Laboratory fee, $8.00 per semester. Huff, Bonney, Duffey, Schroeder, Reid.

Ch. E. 207 f,s. Advanced Plant Design Studies. (3, 3)
Three hours a week, both semesters. Prerequisite, permission of the department. Huff, Schroeder.

Ch. E. 209 f,s. Plant Design Studies Laboratory. (3, 3)
Three laboratory periods a week, both semesters. Prerequisite, permission of the department. Laboratory fee, $8.00 per semster. Bonney.

Ch. E. 210 f,s. Gaseous Fuels. (2, 2)
Two hours a week, both semesters. Prerequsite, permission of the department. Huff.

Ch. E. 214. Corrosion and Metal Protection. (4)
Second semester. Four lecture hours a week. Prerequisites, Ch. E. 114 or Chem. 187, 189 or Chem. 188, 190, or consent of the instructor. Huff

Ch. E. 216. Unit Processes of Organic Technology. (3)
Three lectures a week, second semester. Prerequisite, permission of the Department. Bonney.

Ch. E. 217. Unit Processes of Organic Technology Laboratory. (2)
Two or more laboratory periods a week, second semester. Prerequisite, permission of the instructor. Laboratory fee, $8.00. Bonney.

Ch. E. 240, 241. Advanced Heat and Mass Transfer. (2, 2)
Two lectures a week, both semesters. Prerequisite, permission of the Department.

Ch. E. 250. Chemical Engineering Practice. (6)
Four hours conference and forty hours a week of work in laboratory and plant for eight weeks. Prerequisite, permission of the department. (Not offered 1958-1959).

Ch. E. 280, 281. Graduate Chemical Engineering Thermodynamics. (3, 3)
Three lectures a week, first and second semesters. Prerequisites, Ch. E. 109, f,s; Ch. E. 110 or Ch. E. 116 or permission of instructor. Bonney.

Ch. E. 290. Chemical Engineering Process Kinetics. (3)
First semester, three lectures a week. Prerequisite, permission of instructor. Reid.

Ch. E. 302, 303. Nuclear Reactor Engineering. (3, 3)
First and second semesters. Three lectures a week. Prerequisite, permission of instructor. Duffey.

Ch. E. 305. Sub-critical Nuclear Reactor Laboratory. (3)
One lecture, two laboratory periods a week. Prerequisites, Ch. E. 148, 302, 303, or equivalents, and permission of instructor. Laboratory fee, $8.00. Duffey and Bonney.

Ch. E. 311. Nuclear Separation Engineering. (2)
Second semester. Two lectures a week. Prerequisite, permission of instructor. Duffey.

Ch. E. 315. Non-power Uses of Nuclear or High Energy Radiation. (2)
Second semester. Two lectures a week. Prerequisite, permission of instructor. Duffey.

METALLURGICAL OPTION

For Graduates and Advanced Undergraduates

Met. 104. Senior Metallurgical Seminar. (1, 1)
One hour a week. The content of this course is constantly changing so a student may receive a number of credits by re-registration. Costas.

Met. 150, 151. Physical Metallurgy. (3, 3)
Three lectures a week. Prerequisites, Math. 21, Phys. 21. Pennington.

Met. 152, 153. Physical Metallurgy Laboratory. (2, 2)
Two three-hour laboratories a week. Prerequisites, Math. 21, Phys. 21, Met. 150, 151 (may be taken concurrently). These courses are associated with Met. 150, 151, but are not required with the lecture courses except in the case of Metallurgy majors. Laboratory fee, $8.00 per semester. Pennington.

Met. 164, 166. Thermodynamics of Metallurgical Processes. (3, 3)
Three lectures a week. Prerequisites, Chem. 187, 189; Chem. 188, 190. Pennington.

Met. 168, 170. Metallurgical Investigations. (2, 4)
First semester, two three-hour laboratory periods a week; second semester, three lectures and one three-hour laboratory period a week. Prerequisites, concurrent registration in or completion of Met. 182, 183. Laboratory fee, $8.00 per semester. Pennington.

Met. 182, 183. Optical and X-Ray Metallography. (4, 4)
Three lectures and one laboratory period a week. Prerequisites, Met. 64, 66 (or Met. 150, 151; Met. 152, 153); Met. 68, 70; or permission of instructor. Laboratory fee, $8.00 per semester. Park.

Met. 188, 189. Alloy Steels I, II. (2, 2)
Two lectures per week. Prerequisite, graduate or undergraduate standing. (Met. 188 is not prerequisite to Met. 189. Offered at off-campus installations as determined by departmental and registration requirements). Loring.

For Graduates

Met. 205. Research in Metallurgy.
Prerequisites and credits to be arranged for individuals. Laboratory fee, $8.00 per semester. Pennington.

Met. 220, 221. Solid Phase Reactions. (3, 3)
Three lectures a week. Prerequisites, Chem. 187, 189; Chem. 188, 190; Met. 182, 183; or permission of the instructor. Moore.

Met. 224, 225. Advanced X-Ray Metallography. (3, 3)
Two lectures and one laboratory period a week. Prerequisites, Math. 114, 115; Met. 182, 183. Laboratory fee, $8.00 per semester.

Met. 228. Seminar in Metallurgy. (1, 1)
One meeting a week. Required of graduate students in Metallurgical curriculum. The content of this course is constantly changing, so a student may receive a number of credits by re-registration. Pennington.

Met. 229. Gases in Metals. (2)
Second semester. Two lectures per week. Prerequisites, Met. 182, 183 or permission of the instructor. Pennington.

Met. 230, 231. Mechanical Metallurgy. (3, 3)
Three lectures a week. Prerequisites Math. 114, 115; Met. 182, 183. Moore.

Met. 232, 233. Advanced Physical Metallurgy. (3, 3)
Three lectures a week. Required of graduate students in Metallurgical curriculum. Loring.

CHEMISTRY

Professors: *Drake, Lippincott, Pratt, Reeve, Rollinson, Svirbely, Veitch, White, and Woods.*
Research Professors: *Bailey and Slawsky.**
Associate Professors: *Brown, Jansen**, *Mason**, *Pickard, Schamp**, *and Stuntz.*
Assistant Professors: *Dewey, Jaquith and Vanderslice**.

Departmental regulations have been assembled for the guidance of candidates for graduate degrees. Copies of these regulations are available from the Department of Chemistry.

Laboratory fees in Chemistry are $10.00 per laboratory course per semester.

A. ANALYTICAL CHEMISTRY

For Graduates and Advanced Undergraduates

Chem. 123. Quantitative Analysis. (4)
First semester. Two lecturers and two three-hour laboratory periods per week. Prerequisite, Chem. 21 or equivalent. Stuntz.

An intensive study of the theory and techniques of inorganic quantitative analysis, including volumetric, gravimetric, electrometric and colorimetric methods. Required of all students majoring in Chemistry. Stuntz.

Chem. 166, 167. Food Analysis. (3, 3)
First and second semesters. One lecture and two three-hour laboratory periods per week. Prerequisites, Chem. 33, 34.

For Graduates

Chem. 206, 208. Spectrographic Analysis. (1, 1)
One three-hour laboratory a week. Prerequisite, Chem. 188, 190, and consent of the instructor. Registration limited. White.

Chem. 221, 223. Chemical Microscopy. (2, 2)
One lecture and one three-hour laboratory period a week, first and second semesters. Prerequisite, consent of instructor. Registration limited. Stuntz.

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*Members of Institute of Molecular Physics.

Chem. 226, 228. Advanced Quantitative Analysis. (2, 2)
Two three-hour laboratory periods a week, first and second semesters. Prerequisite, consent of instructor. Stuntz.

Chem. 266. Biological Analysis. (2)
Second semester. Two three-hour laboratory periods per week. Prerequisites, Chem. 19, 33, 34.

A study of analytical methods applied to biological material.

B. BIOCHEMISTRY

For Graduates and Advanced Undergraduates

Chem. 161, 163. Biochemistry. (2, 2)
Two lectures a week, first and second semesters. Prerequisites, Chem. 33, or Chem. 37. Woods, Veitch.

Chem. 162, 164. Biochemistry Laboratory. (2, 2)
Two three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 34, or Chem. 38. Woods, Veitch.

For Graduates

Chem. 261, 263. Advanced Biochemistry. (2, 2)
Two lectures a week, first and second semesters. Prerequisites, Chem. 143 or consent of instructor. Veitch.

Chem. 262, 264. Advanced Biochemistry Laboratory. (2, 2)
Two three-hour laboratory periods a week, first and second semesters. Prerequisite, consent of the instructor. Veitch.

Chem. 265. Enzymes. (2)
Two lectures a week, first semester. Prerequisite, Chem. 163. Veitch.

Chem. 268. Special Problems in Biochemistry. (2-4)
Two to four three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 161, 162, 163, 164, and consent of the instructor. Veitch.

C. INORGANIC CHEMISTRY

For Graduates and Advanced Undergraduates

Chem. 101. Advanced Inorganic Chemistry. (2)
Two lectures a week, second semester. Prerequisites, Chem. 37, 123. Staff.

Chem. 102. Inorganic Preparations. (2)
Two three-hour laboratory periods per week, second semester. Prerequisite, Chem. 123. Jaquith.

Chem. 111. Chemical Principles. (4)
Two lectures and two three-hour laboratory periods a week. Prerequisite, Chem. 1 and 3, or equivalent. Not open to students seeking a major in the physical sciences, since the course content is covered elsewhere in their curriculum. Jaquith.

A course in the principles of chemistry with accompanying laboratory work consisting of simple quantitative experiments. (Credit applicable only toward degree in College of Education.)

For Graduates

Chem. 201, 203. The Chemistry of The Rarer Elements. (2, 2)
Two lectures a week, first and second semesters. White.

Chem. 202, 204. Advanced Inorganic Laboratory. (2)
Two three-hour laboratory periods a week, first and second semesters.

Chem. 205. Radiochemistry. (2)
Two lectures a week. Rollinson.

Chem. 207. Chemistry of Coordination Compounds. (2)
Two lectures a week. Rollinson.

Chem. 209. Non-aqueous Inorganic Solvents. (2)
Two lectures a week, first or second semester. Jaquith.

Chem. 210. Radiochemistry Laboratory. (1 or 2)
One or two four-hour laboratory periods a week. Registration limited. Prerequisites, Chem. 205 (or concurrent registration therein) and consent of instructor. Rollinson.

D. ORGANIC CHEMISTRY

For Graduates and Advanced Undergraduates

Chem. 141, 143. Advanced Organic Chemistry. (2, 2)
Two lectures a week, first and second semesters. Prerequisites, Chem. 37, 38. An advanced study of the compounds of carbon. Reeve.

Chem. 144. Advanced Organic Laboratory. (2-4)
Two three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 37, 38. Pratt.

Chem. 146, 148. The Identification of Organic Compounds. (2, 2)
Two three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 141, 143, or concurrent registration therein. The systematic identification of organic compounds. Pratt.

Chem. 150. Organic Quantitative Analysis. (2)

Two three-hour laboratory periods per week, first and second semesters. Prerequisite, consent of instructor. The semi-micro determination of carbon, hydrogen, nitrogen, halogen and certain functional groups.

This course may be substituted for Chem. 144 in the chemistry major curriculum. Gerdeman.

For Graduates

(One or more courses from the following group 241-254 will customarily be offered each semester. Two of these courses will be presented in the academic year 1957-1958.)

Chem. 240. Organic Chemistry of High Polymers. (2)

Two lectures a week, first semester. Prerequisites, Chem. 141, 143. An advanced course covering the synthesis of monomers, mechanism of polymerization, and the correlation between structure and properties in high polymers. Prerequisities, Chem. 141 and 143. Bailey.

Chem. 241. Stereochemistry. (2)

Two lectures a week. Woods.

Chem. 245. The Chemistry of the Steroids. (2)

Two lectures a week. Pratt.

Chem. 249. Physical Aspects of Organic Chemistry. (2)

Two lectures a week. Woods.

Chem. 251. The Heterocyclics. (2)

Two lectures a week. Pratt.

Chem. 253. Organic Sulfur Compounds. (2)

Two lectures a week. Dewey.

Chem. 254. Advanced Organic Preparations. (2 *to* 4)

Two or four three-hour laboratory periods a week, first and second semesters. Pratt.

Chem. 258. The Identification of Organic Compounds, an Advanced Course. (2 *to* 4)

Two to four three-hour laboratory periods a week, first and second semesters. Prerequisites, Chem. 141, 143, or concurrent registration therein. Pratt.

E. PHYSICAL CHEMISTRY

For Graduates and Advanced Undergraduates

Chem. 181, 183. Elements of Physical Chemistry. (2, 2)

Two lectures a week, first and second semesters. Prerequisites, Chem. 19; Phys. 10, 11; Math. 10, 11. Brown.

Chem. 182, 184. Elements of Physical Chemistry Laboratory. (*1, 1*)
One three-hour laboratory period a week, first and second semesters. May be taken ONLY when accompanied by Chem. 181, 183. **Brown.**

Chem. 187, 189. Physical Chemistry. (3, 3)
Three lectures a week, first and second semesters. Prerequisites, Chem. 19 or 21; Phys. 20, 21; Math. 20, 21. This course must be accompanied by Chem. 188, 190. **Svirbely.**

Chem. 188, 190. Physical Chemistry Laboratory. (*2, 2*)
Two three-hour laboratory periods a week, first and second semesters. A laboratory course for students taking Chem. 187, 189. **Pickard.**

Chem. 192, 194. Glassblowing Laboratory. (*1, 1*)
One three-hour laboratory period a week, first and second semesters. Prerequisite, consent of instructor. **Carruthers.**

For Graduates

The common prerequisites for the following courses are Chem. 187 and 189.

One or more courses of the group, 281-323, will be offered each semester, depending on demand.

Chem. 281. Theory of Solutions. (2)
Two lectures a week. Prerequisite, Chem. 307, or equivalent. **Svirbely.**

Chem. 285. Colloid Chemistry. (2)
Two lectures a week. **Pickard.**

Chem. 287. Infra-red and Raman Spectroscopy. (2)
Two lectures a week. Prerequisites, Chem. 141, 143, 187, 189 and consent of instructor. **Lippincott.**

Chem. 289. Selected Topics in Advanced Colloid Chemistry. (2)
Two lectures a week. Prerequisite, Chem. 285. **Pickard.**

Chem. 295. Heterogeneous Equilibria. (2)
Two lectures a week. **Pickard.**

Chem. 299. Reaction Kinetics. (3)
Three lectures a week. **Svirbely.**

Chem. 303. Electrochemistry. (3)
Three lectures a week. **Pickard.**

Chem. 304. Electrochemistry Laboratory. (2)
Two three-hour laboratory periods a week. Prerequisite, consent of instructor. **Svirbely.**

Chem. 307. Chemical Thermodynamics. (3)
Three lectures a week. **Pickard.**

Chem. 311. Physiochemical Calculations. (2)
Summer school only. Pickard.

Chem. 313. Molecular Structure. (3)
Three lectures a week. Brown.

Chem. 317. Chemical Crystallography. (3)
Three lectures per week. Prerequisite, consent of instructor. Brown.

Chem. 319, 321. Quantum Chemistry. (3, 2)
Three and two lectures a week. Prerequisite, Chem. 307, or equivalent. Lippincott, Mason.

Chem. 323. Statistical Mechanics and Chemistry. (3)
Three lectures a week. Prerequisite, Chem. 307 or equivalent. Brown.

F. SEMINAR AND RESEARCH

Chem. 351. Seminar. (1)
First and second semesters. Staff.

Chem. 360. Research.
First and second semesters, summer session. Staff.

CIVIL ENGINEERING

Professors: *Mavis, Allen, Otts.*
Associate Professors: *Barber, Blackburn, Cournyn, Wedding.*

The Civil Engineering Department offers graduate work in the following fields: engineering materials, highway engineering, hydraulic engineering, sanitary engineering, soils and foundations, and structural engineering, leading to the degree of Master of Science.

For Graduates and Advanced Undergraduates

C. E. 100. Seminar. (2)
Second semester. Prerequisite, consent of department. Staff.

C. E. 101. Construction Planning. (3)
Second semester. Prerequisite, consent of department. Staff.

C. E. 110. Surveying I. (3)
Two lectures and one laboratory period a week, first semester. Prerequisite, consent of instructor. Gohr and Staff.

C. E. 111. Surveying II. (3)
Two lectures and one laboratory period a week, second semester. Prerequisite, C. E. 110, or equivalent. Gohr and Staff.

C. E. 112. Photogrammetry. (3)

Two lectures and one laboratory period a week, first or second semester. Prerequisite, C. E. 111, or equivalent. Gohr.

C. E. 140. Fluid Mechanics. (3)

Two lectures and one laboratory period a week, first and second semesters. Prerequisite, C. E. 21 and consent of instructor. Cournyn.

C. E. 141. Fluid Mechanics. (3)

First and second semesters. Prerequisite, C. E. 20 and consent of instructor. Cournyn.

C. E. 142. Hydrology. (3)

Two lectures and one laboratory period a week, first or second semester. Prerequisite, C. E. 140 or C. E. 141. Cournyn.

C. E. 150. Soil Mechanics. (3)

Two lectures and one laboratory period a week, first semester. Prerequisites, C. E. 23, 24 and 30, or equivalents. Barber.

C. E. 160. Structural Analysis I. (3)

Two lectures and one laboratory period a week, first and second semesters. Prerequisite, C. E. 23, or equivalent. Piper.

C. E. 161. Structural Analysis II. (3)

First and second semesters. Prerequisite, C. E. 160, or equivalent. Piper.

C. E. 162. Structural Design (Steel). (3)

Two lectures and one laboratory period a week, first semester. Prerequisite, C. E. 160, or equivalent. Allen, Piper.

C. E. 163. Structural Design (Concrete). (3)

Two lectures and one laboratory period a week, second semester. Prerequisites, C. E. 160 and C. E. 161. Allen, Piper.

C. E. 170. Water Supply. (3)

Two lectures and one laboratory period a week, first semester. Prerequisite, C. E. 140, or equivalent. Otts.

C. E. 171. Sewerage. (3)

Two lectures and one laboratory period a week, second semester. Prerequisite, C. E. 140, or equivalent. Otts.

C. E. 180. Transportation. (3)

Second semester. Prerequisite, C. E. 110, or equivalent. Blackburn.

C. E. 181. Highways. (3)

Two lectures and one laboratory period a week, second semester. Prerequisite, C. E. 150, or equivalent. Barber.

For Graduates

C. E. 220. Advanced Strength of Materials. (3)
First or second semester. Prerequisite, C. E. 23, or equivalent. Wedding.

C. E. 221. Experimental Stress Analysis. (3)
First or second semester. Prerequisite, C. E. 220, or consent of instructor Wedding.

C. E. 230. Advanced Properties of Materials. (3)
First or second semester. Prerequisite, C. E. 30, or equivalent. Wedding.

C. E. 231, 232. Theory of Concrete Mixtures I, II. (3, 3)
First and second semesters. Prerequisite, C. E. 30, or equivalent. The second semester of this course is open only to students who are majoring in materials. Blackburn, Wedding.

C. E. 240. Hydraulic Engineering. (3)
First or second semester. Prerequisite, C. E. 140 or 141, or equivalent. Cournyn.

C. E. 241. Hydraulic Machinery. (3)
First or second semester. Prerequisite, C. E. 140 or 141, or equivalent. Cournyn.

C. E. 250. Groundwater and Seepage. (3)
First or second semester. Prerequisite, C. E. 150. Barber.

C. E. 251. Soil Mechanics. (3)
First or second semester. Prerequisite, C. E. 150, or equivalent. Barber, Blackburn.

C. E. 252. Advanced Foundations. (3)
First or second semester. Prerequisites, C. E. 150, 162 and 163, or equivalents. Barber.

C. E. 253. Soil Mechanics Laboratory. (3)
First or second semester. Prerequisite, C. E. 150, or equivalent. Barber.

C. E. 260. Advanced Structural Analysis I. (3)
First or second semester. Prerequisite, C. E. 160, or equivalent. Piper.

C. E. 261. Advanced Structural Analysis II. (3)
First or second semester. Prerequisite, C. E. 260, or equivalent. Staff.

C. E. 262. Advanced Structural Design. (3)
First or second semester. Prerequisites, C. E. 162 and 163, or equivalents. Staff.

C. E. 263. Structural Design Problems. (3)
Second semester. Prerequisites, C. E. 260 and 261. Staff.

C. E. 270. Advanced Water Supply. (3)
First or second semester. Prerequisite, C. E. 170, or equivalent. Otts.

C. E. 271. Advanced Sewerage. (3)
First or second semester. Prerequisite, C. E. 171 or equivalent.

C. E. 272. Sanitary Engineering Design I. (3)
First or second semester. Prerequisites, C. E. 170 and 171, or equivalents. Otts.

C. E. 273. Sanitary Engineering Design II. (3)
First or second semester. Prerequisites, C. E. 170 and 171, or equivalents. Otts.

C. E. 274. Sanitary Engineering Laboratory I. (3)
First or second semester. Prerequisites, C. E. 170 and 171, or equivalents. Otts.

C. E. 275. Sanitary Engineering Laboratory II. (3)
First or second semester. Prerequisites, C. E. 170 and 171, or equivalents. Otts.

C. E. 277. Advanced Sanitation. (3)
First or second semester. Prerequisite, consent of instructor. Otts.

C. E. 280. Advanced Highway Engineering I. (3)
First semester. Prerequisite, C. E. 251, or equivalent. Blackburn.

C. E. 281. Advanced Highway Engineering II. (3)
Second semester. Prerequisite, consent of instructor. Blackburn.

C. E. 282. Advanced Highway Engineering Laboratory I. (1)
First semester. Prerequisite, consent of instructor. Blackburn.

C. E. 283. Advanced Highway Engineering Laboratory II. (1)
Second semester. Prerequisite, consent of instructor. Blackburn.

C. E. 298. Seminar.
First or second semester. Credit in accordance with work outlined by the Department. Prerequisite, consent of department. Staff.

C. E. 299. Research.
First and second semesters. Credit in accordance with work done. Staff.

COMPARATIVE LITERATURE

Professors: *Aldridge, Falls, Goodwyn, Harman, McManaway (P.T.), Murphy, Prahl, Zeeveld, and Zucker.*
Associate Professors: *Cooley, Manning, Parsons, and Weber.*

For Graduates and Advanced Undergraduates

Comp. Lit. 101, 102. Introductory Survey of Comparative Literature. (3, 3)
First and second semester. Zucker.

Comp. Lit. 103. The Old Testament as Literature. (3)
Second semester. Zucker.

Comp. Lit. 105. Romanticism in France. (3)
First semester. Parsons.

Comp. Lit. 106. Romanticism in Germany. (3)
Second semester. Prahl.

Comp. Lit. 107. The Faust Legend in English and German Literature. (3)
First semester. Prahl.

Comp. Lit. 112. Ibsen. (3)
First semester. Zucker.

Comp. Lit. 114. The Greek Drama. (3)
First semester. Prahl.

Comp. Lit. 125. Literature of the Middle Ages.
Cooley.

In addition, the following courses will count as credit in Comparative Literature: Eng. 104, Eng. 113, Eng. 121, Eng. 129, 130, Eng. 144, Eng. 145, Eng. 155, 156, Eng. 157; Span. 109; Speech 131, 132.

For Graduates

Comp. Lit. 258. Folklore in Literature. (3)
Second semester. Goodwyn.

The following courses will count as credit in Comparative Literature: Eng. 201, Eng. 204, Eng. 206, 207, Eng. 216, 217, Eng. 227, 228, Ger. 203, Ger. 204, Ger. 208.

DAIRY

Professors: *Arbuckle and Shaw.*
Associate Professors: *Davis, Keeney and Mattick.*

The Dairy Department offers work leading to the degrees of Master of Science and Doctor of Philosophy. Candidates for the Doctor of Philosophy degree have the option of studying in one of two major fields: Dairy Production, which is concerned with breeding, nutrition and physiology of dairy animals, or Dairy Technology, which is concerned with chemical, bacteriological and nutritional aspects of dairy products, as well as the practical industrial phases of milk processing.

Dairy 101. Dairy Production. (3)
Two lectures and one laboratory period a week, first semester. Prerequisites, Dairy, 1 and A. H. 110. Davis.

Dairy 103. Physiology of Milk Secretion. (3)
Second semester. Two lectures and one laboratory period per week. Prerequisites, Zool. 1, Organic Chemistry. (Alternate years, given in 1957-58.) The anatomy, evolution and metabolism of the mammary gland including hormonal control and the biosynthesis of milk constituents. Shaw.

Dairy 105. Dairy Cattle Breeding. (3)

Two lectures and one laboratory period a week, second semester. Prerequisites, Dairy 1, Zool. 104. Davis.

Dairy 108. Dairy Technology. (4)

Two lectures and two laboratory periods a week, first semester. Prerequisites, Dairy 1, Microb. 133, Chem. 1, 3. Laboratory fee, $3.00. Keeney.

Dairy 109. Market Milk. (4)

Two lectures and two laboratory periods a week, first semester. Prerequisites, Dairy 1, Microb. 133, Chem. 1, 3. Laboratory fee, $3.00. Mattick.

Dairy 110. Concentrated Milk, Cheese and Butter. (4)

Fall semester. Two lectures and one five-hour laboratory a week. Prerequisites, Dairy 1, Microb. 133 or equivalent; Chem. 1 and 3. Methods of production of butter, cheese, condensed and evaporated milk and milk products. Consideration is given to the procedures of processing, quality control and the physio-chemical principles involved. Laboratory fee, $3.00. Mattick.

Dairy 112. Ice Cream Making. (4)

Two lectures and two laboratory periods a week, second semester. Laboratory fee, $3.00. Prerequisites, Dairy 108. Arbuckle.

Dairy 114. Special Laboratory Methods. (4)

Two lectures and two laboratory periods a week, second semester. Prerequisites, Dairy 108, Microb. 133, Chem. 19, 31, 32, 33, 34. Laboratory fee, $3.00. Keeney.

Dairy 116. Dairy Plant Management. (3)

Second semester. Two lectures and one laboratory period a week. Prerequisites, at least three advanced dairy products technology courses. Principles of dairy plant management, record systems; personnel, plant design and construction; dairy machinery and equipment. Mattick.

Dairy 201. Advanced Ruminant Nutrition. (3)

First semester. Three one-hour lectures per week. Prerequisites, A. H. 110 or Dairy 101, Organic Chemistry and permission of department. (Alternate years, given in 1958-59). Biochemical, physiological and bacteriological aspects of the nutrition of ruminants and other animals. Shaw and Davis.

Dairy 202. Advanced Dairy Technology. (3)

First semester. Prerequisites, Dairy 108, 114, or equivalent. Keeney.

Dairy 204. Special Problems in Dairying. (1-5)

First and second semesters. Prerequisite, permission of professor in charge of work. Staff.

Dairy 205. Seminar. (1)

First and second semesters. Staff.

Dairy 206. Advanced Dairy Research Seminar. (1)

Second semester. Discussion of fundamental research in dairy science. Staff.

Dairy 208. Research. (3-8)

Credit to be determined by amount and quality of work done. Staff.

ECONOMICS

Professors: *Dillard and Gruchy.*
Associate Professors: *Grayson, Gurley, and Hamburg.*
Assistant Professor: *Measday.*

MASTER OF ARTS

Requirements for the Master's degree include (1) course work in economics as the Department deems appropriate in view of the candidate's previous training, (2) course work in a minor subject, (3) a thesis on a topic approved by the Department, and (4) a comprehensive oral examination covering the major and the minor subjects and defense of the thesis.

DOCTOR OF PHILOSOPHY

The Ph.D. degree in Economics is under the joint direction of the faculties of the Department of Economics and the Department of Business Organization and Administration. Before being advanced to candidacy doctoral students must pass comprehensive written and oral examinations in five of the following fields: (1) Accounting, (2) Comparative Economic Systems and Economic Planning, (3) Economic Development, (4) Economic Theory (required), (5) Financial Administration, (6) History of Economic Thought (required), (7) Industrial Administration, (8) Insurance and Real Estate, (9) International Economics, (10) Labor and Industrial Relations, (11) Marketing, (12) Money and Banking, (13) Public Finance and Fiscal Policy, (14) Public Utilities and Social Control of Business, (15) Transportation, (16) Any other field, including the minor, approved by the faculty. Students should consult with members of the faculty concerning the choice of fields and the choice of courses within these fields.

Six semester hours of Statistics with grades of "B" or better must be presented. Normally the foreign language requirements are taken before the comprehensive examinations.

Further information concerning requirements and procedures may be obtained from the Departments administering the program.

For Graduates and Advanced Undergraduates

Econ. 102. National Income Analysis. (3)
First and second semesters. Prerequisite, Econ. 32.

Econ. 131. Comparative Economic Systems. (3)
First and second semesters. Prerequisite, Econ. 32 or 37. Gruchy.

Econ. 132. Advanced Economic Principles. (3)
First and second semesters. Prerequisite, Econ. 32. Grayson.

Econ. 134. Contemporary Economic Thought. (3)
First semester. Prerequisite, Econ. 32. Gruchy.

Econ. 136. International Economic Policies and Relations. (3)
First semester. Prerequisite, Econ. 32 or 37.

Econ. 137. The Economics of National Planning. (3)
Second semester. Prerequisite, Econ. 32 or 37. Gruchy.

Econ. 138. Economics of the Soviet Union. (3)
Prerequisite, Econ. 32 or 37. Dodge.

Econ. 140. Money and Banking. (3)
First and second semesters. Prerequisite, Econ. 32 or 37. Staff.

Econ. 141. Theory of Money, Credit, and Prices. (3)
Second semester. Prerequisites, Econ. 32 and 140. Gurley.

Econ. 142. Public Finance and Taxation. (3)
First and second semesters. Prerequisite, Econ. 32 or 37. Grayson.

Econ. 147. Business Cycles. (3)
First semester. Prerequisite, Econ. 140. Hamberg.

Econ. 149. International Finance and Exchange. (3)
Second semester. Prerequisite, Econ. 140. Econ. 136 recommended.

Econ. 160. Labor Economics. (3)
First and second semesters. Prerequisite, Econ. 32 or 37. Staff.

Econ. 170. Monopoly and Competition. (3)
Second semester. Prerequisite, Econ. 32 or 37. Smith.

Econ. 171. Economics of American Industries. (3)
Second semester. Prerequisite, Econ. 32 or 37. Clemens.

For Graduates

Econ. 200. Micro-Economic Analysis. (3)
Second semester. Prerequisite, Econ. 132 or equivalent. Grayson.

Econ. 202. Macro-Economic Analysis. (3)
First semester. Prerequisite, Econ. 132. Recommended Econ. 147. Dillard.

Econ. 204, 205. Seminar in Economic Development. (3, 3)
First and second semesters.

Econ. 230. History of Economic Thought. (3)
First semester. Prerequisite, Econ. 132 or consent of instructor. Dillard.

Econ. 231. Economic Theory in the Nineteenth Century. (3)
Second semester. Prerequisite, Econ. 230 or consent of instructor. Dillard.

Econ. 232, 233. Seminar in Institutional Economic Theory. (3, 3)
First and second semesters. Prerequisite, Econ. 132 or consent of instructor. Gruchy.

Econ. 236. Seminar in International Economic Relations. (3)

Econ. 237. Seminar in Economic Investigation. (3)
Staff.

Econ. 240. Seminar in Monetary Theory and Policy. (3)
First semester. Gurley.

Econ. 247. Economic Growth and Instability. (3)
Second semester. Prerequisite, a course in Business Cycles or consent of instructor. Hamberg.

Econ. 270. Seminar in Economics and Geography of American Industries. (3)
Clemens.

Econ. 299. Thesis.
Arranged. Staff.

EDUCATION

Professors: *Anderson, Brown, Byrne, Denemark, Grentzer, Hovet, Kurtz, Maley, Mershon, Mohr, Morgan, Newell, Patrick, Perkins, Prescott, Schindler, VanZwoll, Waetjen and Wiggin.*
Associate Professors: *Blough, Brandt, O'Neill, Risinger, Schneider, Thompson, Tierney and Ulry.*
Assistant Professor: *Spencer.*

Master of Arts and Master of Education

A student in Education has the option of qualifying for the degree of Master of Arts or Master of Education.

In addition to the general requirements for admission to the Graduate School, applicants for unconditional admission with a major in Education must have had sixteen semester hours of acceptable undergraduate work in Education and must meet other standards set by this department of the Graduate School.

During the first semester of graduate work, the student is required to take a test battery, at a fee of $5.00, and to submit professional recommendations. Not later than the completion of the first two courses, the student must select

a major adviser and a major area the course requirements for which must be met for favorable consideration for graduation. Following is a list of the major areas:

Adult Education
Business Education
Educational Administration and Supervision
Elementary School Curriculum and Instruction
Guidance and Personnel
Higher Education
Music Education
History, Philosophy, and Comparative Education
Home Economics Education
Secondary School Curriculum and Instruction
Human Growth and Development
Industrial Arts Education
Nursing Education
Vocational Industrial Education

The time limit for completing either degree is the same as that prescribed for the Master of Arts and the Master of Science degrees of the Graduate School.

Master of Arts Requirements

No student is recommended to the Graduate Council for advancement to candidacy for the Master of Arts degree until he has successfully passed the qualifying examination and has completed at least twelve hours of satisfactory graduate work at the University of Maryland. The candidate must meet all requirements including thesis and successful passing of the oral examination as prescribed by the Graduate School for the Master of Arts degree.

Master of Education Requirements

A student may be recommended for advancement to candidacy on the basis of course work plus recommendations of his major adviser and the Education Master's Committee acting for the Department of Education. The Master of Education candidate will write two seminar papers and will take a final comprehensive examination covering all course work. The final examination must be taken by the full-time student in the second semester of course work and by the part-time student during the time he is enrolled for the last six hours of course work.

Currently both the qualifying and the comprehensive examinations are administered on the third Saturday of January and May and on the Saturday preceding the last week of the Summer Session.

For further information respecting the Masters Degrees in Education, see the statement of policy issued by the Department of Education.

Doctor of Philosophy and Doctor of Education

Each candidate is required to achieve exceptional ability in at least one major area and one minor area of competence.

The candidate should choose his major from the following list of areas:

Curriculum and Instruction
Educational Administration and Supervision
Elementary Education
Guidance and Personnel
*Physical Education, Recreation, and Health
History, Philosophy, and Comparative Education
Human Development Education
Industrial Arts Education
Secondary Education
Vocational-Industrial Education

Minors may be chosen from fields other than Education as approved by the Committee on Candidacy, from the foregoing list of major areas, or from the following list:

Adult Education
**Agricultural Education
Business Education
Higher Education
Home Economics Education
Music Education

In addition to the general University requirements for a Doctor's degree, the following requirements must be met:

1. The preliminary examination for admission to candidacy for the Doctor's degree will cover the student's preparation in major and minor fields, and will include such other examinations as may be required by the faculty. A student must be admitted to candidacy in order to have the department's official permission to be a candidate for a Doctor's degree.

2. A comprehensive examination covering the general fields of major and minor study must be passed by each candidate, after which the final examination is administered by a committee appointed by the Dean of the Graduate School.

In general the requirements for the Doctor of Education degree are the same as those for the degree Doctor of Philosophy. The most important differences between the two degrees are as follows:

1. The purpose of the Doctor of Education degree is to prepare persons of exceptional competence to work in the field. The emphasis for this degree is placed on broad understanding, whereas that for the degree of Doctor of Philosophy is placed on specialized research.

2. A reading knowledge of foreign languages is required for the degree of Doctor of Education only when needed for research and study in the doctoral program.

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*The Ph.D. Program in this area is administered under a separate department of the Graduate School.

**Administered under a separate department of the Graduate School.

3. In order to meet the residence requirements, a candidate for the Ph.D. degree must spend at least two semesters in full-time study on the College Park campus. A candidate for the Ed.D. degree may substitute two summers of residence for one semester of residence, or four summers for two semesters.

4. The doctoral study for the Ed.D. consists of a project rather than a dissertation. The project requires research to meet a practical field problem. Credit of six to nine hours is allowed for a project as compared with twelve to eighteen hours for a Ph.D. dissertation.

A. HISTORY, PRINCIPLES, CURRICULUM, AND ADMINISTRATION

For Graduates and Advanced Undergraduates

Ed. 100. History of Education in Western Civilization. (3)
Wiggin.

Ed. 102. History of Education in the United States. (3)
Second semester. Wiggin.

Ed. 107. Philosophy of Education. (2-3)
Wiggin.

Ed. 121. The Language Arts in the Elementary School. (2)

Ed. 122. The Social Studies in the Elementary School. (2)
O'Neill.

Ed. 123. The Child and the Curriculum. (3)
Denecke.

Ed. 124. Arithmetic in the Elementary Schools. (2)
Schindler.

Ed. 125. Art in Elementary Schools. (2)
Lembach.

Ed. 127. Teaching in Elementary Schools. (2-6)

Ed. 130. The Junior High School. (2-3)

Ed. 133. Methods of Teaching Social Studies in Secondary Schools. (2-3)
Risinger.

Ed. 134. Materials and Procedures for the Secondary School Core Program (3)
Fee $1.00. Schneider.

Ed. 137. Methods of Teaching Mathematics and Science in the Secondary School. (2-3)
Laboratory fee, $2.00.

Ed. 140. Curriculum, Instruction, and Observation. (3)
Graduate credit is allowed only by special permission. Staff.

Ed. 141. *Methods of Teaching English in Secondary Schools.* (3)
Bryan.

Ed. 145. *Principles and Methods of Secondary Education.* (2-3)
Denemark.

Ed. 147. *Audio-Visual Education.* (3)
Laboratory fee, $1.00.
Maley.

Ed. 150. *Educational Measurement.* (2)

Ed. 153. *The Teaching of Reading.* (2)
Schindler, Matson.

Ed. 154. *Remedial Reading Instruction.* (2)
Schindler.

Ed. 155. *Laboratory Practices in Reading for Elementary and Secondary Schools.* (2-4)
Schindler.

Ed. 160. *Educational Sociology.* (2)
Risinger.

Ed. 161. *Principles of Guidance.* (3)
Byrne.

Ed. 162. *Mental Hygiene in the Classroom.* (2)
Denecke.

Ed. 163, 164, 165. *Community Study Laboratory I, II and III.* (2, 2, 2)
Schindler.

Ed. 170. *Introduction to Special Education.* (2)

Ed. 171. *Education of Retarded and Slow-Learning Children.* (2)
Haring.

Ed. 187. *Field Experience in Education.* (1-4)

Ed. 188. *Special Problems in Education.* (1-3)
Staff.

Ed. 189. *Workshops, Clinics, and Institutes.* (1-6)
Staff.

Ed. 190. *Problems and Trends in Contemporary American Education.* (2-4)
Denemark, Blough.

For Graduates

Ed. 202. *The Junior College.* (2)
Wiggin.

Ed. 203. *Problems in Higher Education.* (3)
Wiggin.

Ed. 205. *Comparative Education.* (3)
Wiggin.

Ed. 206. *Seminar in Comparative Education.* (2)
Wiggin.

Ed. 207. Seminar in History and Philosophy of Education. (2)
Wiggin.

Ed. 209. Adult Education. (3)
Wiggin.

Ed. 210. The Organization and Administration of Public Education. (3)
Newell.

Ed. 211. The Organization, Administration, and Supervision of Secondary Schools. (2)
Schneider.

Ed. 212. School Finance and Business Administration. (3)
VanZwoll.

Ed. 214. School Plant Planning. (2)
VanZwoll.

Ed. 216. High School Supervision. (2)
Schneider.

Ed. 217. Administration and Supervision in Elementary Schools. (2)
Denecke.

Ed. 218. School Surveys. (2-6)
Newell.

Ed. 219. Seminar in Educational Administration and Supervision. (2-4)
Newell, VanZwoll.

Ed. 220. Pupil Transportation. (2)
VanZwoll.

Ed. 221. Advanced School Plant Planning. (2)
VanZwoll.

Ed. 223. Practicum in Personnel Relationships. (2-6)
Newell.

Ed. 224. Apprenticeship in Education. (6-9)
Staff.

Ed. 225. School Public Relations. (3)
VanZwoll.

Ed. 226. Child Accounting. (2)
VanZwoll.

Ed. 227. Public School Personnel Administration. (3)
VanZwoll.

Ed. 228. Seminar in Student Personnel. (2)
Byrne.

Ed. 229. Seminar in Elementary Education. (2)
Denecke.

Ed. 230. Elementary School Supervision. (2)
Hovet.

Ed. 234. The School Curriculum. (2-3)
Hovet, Anderson.

Ed. 235. Principles of Curriculum Development. (3)
Hovet.

Ed. 237. Curriculum Theory and Research. (2)

UNIVERSITY OF
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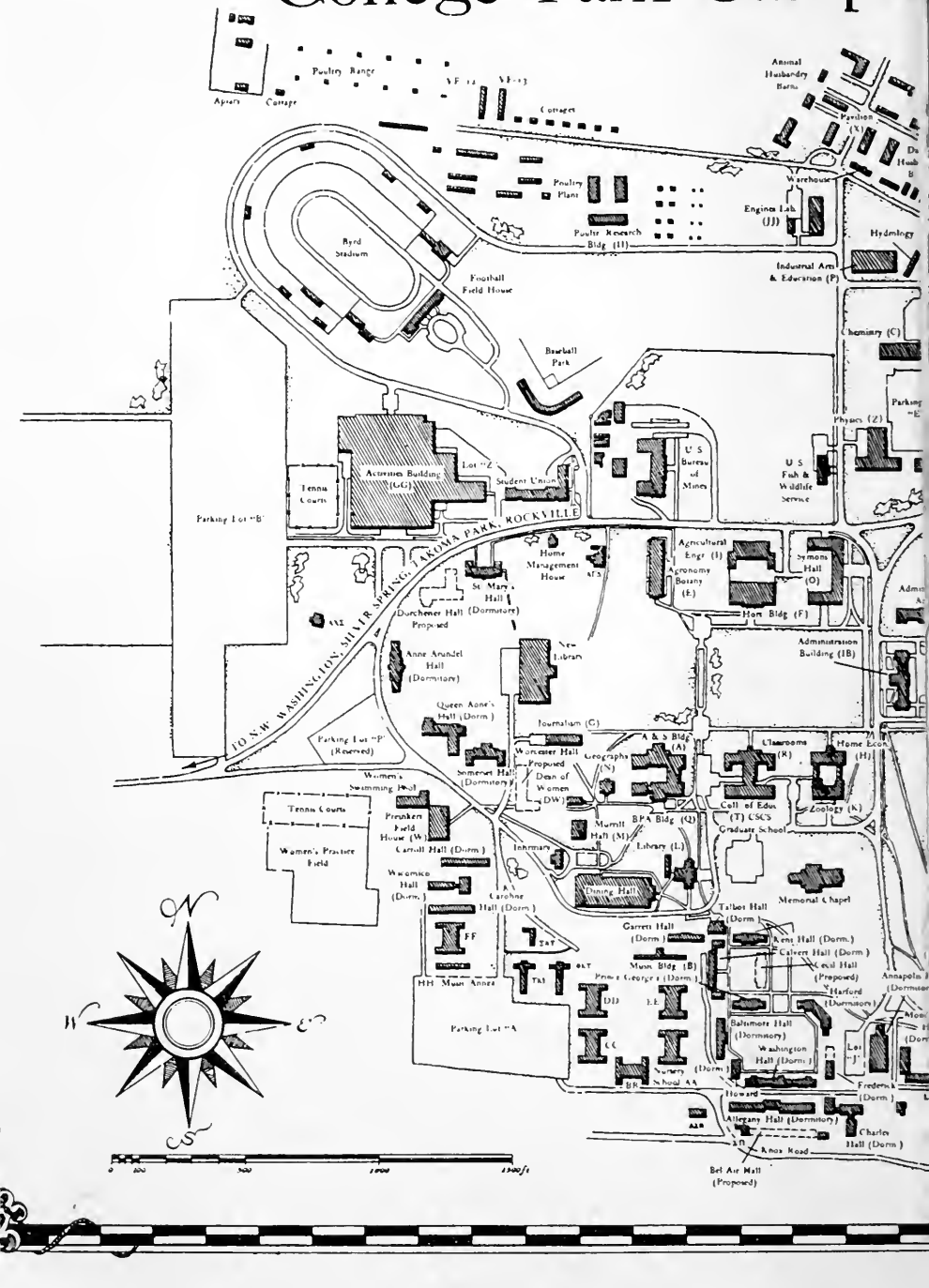

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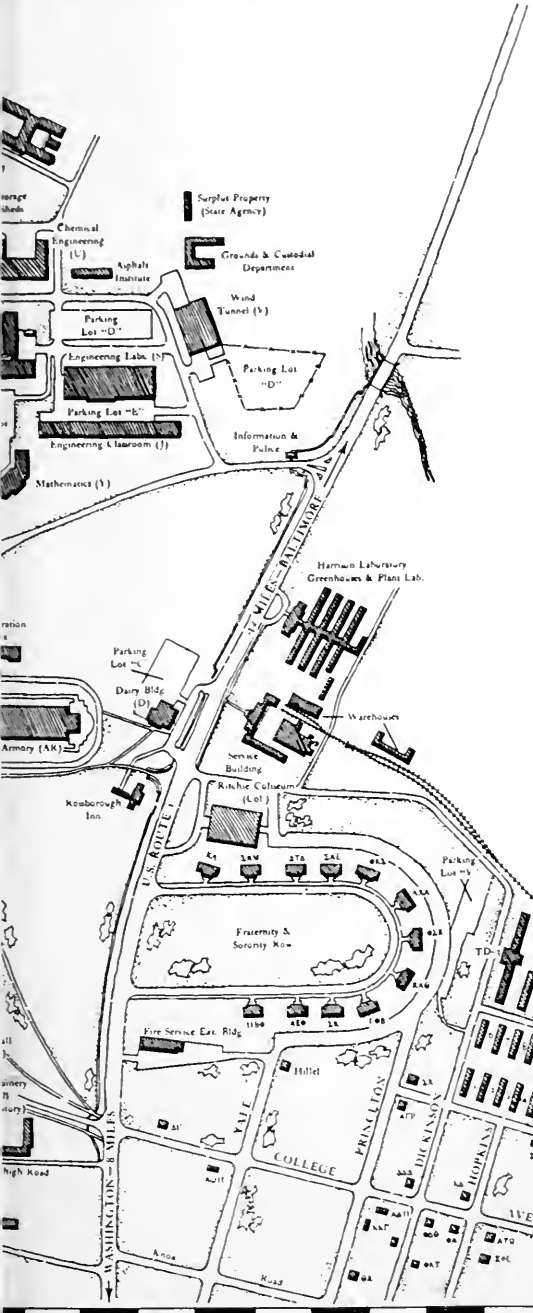

BUILDING CODE LETTERS FOR CLASS SCHEDULES

A	Arts & Sciences—Francis Scott Key Hall
AA	Nursery School
AR	Armory
B	Music
BB	Administration
C	Chemistry
Col	Coliseum
D	Dairy—Turner Laboratory
DD	Aviation Psychology Laboratory
DW	Dean of Women
E	Agronomy—Botany—H. J. Patterson Hall
EE	Counseling Center
F	Horticulture—Holzapfel Hall
FF	Temporary Dormitory
G	Journalism
GG	Activities Building—Cole Building
H	Home Economics—Margaret Brent Hall
I	Agricultural Engr.—Shriver Laboratory
J	Engr. Classroom Bldg.
K	Zoology—Silvester Hall
L	Library—Shoemaker Building
M	Morrill Hall
N	Geography
O	Agriculture—Symons Hall
P	Industrial Arts & Education—J. M. Patterson Bldg.
Q	Business & Public Administration—Taliaferro Hall
R	Classroom Building—Woods Hall
S	Engr. Laboratories
T	Education—Skinner Building
U	Chem. Engr.
V	Wind Tunnel
W	Preinkert Field House
X	Judging Pavilion
Y	Mathematics
Z	Physics
II	Poultry—Jull Hall
JJ	Engines Research Lab. (Molecular Physics)

Sororities Not Shown
- Phi Sigma Sigma
- Alpha Chi Omega
- Alpha Xi Delta

Fraternities Not Shown
- Alpha Epsilon Pi
- Zeta Beta Tau
- Phi Kappa Gamma
- Tau Epsilon Phi

Ed. 239. Seminar in Secondary Education. (2)

Ed. 242. Coordination in Work-Experience Programs. (2)
Brown.

Ed. 243. Problems of Teaching Arithmetic in Elementary Schools. (2)
Schindler.

Ed. 244. Problems of Teaching Language Arts in Elementary Schools. (2)

Ed. 245. Introduction to Research. (2)
Hovet.

Ed. 246. Problems of Teaching Social Studies in Elementary Schools. (2)
O'Neill.

Ed. 247. Seminar in Science Education. (2)
Blough, Ulry.

Ed. 248. Seminar in Industrial Arts and Vocational Education. (2)
See Ind. Ed. 248. Brown, Maley.

Ed. 250. Analysis of the Individual. (3)
Byrne.

Ed. 253. Guidance Information. (2)
Byrne.

Ed. 254. Organization and Administration of Guidance Programs. (2)
Byrne.

Ed. 260. School Counseling: Theoretical Foundations and Practice. (3)
Prerequisites, Ed. 161, 250, 253 for majors. Byrne.

Ed. 261. Practicum in School Counseling. (2)
Prerequisite, Ed. 260. Byrne.

Ed. 263, 264. Aptitudes and Aptitude Testing. (2, 2)
(Offered in Baltimore.)

Ed. 267. Curriculum Construction Through Community Analysis. (2)

Ed. 268. Seminar in Educational Sociology. (2)

Ed. 269. Seminar in Guidance. (2)
Registration only on approval of instructor. Byrne.

Ed. 278. Seminar in Special Education. (2)
Denecke.

Ed. 279. Seminar in Adult Education. (2)
Wiggin.

Ed. 280. Research Methods and Materials. (2)

Ed. 281. Source Materials in Education. (2)
Wiggin.

Ed. 287. Internship in Education. (12-16)

Ed. 288. Special Problems in Education. (1-6)
Staff.

Ed. 289. Research—Thesis. (1-6)
Staff.

Ed. 290. Doctoral Seminar. (1-3)
Staff.

B. BUSINESS EDUCATION

For Graduates and Advanced Undergraduates

B. Ed. 101. Problems in Teaching Office Skills. (2)
Patrick.

B. Ed. 102. Methods and Materials in Teaching Bookkeeping and Related Subjects. (2)
Patrick.

B. Ed. 104. Basic Business Education in the Secondary Schools. (2)
Patrick.

For Graduates

B. Ed. 200. Administration and Supervision of Business Education. (2)

B. Ed. 255. Principles and Problems of Business Education. (2)
Patrick.

B. Ed. 256. Curriculum Development in Business Education. (2-6)

C. CHILDHOOD EDUCATION

For Graduates and Advanced Undergraduates

C. Ed. 100. Child Development I—Infancy. (3)
Hymes.

C. Ed. 101. Child Development II—Early Childhood. (3)
Hymes.

C. Ed. 110. Child Development III. (3)
Laboratory fee, $1.00. Hymes, Broome.

C. Ed. 115. Children's Activities and Activities Materials. (3)
Laboratory fee, $5.00. Second semester.

C. Ed. 116. Creative Music for Young Children. (2-3)
Brown.

C. Ed. 119. Curriculum, Instruction, and Observation—Cooperative Nursery School. (2-3)

C. Ed. 140. Curriculum, Instruction, and Observation—Early Childhood Education (Nursery School and Kindergarten). (3)
Stant, Glass.

C. Ed. 145. Guidance in Behavior Problems. (2)
Glass.

C. Ed. 160. Methods and Materials in Parent Education. (2-3)

D. HOME ECONOMICS EDUCATION

For Graduates and Advanced Undergraduates

H. E. Ed. 102. Problems in Teaching Home Economics. (3)
Spencer.

H. E. Ed. 120. Evaluation of Home Economics. (3)
Spencer.

H. E. Ed. 140. Curriculum, Instruction, and Observation. (3)
Spencer.

For Graduates

H. E. Ed. 200. Seminar in Home Economics Education. (2)
Spencer.

H. E. Ed. 202. Trends in the Teaching and Supervision of Home Economics.
Spencer.

E. HUMAN DEVELOPMENT EDUCATION

For Graduates and Advanced Undergraduates

H. D. Ed. 100, 101. Principles of Human Development I and II. (3, 3)

H. D. Ed. 102, 103, 104. Child Development Laboratory I, II and III. (2, 2, 2)

H. D. Ed. 112, 114, 116. Scientific Concepts in Human Development I, II, III, (3, 3, 3)
Summer.

H. D. 113, 115, 117. Laboratory in Behavior Analysis I, II, III. (3, 3, 3)
Summer.

For Graduates

H. D. Ed. 200. Introduction to Human Development and Child Study. (3)

H. D. Ed. 201. Biological Bases of Behavior. (3)

H. D. Ed. 202. Social Bases of Behavior. (3)

H. D. Ed. 203. Integrative Bases of Behavior. (3)

H. D. Ed. 204, 205. Physical Processes in Human Development. (3, 3)

H. D. Ed. 206, 207. Socialization Processes in Human Development I, II. (3, 3)

H. D. Ed. 208, 209. Self Processes in Human Development I and II. (3, 3)

H. D. Ed. 210. Affectional Relationships and Processes in Human Development. (3)

H. D. Ed. 211. Peer-culture and Group Processes in Human Development. (3)

H. D. Ed. 212, 214, 216. Advanced Scientific Concepts in Human Development I, II, III. (3, 3, 3)

Summer.

H. D. Ed. 213, 215, 217. Advanced Laboratory in Behavior Analysis I, II, III. (3, 3, 3)

Summer.

H. D. Ed. 218. Workshop in Human Development. (6) *Prerequisites, H. D. Ed. 212, 213, 214, 215, 216, 217.*

Summer.

H. D. Ed. 220. Developmental Tasks. (3)

H. D. Ed. 230, 231. Field Program in Child Study I and II. (2-6)

H. D. Ed. 250a, 250c. Direct Study of Children. (1, 1, 1)

H. D. Ed. 260. Synthesis of Human Development Concepts. (3)

H. D. Ed. 270. Seminars in Special Topics in Human Development. (2-6)

F. INDUSTRIAL EDUCATION

For Graduates and Advanced Undergraduates

Ind. Ed. 105. General Shop. (2)

Laboratory fee, $5.00.

Ind. Ed. 140. Curriculum, Instruction, and Observation. (3)

Ind. Ed. 143. Industrial Safety Education I. (2)

Ind. Ed. 144. Industrial Safety Education II. (2)

Ind. Ed. 150. Training Aids Development. (3)

Ind. Ed. 157. Tests and Measurements. (2)

Ind. Ed. 161. Principles of Vocational Guidance. (2)

Ind. Ed. 164. Shop Organization and Management. (2)

Ind. Ed. 165. Modern Industry. (2)

Ind. Ed. 166. Educational Foundations of Industrial Arts. (2)

Ind. Ed. 167. Problems in Occupational Education. (2)
Offered in Baltimore.

Ind. Ed. 168. Trade or Occupational Analysis. (2)

Ind. Ed. 169. Course Construction. (2)

Ind. Ed. 170. Principles of Vocational Education. (2)

Ind. Ed. 171. History of Vocational Education. (2)

For Graduates

Ind. Ed. 207. Philosophy of Industrial Arts Education. (3)

Ind. Ed. 214. School Shop Planning and Equipment Selection. (3)

Ind. Ed. 216. Supervision of Industrial Arts. (2)

Ind. Ed. 220. Organization, Administration, and Supervision of Vocational Education. (2)

Ind. Ed. 240. Research in Industrial Arts and Vocational Education. (2)
Staff.

Ind. Ed. 241. Content and Method of Industrial Arts. (3)

Ind. Ed. 248. Seminar in Industrial Arts and Vocational Education. (2)

G. MUSIC EDUCATION

For Graduates and Advanced Undergraduates

Mus. Ed. 125. Creative Activities in the Elementary School. (2)
Prerequisite, consent of instructor.

Mus. Ed. 128. Music for the Elementary Classroom Teacher. (2)
Prerequisite, consent of instructor.

Mus. Ed. 132. Music in the Secondary School. (2)
Prerequisite, consent of instructor.

Mus. Ed. 139. Music for the Elementary School Specialist. (2-3)

Mus. Ed. 155. Organization and Technique of Instrumental Class Instruction. (2)
Prerequisite, consent of instructor. Henderson.

Mus. Ed. 163. Band Techniques and Administration. (2)
Prerequisites, Mus. 81 and 161. Henderson.

Mus. Ed. 170. Methods and Materials for Class Piano Instruction. (2)

Mus. Ed. 171. String Teaching in the Public Schools. (2)

Mus. Ed. 175. Methods and Materials in Vocal Music for the High School. (2)
Prerequisite, consent of instructor. Grentzer.

Mus. Ed. 180. Instrumental Seminar. (2)
Prerequisite, consent of instructor. Jordan.

For Graduates

Mus. Ed. 200. Research Methods in Music and Music Education. (3) Grentzer.

Mus. Ed. 201. Administration and Supervision of Music in the Public Schools (3)

Mus. Ed. 204. Current Trends in Music Education. (2) Grentzer.

Mus. Ed. 205. Seminar in Vocal Music in the Elementary Schools. (2)

Mus. Ed. 206. Choral Conducting and Repertoire. (2)

Mus. Ed. 207. Seminar in Vocal Music in the Secondary Schools. (2)

Mus. Ed. 208. The Teaching of Music Appreciation. (2)

Mus. Ed. 209. Seminar in Instrumental Music. (2)

Mus. Ed. 210. Seminar in Advanced Orchestration and Band Arranging. (2)

H. NURSING EDUCATION

Courses in nursing offered by the School of Nursing.

I. SCIENCE EDUCATION

Sci. Ed. 105. Workshop in Science for Elementary Schools. (2)
Laboratory fee, $2.00. Blough.

ELECTRICAL ENGINEERING

Professors: *Corcoran, Reed, and Weber.*
Associate Professors: *Price, Wagner, Trent and Schuchard.*
Lecturers: *Ahrendt, Chu, Freeman and Vanderslice.*

A written qualifying examination is required of all candidates for the Master's degree in electrical engineering. This examination will be held Saturday, October 4, 1958. Off-campus and part-time students must have satisfactorily

completed a minimum of nine semester hours of graduate course work before being admitted to the written qualifying examination. Full-time students having less than nine semester hours of graduate course work are permitted to take this examination by special arrangement. The student must have been admitted to the Graduate School (Electrical Engineering) before taking this examination.

Students working toward the Master of Science degree in electrical engineering must take a minimum of six semester hours of course work from resident professors of electrical engineering. Students working toward the Doctor of Philosophy degree must take a minimum of twenty-four semester hours of course work from resident professors of electrical engineering; students presenting a minor in electrical engineering must include at least six semester hours of electrical engineering from resident professors.

For Graduates and Advanced Undergraduates

E. E. 100. Alternating-Current Circuits. (4)

Three lectures and one laboratory period a week, first semester. Laboratory fee, $4.00. Prerequisites, Math. 21, Phys. 21, and E. E. 1. Price, Simons.

E. E. 101. Engineering Electronics. (4)

Three lectures and one laboratory period a week, second semester. Laboratory fee, $4.00. Prerequisite, E. E. 100. Price, Simons.

E. E. 102. Alternating-Current Machinery. (4)

Three lectures and one laboratory period a week, first semester. Laboratory fee $4.00. Prerequisites, E. E. 65 and E. E. 100. Hodgins.

E. E. 103. Engineering Analysis. (2)

Two lectures a week, second semester. Prerequisite, E. E. 100. Corcoran, Reed.

E. E. 104. Communications. (3)

Three lectures a week, second semester. Prerequisites, E. E. 60 and E. E. 100. Reed.

E. E. 105, 106. Radio Engineering. (4, 4)

Three lectures and one laboratory period a week, first and second semesters. Laboratory fee, $4.00. Prerequisite, E. E. 101. Wagner, Price.

E. E. 107. Electrical Measurements. (4)

Three lectures and one laboratory period a week, second semester. Laboratory fee, $4.00. Prerequisites, E. E. 100 and Math. 64. Thompson.

E. E. 108. Electric Transients. (3)

Three lectures a week, first semester. Prerequisite, E. E. 101 and Math. 64. Reed, Price.

E. E. 109. Pulse Techniques. (3)

Three lectures a week, second semester. Prerequisite, E. E. 108 and Math. 64. Schulman.

E. E. 110. Transistor Circuitry. (3)
Three lectures a week, second semester. Prerequisite, E. E. 101. Corcoran, Reed.

E. E. 114. Applied Electronics. (3)
Three lectures a week, first semester. Prerequisite, E. E. 101. Staff.

E. E. 115. Feedback Control Systems. (3)
Three lectures a week, second semester. Prerequisite, E. E. 101 and E. E. 108. Price.

E. E. 116. Feedback Control Systems Laboratory. (1)
One laboratory period a week, second semester. Laboratory fee, $4.00. Price.

E. E. 117. Power Transmission and Distribution. (3)
Three lectures a week, first semester. Prerequisite, concurrent registration in E. E. 102. Reed.

E. E. 120. Electromagnetic Waves. (3)
Three lectures a week, second semester. Prerequisite, Math. 64 and senior standing in electrical engineering or physics. Reed.

E. E. 130. Electronic Analog Computers. (3)
Three lectures a week, first semester. Prerequisites, E. E. 101 and Math. 64. Chu.

E. E. 131. Electronic Digital Computers. (3)
Three lectures a week, second semester. Prerequisites, E. E. 101 and Math. 64. Chu.

E. E. 160, 161. Vacuum Tubes. (3, 3)
Three lectures a week, first and second semesters. Prerequisite, Math. 64 and senior standing in electrical engineering or physics. Weber.

For Graduates

E. E. 200. Symmetrical Components. (3)
Three lectures a week, first semester. Prerequisite, E. E. 102. Reed.

E. E. 201. Electromagnetic Theory. (3)
Three lectures a week, second semester. Prerequisite, E. E. 120 or E. E. 215. Weber.

E. E. 202, 203. Transients in Linear Systems. (3, 3)
Three lectures a week, first and second semesters. Prerequisite, undergraduate major in electrical or mechanical engineering or physics. Wagner.

E. E. 206, 207. Microwave Engineering. (3, 3)
Three lectures a week, first semester; two lectures and one laboratory period a week, second semester. Laboratory fee, second semester, $4.00. Prerequisite, E. E. 201, or E. E. 216. Weber.

E. E. 209. Stability in Power Systems. (3)
Three lectures a week, second semester. Prerequisite, E. E. 200. Reed.

E. E. 212, 213. Servomechanisms. (3, 3)

Three lectures a week, first and second semesters. Prerequisite, undergraduate major in electrical or mechanical engineering or physics. Price, Ahrendt.

E. E. 215, 216. Radio Wave Propagation. (3, 3)

Three lectures a week, first and second semesters. Prerequisite, undergraduate major in electrical engineering, physics, or mathematics. Reed.

E. E. 218, 219. Signal Analysis and Noise. (3, 3)

Three lectures a week, first and second semesters. Prerequisite, undergraduate major in electrical engineering or physics. Weber, Freeman.

E. E. 220, 221. Theory of Communication. (3, 3)

Three lectures a week, first and second semesters. Prerequisites, E. E. 218, 219. Weber, Freeman.

E. E. 222. Graduate Seminar. (1)

Second semester. Prerequisite, approved application for candidacy to the degree of Master of Science or Doctor of Philosophy in electrical engineering. Graduate Staff.

E. E. 230. Mathematics of Circuit Analysis. (3)

Three lectures a week, first semester. Prerequisite, undergraduate major in electrical engineering or physics. Vanderslice.

E. E. 231. Active Network Analysis. (3)

Three lectures a week, second semester. Prerequisite, E. E. 230. Corcoran, Vanderslice.

E. E. 232, 233. Network Synthesis. (3, 3)

Three lectures a week, first and second semesters. Prerequisite, E. E. 231 or equivalent. Vanderslice.

E. E. 235. Application of Tensor Analysis. (3)

Three lectures a week, first semester. Prerequisite, E. E. 202 or E. E. 230. Wagner.

E. E. 250. Electrical Engineering Research.

Prerequisite, approved application for candidacy to the degree of Master of Science or Doctor of Philosophy in electrical engineering. Six semester hours are required of M.S. degree candidates and a minimum of 18 semester hours are required of Ph.D. candidates. Graduate Staff.

ENGLISH LANGUAGE AND LITERATURE

Professors: *Murphy, Aldridge, Bode,* Harman, McManaway (P.T.), and Zeeveld.*
Associate Professors: *Cooley, Manning, and Weber.*
Assistant Professors: *Beall and Lutwack.*

Master of Arts

1. Students must demonstrate a reading knowledge of French or German before they will be recommended for admission to candidacy.

*On leave, first semester 1958-1959.

2. Candidates must pass a final written examination covering the English language and the whole course of English and American literature.

Doctor of Philosophy

1. Students must demonstrate a reading knowledge of German and French before they will be permitted to take the preliminary qualifying examination.

2. Students must pass a preliminary qualifying examination before they will be recommended for admission to candidacy. They are expected to take this examination by the time they have completed a full year of residence beyond the Master of Arts requirement.

3. Candidates must pass a comprehensive written examination covering linguistics and the whole course of English and American literature.

Eng. 101. History of the English Language. (3)
Second semester. Summer School (2). Harman.

Eng. 102. Old English. (3)
First semester. Summer School (2). Ball.

Eng. 103. Beowulf. (3)
Second semester. Ball.

Eng. 104. Chaucer. (3)
First semester. Summer School (2). Harman.

Eng. 110, 111. Elizabethan and Jacobean Drama. (3, 3)
First and second semesters. Zeeveld, Mish.

Eng. 112. The Poetry of the Renaissance. (3)
(Not offered 1958-1959.) Zeeveld.

Eng. 113. Prose of the Renaissance. (3)
(Not offered 1958-1959.) Zeeveld, Mish.

Eng. 115, 116. Shakespeare. (3, 3)
First and second semesters. Summer School (2, 2). Zeeveld.

Eng. 120. English Drama from 1660 to 1800. (3)
Second semester. Ward.

Eng. 121. Milton. (3)
Second semester. Summer School (2). Murphy.

Eng. 122. Literature of the Seventeenth Century, 1600-1660. (3)
First semester. Murphy.

Eng. 123. Literature of the Seventeenth Century, 1660-1700. (3)
(Not offered 1958-1959). Aldridge.

Eng. 125, 126. Literature of the Eighteenth Century. (3, 3)
Eng. 125, Summer School (2). First and second semesters. Aldridge.

Eng. 129, 130. Literature of the Romantic Period. (3, 3)
Summer School (2, 2). First and second semesters. Weber.

Eng. 134, 135. Literature of the Victorian Period. (3, 3)
First and second semesters. Summer School (2, 2). Cooley.

Eng. 139, 140. The English Novel. (3, 3)
First and second semesters. Eng. 140, Summer School (2). Ward, Mish.

Eng. 143. Modern Poetry. (3)
First semester. Summer School (2). Fleming.

Eng. 144. Modern Drama. (3)
First semester. Weber.

Eng. 145. The Modern Novel. (3)
Second semester. Andrews.

Eng. 148. The Literature of American Democracy. (3)
(Not offered 1958-1959.)

Eng. 150, 151. American Literature. (3, 3)
First and second semesters. Summer School (2, 2). Manning, Gravely, Lutwack.

Eng. 155, 156. Major American Writers. (3, 3)
First and second semesters. Summer School (2, 2). Gravely, Manning.

Eng. 157. Introduction to Folklore. (3)
First semester. Summer School (2). Cooley.

Eng. 170. Creative Writing. (2)
First semester. Prerequisite, permission of the instructor. Fleming.

Eng. 171. Advanced Creative Writing. (2)
Second semester. Prerequisite, permission of the instructor. Fleming.

Eng. 172. Playwriting. (2)
(Not offered 1958-1959.) Fleming

For Graduates

Eng. 200. Research. (1-6)
Arranged. Staff.

Eng. 201. Bibliography and Methods. (3)
First semester. Mish.

Eng. 202. Middle English. (3)
First semester. Summer School (2). Harman.

Eng. 203. Gothic. (3)
Second semester. Harman.

Eng. 204. Seminar in Medieval Literature. (3)
Second semester. Cooley.

Eng. 206, 207. Seminar in Renaissance Literature. (3, 3)
First and second semesters. Eng. 206, Summer School (2). McManaway, Zeeveld.

Eng. 210. Seminar in Seventeenth Century Literature. (3)
Summer School (2). Second semester. Murphy, Mish.

Eng. 212, 213. Seminar in Eighteenth Century Literature. (3, 3)
First and second semesters. Aldridge.

Eng. 214, 215. Seminar in Nineteenth Century Literature. (3, 3)
First and second semesters. Eng. 214, Summer School (2). Cooley, Weber.

Eng. 216, 217. Literary Criticism. (3, 3)
First and second semesters. Murphy.

Eng. 225, 226. Seminar in American Literature. (3, 3)
First and second semesters. Summer School (2, 2). Bode, Lutwack.

Eng. 227, 228. Problems in American Literature. (3, 3)
(Not offered 1958-1959.) Eng. 227, Summer School (2). Aldridge.

ENTOMOLOGY

Professors: *Bickley, Ditman and Langford.*
Associate Professor: *McConnell.*
Assistant Professor: *Haviland.*
Lecturer: *Sailer.*

The Department of Entomology offers work toward the degree of Master of Science and Doctor of Philosophy. Candidates for the Ph.D. degree who are not employed by the Department are expected to register for a minimum of 24 semester hours credit during two semesters at College Park.

For Graduates and Advanced Undergraduates

Ent. 100. Advanced Apiculture. (3)
One lecture and two three-hour laboratory periods a week, second semester. Prerequisite, Ent. 4. Laboratory fee, $3,00. (Not offered in 1958-1959.) Abrams.

Ent. 101. Economic Entomology. (3)
Lectures, demonstrations and field trips, second semester. Prerequisite consent of the department. (Alternate years; not offered in 1958-1959.)

Ent. 105. Medical Entomology. (3)
Two lectures and one two-hour laboratory period a week, first semester. Prerequisite, Ent. 1 or consent of the department. Laboratory fee, $3.00. Bickley.

Ent. 106. Advanced Insect Taxonomy. (3)
Two three-hour laboratory periods a week, first semester. Prerequisite, Ent. 3. Laboratory fee, $3.00. Bickley.

Ent. 107. Insecticides. (2)
Second semester. Prerequisite, consent of the department. Shepard.

Ent. 109. Insect Physiology. (2)
Two lectures and occasional demonstrations, second semester. Prerequisite, consent of the department. Munson.

Ent. 110, 111. Special Problems. (*1, 1*)
First and second semesters. Prerequisites, to be determined by the department. Staff.

Ent. 112. Seminar. (*1, 1*)
First and second semesters. Staff.

Ent. 113. Entomological Literature. (*1*)
Second semester. (Not offered in 1958-1959.) Bickley.

Ent. 115. Quarantine Procedures. (2)
Second semester. Prerequisite, consent of the department. Johnson.

Ent. 116. Insect Pests of Ornamentals and Greenhouse Plants. (3)
Two lectures and one two-hour laboratory period a week, second semester. Prerequisite, Ent. 1 or consent of the department. Laboratory fee, $3.00. Haviland.

Ent. 117. Insect Pests of Field Crops and Stored Products. (2)
One lecture and one two-hour laboratory period a week, first semester. Prerequisite, Ent. 1 or consent of the department. Laboratory fee, $3.00. Harrison.

Ent. 118. Insect Pests of Fruit and Vegetable Crops. (3)
Two lectures and one two-hour laboratory period a week, second semester. Prerequisite, Ent. 1 or consent of the department. Laboratory fee, $3.00. (Not offered in 1958-1959.) Harrison.

Ent. 119. Insect Pests of Domestic Animals. (2)
One lecture and one two-hour laboratory period a week, first semester. Prerequisite, Ent. 1 or consent of the department. Laboratory fee, $3.00. Haviland.

For Graduates

Ent. 201. Advanced Entomology.
Credit and prerequisites to be determined by the department. First and second semesters. **Staff.**

Ent. 202. Research.
Credit and prerequisites to be determined by the department. First and second semesters. **Staff.**

Ent. 203. Advanced Insect Morphology. (2)
One lecture and one three-hour laboratory period a week, second semester. Laboratory fee, $3.00.

Ent. 205. Insect Ecology. (2)
One lecture and one two-hour laboratory period a week, first semester. Laboratory fee, $3.00. Prerequisite, consent of the department. **Sailer.**

Ent. 206. Bionomics of Mosquitoes. (2)
One lecture and one three-hour laboratory period a week, second semester. Laboratory fee, $3.00. (Not offered in 1958-1959.) **Bickley.**

FOREIGN LANGUAGES AND LITERATURE

Professors: *Zucker, Falls, Goodwyn, Prahl and Smith.*
Associate Professors: *Parsons and Quynn.*
Assistant Professors: *Rand and Rosenfield.*

Master of Arts

Candidates must pass, in addition to written examinations in the courses pursued, a written examination based on the reading lists in their respective fields of French, German and Spanish, established by the Department. The examination will test the general familiarity of the candidate with his respective field and his powers of analysis and criticism. The oral examination will deal chiefly with the field of his thesis.

Doctor of Philosophy

Candidates must pass a comprehensive written examination at least three months before the degree is awarded. This examination will include linguistics and each of the major literary fields.

Attention is called to the courses in *Comparative Literature* listed on page 82.

A. FRENCH

For Graduates and Advanced Undergraduates

French 0. Intensive Elementary French. (0)
Graduate students should register as auditors only. Intensive elementary course in the French language designed particularly for graduate students who wish to acquire a reading knowledge. (Offered in the Summer Session only.) Kramer.

French 100. French Literature of the Sixteenth Century. (3)
First semester. Falls.

French 101, 102. French Literature of the Seventeenth Century. (3, 3)
First and second semesters. Quynn, Rosenfield.

French 103, 104. French Literature of the Eighteenth Century. (3, 3)
First and second semesters. Falls, Bingham.

French 105, 106. French Literature of the Nineteenth Century. (3, 3)
First and second semesters. Bingham, Quynn.

French 107, 108. French Literature of the Twentieth Century. (3, 3)
First and second semesters. Falls.

French 121, 122. Advanced Composition. (3, 3)
First and second semesters. Falls.

French 161, 162. French Civilization. (3, 3)
First and second semesters. Rosenfield.

French 171. Practical French Phonetics. (3)
First semester. Smith.

French 199. Rapid Review of the History of French Literature. (1)
Second semester. Especially designed for French majors. Weekly lectures. Falls.

For Graduates

The requirements of students will determine which courses will be offered.

French 201. Research.
Credit determined by work accomplished. Staff.

French 203, 204. George Duhamel, Poet, Dramatist, Novelist. (2, 2)
First and second semesters. Falls.

French 205, 206. French Literature of the Middle Ages. (3, 3)
First and second semesters. Smith, Bulatkin.

French 207, 208. The French Novel in the First Half of the Nineteenth Century. (2, 2)
First and second semesters. Falls.

French 209, 210. The French Novel in the Second Half of the Nineteenth Century. (2, 2)
First and second semesters. Falls.

French 211. Introduction to Old French. (3)
Second semester. Smith, Bulatkin.

French 215, 216. Moliere. (3, 3)
First and second semesters. Quynn.

French 221, 222. Reading Course.
(Arranged.) Staff.

French 230. Introduction to European Linguistics. (3)
Smith, Bulatkin.

French 251, 252. Seminar. (3, 3)
Required of all graduate majors in French. Staff.

B. GERMAN

For Graduates and Advanced Undergraduates

German 0. Intensive Elementary German. (0)
Graduate students should register as auditors only. Intensive elementary course in the German language designed particularly for graduate students who wish to acquire a reading knowledge. (Offered in the Summer Session only.) Kramer.

German 101, 102. German Literature of the Eighteenth Century. (3, 3)
First and second semesters. Prahl, Schweizer.

German 103, 104. German Literature of the Nineteenth Century. (3, 3)
First and second semesters. Prahl, Schweizer.

German 105, 106. Modern German Literature. (3, 3)
First and second semesters. Prahl, Dobert.

German 107, 108. Goethe's Faust. (2, 2)
First and second semesters. Zucker.

Attention is called to Comp. Lit. 106, Romanticism in Germany, and Comp. Lit. 107, The Faust Legend in English and German Literature.

German 121, 122. Advanced Composition. (3, 3)
First and second semesters. Kramer, Dobert.

German 161, 162. German Civilization. (3, 3)
First and second semesters. Prahl.

German 199. Rapid Review of the History of German Literature. (1)
Second semester. Especially designed for German majors. Weekly lectures.
Schweizer.

For Graduates

The requirements of students will determine which courses will be offered.

German 201. Research.
Credits determined by work accomplished. Staff.

German 202, 203. The Modern German Drama. (3, 3)
First and second semesters. Zucker.

German 204. Schiller. (3)
Prahl.

German 205. Goethe's Works outside of Faust. (2)
Second semester. Zucker.

German 206. The Romantic Movement. (3)
Prahl.

German 208. The Philosophy of Goethe's Faust. (3)
First semester. Zucker.

German 221, 222. Reading Course.
(Arranged). First and second semesters. Staff.

German 230. Introduction to European Linguistics. (3)
First semester. Smith, Bulatkin.

German 231. Middle High German. (3)
Second semester. Schweizer.

German 251, 252. Seminar. (3, 3)
Required of all graduate majors in German. Staff.

C. SPANISH

Spanish 101. Epic and Ballad. (3)
First semester. Parsons.

Spanish 102. The Spanish Popular Ballad. (3)
Second semester. Goodwyn.

Spanish 104. The Drama of the Golden Age. (3)
Second semester. Parsons.

Spanish 108. Lope de Vega. (3)
First semester. Parsons.

Spanish 109. Cervantes. (3)
Second semester. Rand.

Spanish 110. Modern Spanish Poetry. (3)
First semester. Rand.

Spanish 111. The Spanish Novel of the Nineteenth Century. (3)
First semester. Parsons.

Spanish 112. Modern Spanish Drama. (3)
First semester. Nemes.

Spanish 113. The Spanish Novel of the Twentieth Century. (3)
Second semester. Rand.

Spanish 115. Modern Spanish Thought. (3)
Second semester. Rand.

Spanish 121, 122. Advanced Composition. (3, 3)
First and second semesters. Goodwyn.

Spanish 151. Spanish-American Novel. (3)
First semester. Nemes.

Spanish 152. Spanish-American Poetry. (3)
Second semester. Nemes.

Spanish 153. Spanish-American Essay. (3)
First semester. Nemes.

Spanish 161, 162. Spanish Civilization. (3, 3)
First and second semesters. Rand.

Spanish 163, 164. Latin-American Civilization. (3, 3)
First and second semesters. Goodwyn.

Spanish 199. Rapid Review of the History of Spanish Literature. (1)
Second semester. Especially designed for Spanish majors. Weekly lectures.
Parsons.

For Graduates

Spanish 201. Research.
Credit determined by work accomplished. Staff.

Spanish 202. The Golden Age in Spanish Literature. (3)
First semester. Goodwyn.

Spanish 203, 204. Spanish Poetry. (3, 3)
First and second semesters. Goodwyn.

Spanish 211. Introduction to Old Spanish. (3)
Second semester. Parsons, Bulatkin.

Spanish 221, 222. Reading Course.
(Arranged). Staff.

Spanish 230. Introduction to European Linguistics. (3)
Smith, Bulatkin.

Spanish 251, 252. Seminar. (3, 3)
Required of all graduate majors in Spanish. Staff.

D. RUSSIAN

For Graduates and Advanced Undergraduates

Russian 101, 102. Modern Russian Literature. (3, 3)
First and second semesters. Boborykine.

Russian 103, 104. Russian Literature of the Nineteenth Century. (3, 3)
First and second semesters. Boborykine.

E. CHINESE

Chinese 101, 102. Readings from Chinese History. (3, 3)
First and second semesters. Chen.

GEOGRAPHY

Professors: *Van Royen and Hu.*
Consulting Professors: *Roterus and Whipple.*
Lecturers with rank of Professor: *Lemons and McBryde.*
Associate Professors: *Augelli and Patton.*

Students seeking graduate degrees in geography are expected to have acquired a broad foundation in the subject and in allied fields. This foundation must have included a minimum of 24 semester hours in geography, of which 6 semester hours shall have been in Morphology and Map Reading and Interpretation, 6 semester hours in Weather and Climate, and 12 semester hours in Human, Economic, or Regional Geography. In addition the student must have taken successfully the following courses, or their equivalents, in allied fields: Anthropology (3 semester hours), Economics (6 semester hours), History (6 semester hours), Introductory or General Botany (3 semester hours), Sociology (3 semester hours), Foreign Language (12 semester hours). Students who do not have this background will be accepted as graduate students in a provisional status only and will be required to make up their deficiencies before being admitted to candidacy for an advanced degree. Graduate credit will not be given for courses taken to make up for deficiencies in background.

In addition to meeting the general requirements of the Graduate School, candidates for the Master's degree in geography are required to have taken successfully: one field course (Geography 170 or 200, or equivalent), a course in cartography, a course in soils, and one seminar. In addition to the final oral examination, the candidate for the Master's degree in geography is required to pass satisfactorily a written examination covering the field in which he has worked, his understanding of basic principles, and his power of reasoning.

A graduate student seeking the Doctor of Philosophy degree in geography must take a comprehensive written and oral examination to determine whether he has sufficiently broad and profound knowledge and understanding of the entire field of geography to qualify as a candidate for the Doctor's degree.

Geog. 100. Regional Geography of Eastern Anglo-America. (3)
First semester. Prerequisite, Geog. 1, 2 or Geog. 10 or permission of instructor.
McArthur.

Geog. 101. Regional Geography of Western Anglo-America. (3)
Second semester. Prerequisite, Geog. 1, 2 or Geog. 10 or permission of instructor.
McArthur.

Geog. 103. Geographic Concepts and Source Materials. (2)
First or second semester.

Geog. 104. Geography of Major World Regions. (2)
First or second semester.

Geog. 105. Geography of Maryland and Adjacent Areas. (3)
First and second semesters.

Geog. 110. Economic and Cultural Geography of Caribbean America. (3)
First semester. Augelli.

Geog. 111. Economic and Cultural Geography of South America. (3)
Second semester. Augelli.

Geog. 120. Economic Geography of Europe. (3)
First semester. Van Royen, Hooson.

Geog. 122. Economic Resources and Development of Africa. (3)
Second semester. Van Royen.

Geog. 123. Problems of Colonial Geography. (3)
First or second semester.

Geog. 130, 131. Economic and Political Geography of Southern and Eastern Asia. (3, 3)
First and second semesters. Hu.

Geog. 134, 135. Cultural Geography of East Asia. (3, 3)
First and second semesters. Hu.

Geog. 140. Soviet Lands. (3)
First or second semester. Hooson.

Geog. 146. The Near East. (3)
First semester.

Geog. 150. History and Theory of Cartography. (3)
Second semester. McBryde.

Geog. 151, 152. Cartography and Graphics Practicum. (3, 3)
First and second semesters. One hour lecture and two two-hour laboratory periods a week. Karinen.

Geog. 153. Problems in Cartographic Representation and Procedure. (3)
First or second semester. Two hours lecture and two hours laboratory a week. Karinen.

Geog. 154. Problems of Map Evaluation. (3)
First or second semester. Two hours lecture and two hours laboratory a week. Karinen.

Geog. 155. Problems and Practices of Photo Interpretation. (3)
First or second semester. Two hours of lecture and two hours of laboratory per week. Ahnert.

Geog. 160. Advanced Economic Geography I. Agricultural Resources. (3)
First semester. Prerequisite, Geog. 1 and 2, or Geog. 10. Van Royen.

Geog. 161. Advanced Economic Geography II. Mineral Resources. (3)
Second semester. Prerequisite, Geog. 1 and 2, or Geog. 10. Van Royen.

Geog. 170. Local Field Course. (3)
First semester. Ahnert.

Geog. 180. History, Nature and Methodology of Geography. (3)
First semester. Hu.

Geog. 190. Political Geography. (3)
Second semester. Augelli.

Geog. 195. Geography of Transportation. (3)
Second semester. Patton.

Geog. 197. Urban Geography. (3)
First semester. McArthur.

Geog. 199. Topical Investigations. (1-3)
First and second semesters. Restricted to advanced undergraduate students with credit for at least 24 hours of geography. Staff.

For Graduates

Geog. 200. Field Course. (3)
Field work in September, conferences and reports during first semester. For graduate students in geography. Open to other students by special permission of the Head of the Department of Geography.

Geog. 210, 211. Seminar in the Geography of Latin America. (3, 3)
First and second semesters. Prerequisites, Geog. 110, 111 or consent of instructor. McBryde.

Geog. 220, 221. Seminar in the Geography of Europe and Africa. (3, 3)
First and second semesters. Prerequisites, Geog. 120, 121 or consent of instructor. Van Royen.

Geog. 230, 231. Seminar in the Geography of East Asia. (3, 3)
First and second semesters. Hu.

Geog. 240, 241. Seminar in the Geography of the U.S.S.R. (3, 3)
First and second semesters. Prerequisites, reading knowledge of Russian and Geog. 140 or consent of instructor. Staff.

Geog. 246. Seminar in the Geography of the Near East. (3)
Staff.

Geog. 250. Seminar in Cartography.
(Credit to be arranged.) First or second semester. McBryde, Karinen.

Geog. 260. Advanced General Climatology. (3)
First semester. Prerequisite, Geog. 41, or consent of instructor. Lemons.

Geog. 261. Applied Climatology. (3)
Second semester. Prerequisite, Geog. 41, or consent of instructor. Lemons.

Geog. 262, 263. Seminar in Meteorology and Climatology. (3, 3)
First and second semesters. Prerequisite, consent of instructor. Lemons.

Geog. 280. Geomorphology. (3)
Second semester. Van Royen.

Geog. 290, 291. Selected Topics in Geography. (1-3)
First and second semesters. Prerequisite, joint consent of adviser and Head of the Department of Geography. Staff.

Geog. 292, 293. Dissertation Research.
(Credit to be arranged.) First and second semesters and summer.

GOVERNMENT AND POLITICS

Professors: *Plischke, Burdette, Steinmeyer, and Wengert.*
Associate Professor: *Anderson.*
Assistant Professors: *Harrison, and Hathorn.*

The Department of Government and Politics offers a graduate course of study leading to the degree of Master of Arts and the degree of Doctor of Philosophy. For the Master's degree, the student may either pursue a general program in Government and Politics, or he may specialize in international affairs or in public administration.

For the Master's degree, a comprehensive written examination is given on graduate course work in the major field. At the discretion of the Department, an oral examination may be substituted for the written examination.

The doctoral candidate must show in written examinations satisfactory competence in five of the following fields: (1) Comparative Government; (2) International Political Affairs; (3) Local Government; (4) Political Theory; (5) Public Administration; (6) Public Law; (7) Public Policy. No candidate may attempt the comprehensive examinations prior to completion of the language requirements for the doctorate, and no candidate may attempt the comprehensive examinations more than twice.

For Graduates and Advanced Undergraduates

G. & P. 101. International Political Relations. (3)
First semester. Prerequisite, G. & P. 1. Harrison.

G. & P. 102. International Law. (3)
Second semester. Prerequisite, G. & P. 1. Harrison.

G. & P. 104. Inter-American Relations. (3)
Prerequisite, G. & P. 1. Harrison.

G. & P. 105. Recent Far Eastern Politics. (3)
First semester. Prerequisite, G. & P. 1. Steinmeyer.

G. & P. 106. American Foreign Relations. (3)
First semester. Prerequisite, G. & P. 1. Plischke.

G. & P. 108. International Organization. (3)
Second semester. Prerequisite, G. & P. 1. Plischke.

G. & P. 110. Principles of Public Administration. (3)
First semester. Prerequisite, G. & P. 1. Wengert.

G. & P. 111. Public Personnel Administration. (3)
First semester. Prerequisite, G. & P. 110 or B. A. 160. Wengert, Alford.

G. & P. 112. Public Financial Administration. (3)
Second semester. Prerequisite, G. & P. 110 or Econ. 142. Wengert, Alford.

G. & P. 124. Legislatures and Legislation. (3)
Second semester. Prerequisite, G. & P. 1. Burdette, Hathorn.

G. & P. 131, 132. Constitutional Law (3, 3)
First and second semesters. Prerequisite, G. & P. 1. Hathorn.

G. & P. 133. Administration of Justice. (3)
Second semester. Prerequisite, G. & P. 1.

G. & P. 141. History of Political Theory. (3)
First semester. Prerequisite, G. & P. 1. Anderson.

G. & P. 142. Recent Political Theory. (3)
Second semester. Prerequisite, G. & P. 1. Anderson.

G. & P. 144. American Political Theory. (3)
First semester. Prerequisite, G. & P. 1. Anderson.

G. & P. 154. Problems of World Politics. (3)
Second semester. Prerequisite, G. & P. 1. Steinmeyer.

G. & P. 174. Political Parties. (3)
First semester. Prerequisite, G. & P. 1 Burdette, Hathorn.

G. & P. 178. Public Opinion. (3)
First semester. Prerequisite, G. & P. 1 Burdette, Hathorn.

G. & P. 181. Administrative Law. (3)
Second semester. Prerequisite, G. & P. 1. Wengert.

G. & P. 197. Comparative Governmental Institutions. (3)
Second semester. Prerequisite, G. & P. 1. Harrison.

For Graduates

G. & P. 201. Seminar in International Political Organization. (3)
Plischke.

G. & P. 202. Seminar in International Law. (3)
Plischke, Harrison.

G. & P. 205. Seminar in American Political Institutions. (3)
Burdette, Hathorn.

G. & P. 206. Seminar in American Foreign Relations. (3)
Plischke.

G. & P. 207. Seminar in Comparative Governmental Institutions. (3)
Steinmeyer, Harrison.

G. & P. 211. Seminar in Federal-State Relations. (3)
Wengert.

G. & P. 213. Problems of Public Administration. (3)
Wengert.

G. & P. 214. Problems of Public Personnel Administration. (3)
Wengert.

G. & P. 215. Problems of State and Local Government in Maryland. (3)

G. & P. 216. Government Administrative Planning and Management. (3)

G. & P. 217. Government Corporations and Special Purpose Authorities. (3)

G. & P. 221. Seminar in Public Opinion. (3)
Burdette.

G. & P. 223. Seminar in Legislatures and Legislation. (3)
Burdette.

G. & P. 224. Seminar in Political Parties and Politics. (3)
Burdette, Hathorn.

G. & P. 225. Man and the State. (3)
Anderson.

G. & P. 231. Seminar in Public Law. (3)

G. & P. 251. Bibliography of Government and Politics. (3)
Staff.

G. & P. 261. Problems of Government and Politics. (3)

G. & P. 281. Department Seminar. (No Credit)
Registration for two semesters required of all doctoral candidates. Staff.

G. & P. 299. Thesis Course. (Arranged)
Staff.

HISTORY

Professors: *Gewehr, Chatelain, Merrill and Prange.*
Associate Professors: *Bauer and Gordon.*
Assistant Professors: *Beard, Jashemski, Riddleberger, Sparks and Stromberg.*

Master of Arts

1. Eight to ten hours of the total major course requirements of all candidates for this degree must be acquired in general field of the thesis, i.e., either American or European history.

2. H. 287, Historiography, is required of all candidates for graduate degrees in history.

3. Candidates for the Master of Arts degree must pass a three-hour qualifying written examination. This examination is normally taken shortly before the final oral examination. The purpose of the written examination is to determine the student's grasp of the larger field in which the thesis lies, (e. g. American, European, English, Latin-American). The examination will include not only factual and interpretative material, but also bibliography and historiography. However, it will not be based on courses as such.

4. The final oral examination will be confined to the general field of the thesis, and the thesis itself. It is understood that the representative of the minor field may examine the candidate on the minor subject or subjects at his discretion.

5. The thesis must be submitted in final form to the candidate's committee three weeks prior to the final oral examination.

Doctor of Philosophy

1. At least thirty hours of the total major course requirements, including H. 287, must be acquired in the general field of the thesis, i.e., American history or European history.

2. At least ten hours of the thirty required for a minor in history must be taken at the University of Maryland.

3. Recommendations for admission to candidacy will be determined by the department on the basis of achievement which the student is required to substantiate by oral or written examinations.

4. Before confirmation for the degree the student must pass the final oral examination required by the Graduate School.

5. The thesis must be submitted in final form to the candidate's committee five weeks prior to the final oral examination.

A. AMERICAN HISTORY

For Graduates and Advanced Undergraduates

H. 5, 6 are prerequisites for courses H. 101 to H. 142, inclusive.

H. 101. American Colonial History. (3)
First semester. Summer School. (2) Ferguson.

H. 102. The American Revolution. (3)
Second semester. Summer School (2). Ferguson.

H. 105. Social and Economic History of the United States to 1865. (3)
First semester. Summer School (2). Chatelain.

H. 106. Social and Economic History of the United States Since the Civil War. (3)
Second semester. Summer School (2). Chatelain.

H. 114. The Middle Period of American History 1824-1860. (3)
First semester. Summer School (2). Sparks.

H. 115. The Old South. (3)
First semester. Summer School (2). Riddleberger.

H. 116. The Civil War. (3)
Second semester. Summer School (2). Sparks.

H. 117. The New South. (3)
First semester. Summer School (2). Riddleberger.

H. 118, 119. Recent American History. (3, 3)
Summer School (2, 2). Merrill.

H. 121. History of the American Frontier. (3)
First semester. Summer School (2). Prerequisites, H. 5, 6, or the equivalent. The Trans-Allegheny West. The westward movement into the Mississippi Valley. Gewehr.

H. 122. History of the American Frontier. (3)
Second semester. Summer School (2). Prerequisites, H. 5, 6, or the equivalent. The Trans-Mississippi West. Forces and factors in the settlement and development of the Trans-Mississippi West to about 1900. Gewehr.

H. 123. The New West. (3)
Second semester. Summer School (2). Bates.

H. 124. Reconstruction and the New Nation 1865-1896. (3)
First semester. Summer School (2). Merrill.

H. 127, 128. Diplomatic History of the United States. (3, 3)
First and second semesters. Wellborn.

H. 129. The United States and World Affairs. (3)
First semester. Summer School (2). Wellborn.

H. 133, 134. The History of Ideas in America. (3, 3)
First and second semesters. Summer School (2, 2). Beard.

H. 135, 136. Constitutional History of the United States. (3, 3)
First and second semesters. Gewehr.

H. 141, 142. History of Maryland. (3, 3)
Three hours a week, first and second semesters. Summer School (2, 2). Chatelain.

H. 145, 146. Latin-American History. (3, 3)
Three hours a week, first and second semesters. Summer School (2). Crosman.

H. 147. History of Mexico. (3)
First semester. Crosman.

B. EUROPEAN HISTORY

H. 1, 2 or H. 53, 54 are prerequisites for courses H. 151 to H. 191, inclusive.

H. 151. History of the Ancient Orient and Greece. (3)
First semester. Jashemski.

H. 153. History of Rome. (3)
Second semester. Jashemski.

H. 155. Medieval Civilization. (3)
First semester. Summer School (2). Jashemski.

H. 161. The Renaissance and Reformation. (3)
Second semester. Summer School (2). Jashemski.

H. 163, 164. The Middle East. (3, 3)
First and second semesters. Rivlin.

H. 165. Topics from Middle Eastern History in the Nineteenth and Twentieth Centuries. (3)
First semester. Prerequisites, H. 163, 164 or the equivalent or permission of the instructor. Rivlin.

H. 166. The French Revolution. (2)
First semester. Summer School (2). The Enlightenment and the Old Regime in France; the revolutionary uprisings from 1789 to 1799. Gordon.

H. 167. Napoleonic Europe. (2)
Second semester. Summer School (2). European developments from the rise of Napoleon to the Congress of Vienna. Gordon.

H. 171, 172. Europe in the Nineteenth Century, 1815-1919. (3, 3)
First and second semesters. Summer School (2, 2). Bauer.

H. 175, 176. Europe in the World Setting of the Twentieth Century. (3, 3)
First and second semesters. Prange.

H. 185, 186. History of the British Empire. (3, 3)
First and second semesters. H. 186, Summer School (2). Gordon.

H. 187. History of Canada. (3)
First semester. Summer School (2). Gordon.

H. 189. Constitutional History of Great Britain. (3)
Second semester. Gordon.

H. 191. History of Russia. (3)
First semester. Bauer.

H. 192. Foreign Policy of the USSR. (3)
Second semester. Summer School (2). Prerequisites, H. 1, 2 and H. 191. Bauer.

H. 193, 194. History of European Ideas in Modern Times. (3, 3)
First and second semesters. Stromberg.

H. 195. The Far East. (3)
First semester. Summer School (2). Parmer.

H. 196. Southeast Asia. (3)
Second semester. Summer School (2). Parmer.

H. 199. Proseminar in Historical Writing. (3)
First and second semesters. Bauer, Riddleberger.

For Graduates

H. 200. Research. (3-6)
Credit apportioned to amount of research. First and second semesters. Staff.

H. 201. Seminar in American History. (3)
First and second semesters. Summer School (2). Staff.

H. 202. Historical Literature. (3)
First and second semesters. Summer School (2). Assignments in various selected fields of historical literature and bibliography to meet the requirements of qualified graduate students who need more intensive concentration. Staff.

H. 205, 206. Topics in American Economic and Social History. (3, 3)
First and second semesters. Chatelain.

H. 208. Topics in Recent American Hsitory. (3)
First and second semesters. Merrill.

H. 211. The Colonial Period in American History. (3)
First semester. Ferguson.

H. 212. Period of the American Revolution. (3)
Second semester. Ferguson.

H. 215. The Old South. (3)
First semester. Riddleberger.

H. 216. The American Civil War. (3)
First semester. Sparks.

H. 217. Reconstruction and its Aftermath. (3)
Second semester. Merrill.

H. 221, 222. History of the West. (3, 3)
Summer School (2, 2). Gewehr.

H. 233, 234. Topics in American Intellectual History. (3, 3)
Beard.

H. 245. Topics in Latin-American History. (3)
Crosman.

H. 250. Seminar in European History. (3)
First and second semesters. Summer School (2). Bauer.

H. 251. Topics in Greek Civilization. (3)
Jashemski.

H. 253. Topics in Roman History. (3)
Jashemski.

H. 255. Medieval Culture and Society. (3)
(Arranged.) Jashemski.

H. 265. Problems in Diplomatic History of the Middle East. (3)
Second semester. Prerequisites, H. 163, 164 or H. 165 or the equivalent. Rivlin.

H. 282. Problems in the History of World War II. (3)
Prange.

H. 285, 286. Topics in the History of Modern England and Great Britain. (3, 3)
First and second semesters. Gordon.

H. 287. Historiography. (3)
First and second semesters. Required of all candidates for advanced degrees in history.
Sparks.

HOME ECONOMICS

A. TEXTILES AND CLOTHING

Professor: *Mitchell.*
Assistant Professor: Wilbur.

For Graduates and Advanced Undergraduates

Tex. 100. Advanced Textiles. (3)
First semester. One lecture and two laboratory periods a week. Prerequisite, Tex. 1. Laboratory fee, $3.00.

Tex. 101. Problems in Textiles. (3)
One lecture and two laboratory periods a week, second semester. Laboratory fee, $3.00. Prerequisite, Tex. 100; Organic Chemistry.

Tex. 102. Textile Testing. (3)
Three laboratory periods a week, second semester. Prerequisite, Tex. 100. Laboratory fee, $3.00.

Tex. 105. Consumer Problems in Textiles. (3)
Three lectures a week, first and second semesters. Prerequisite, Tex. 1, or equivalent. Laboratory fee, $3.00.

Tex. 108. Decorative Fabrics. (2)
Two lectures a week, first semester. Prerequisite, Tex. 1, or equivalent. Laboratory fee, $3.00. Wilbur.

Clo. 120. Draping. (3)
Three laboratory periods a week, first semester. Prerequisite, Clo. 21, 122. Laboratory fee, $3.00. Wilbur.

Clo. 122. Tailoring. (2)
Two laboratory periods a week, first and second semesters. Prerequisite, Clo. 21. Laboratory fee, $3.00. Mitchell, Heagney, Parker.

Clo. 123. Children's Clothing. (2)
Two laboratory periods a week, first semester. Prerequisite, Clo. 20, or equivalent. Laboratory fee, $3.00. Heagney, Wilbur.

Clo. 124. Projects and Readings in Textiles and Clothing. (2)
First semester. Prerequisites Clo. 120, Tex. 100. Laboratory fee, $3.00. Mitchell.

Clo. 125. Costume Draping. (3)
Second semester. Three two-hour laboratory periods a week. Prerequisite, Pr. Art 20 or consent of department. Laboratory fee, $3.00.

Clo. 126. Fundamentals of Fashion. (2-3)
Second semester. Three lectures a week. Prerequisites, Clo. 120, Tex. 100. Laboratory fee, $3.00. Wilbur.

Clo. 127. Apparel Design. (3)
Second semester. One lecture and two laboratory periods a week. Laboratory fee, $3.00. Prerequisite, Clo. 120. Staff.

Clo. 128. Home Furnishings. (3)
Three laboratory periods a week, first and second semesters. Prerequisites, Tex. 1, Clo. 20, or consent of instructor. Laboratory fee, $3.00. Wilbur.

For Graduates

Tex. 200. Special Studies in Textiles. (2-4)
Second semester. Laboratory fee, $3.00. Staff.

Clo. 220. Special Studies in Clothing. (2-4)
First semester. Laboratory fee, $3.00. Mitchell, Wilbur.

Tex. and Clo. 230. Seminar. (1)
First and second semesters. Laboratory fee, $3.00. Mitchell.

Tex. and Clo. 231. Research. (4-6)
First and second semesters. Laboratory fee, $3.00. Staff.

Tex. and Clo. 232. Economics of Textiles and Clothing. (3)
Second semester. Laboratory fee, $3.00. Mitchell.

B. PRACTICAL ARTS AND CRAFTS

For Graduates and Advanced Undergraduates

Pr. Art 100, 101. Mural Design. (2, 2)
Two laboratory periods a week, second semester. Laboratory fee, $3.00. Prerequisites, Pr. Art 1, 2, 21, or consent of the instructor. Curtiss.

Pr. Art 120, 121. Costume Illustration. (2, 2)
Two laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Pr. Art 1, 20, 21, and 22 if possible. Elliott.

Pr. Art 124, 125. Individual Problems in Costume. (2, 2)
Two laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Pr. Art 1, 20, 120, 121, and permission of instructor. Elliott.

Pr. Art 132. Advertising Layout. (2)
Two laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Pr. Art 1, 20, 21, 22, 30. Cuneo.

Pr. Art 134, 135. Individual Problems in Advertising. (2, 2)
Two laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Pr. Art 1, 20, 30, 120, 132, or equivalent, and permission of instructor. Cuneo.

Pr. Art 136. Display. (2)
Three laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Pr. 1, 20, 30. Longley.

Pr. Art 138. Advanced Photography. (2)
Three laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Pr. Art 38, 39, or permission of the instructor. Davis.

Pr. Art 142, 143. Advanced Interior Design. (2, 2)
Two laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Pr. Art 1, 40, 41, or equivalent. Eno.

Pr. Art 144, 145. Individual Problems in Interior Design. (2, 2)
Two laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Pr. Art 1, 40, 41, 142, 143, and permission of instructor. Eno.

Cr. 102. Creative Crafts. (2-4)
Summer Session. Daily laboratory periods. Laboratory fee, $3.00. Prerequisite, permission of instructor. Longley.

Cr. 120, 121. Advanced Ceramics. (2, 2)
Three laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Cr. 20, 21. Hodgson.

Cr. 124, 125. Individual Problems in Ceramics. (2, 2)
Three laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Cr. 20, 21, 120, 121, and permission of instructor. Hodgson.

Cr. 130, 131. Advanced Metalry. (2, 2)
Three laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Cr. 30, 31. Longley.

Cr. 134, 135. Individual Problems in Metalry. (2, 2)
Three laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Cr. 30, 31, 130, 131, and permission of instructor. Longley.

Cr. 140, 141. Advanced Weaving. (2, 2)
Three laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Cr. 40, 41. Longley.

Cr. 144, 145. Individual Problems in Weaving. (2, 2)
Three laboratory periods a week, first and second semesters. Laboratory fee, $3.00. Prerequisites, Cr. 40, 41, 140, 141, and permission of instructor. Longley.

C. HOME AND INSTITUTION MANAGEMENT

For Graduates and Advanced Undergraduates

Home Mgt. 150, 151. Management of the Home. (3, 3)
Two lectures and one laboratory period a week. Crow, Stephens.

Home Mgt. 152. Experience in Management of the Home. (3)
First and second semesters. Prerequisites, Home Mgt. 150, 151. Laboratory fee, $7.00. Crow, Stephens.

Home Mgt. 155. Money Management. (2)
Two lectures a week. Prerequisite, Home Mgt. 150 or consent of instructor. Crow.

Home Mgt. 156. Household Equipment. (2)
Two laboratory periods a week. Stephens.

Home Mgt. 158. Special Problems in Management. (3)
Five lectures; one two-hour laboratory. Prerequisites, Home Mgt. 150, 151 or equivalent. Laboratory fee, $3.00. Summer Session only. Crow.

Inst. Mgt. 160. Institution Organization and Management. (3)
First semester. Prerequisites, Foods 2, 3; Nut. 110, Home Mgt. 150, 151 to precede or parallel. Collins.

Inst. Mgt. 161. Institution Food Purchasing and Cost Control. (3)
Second semester. Prerequisite, Foods 2, 3; Nut. 10 or 110 or equivalent. Collins.

Inst. Mgt. 162. Institution Foods. (3)
One lecture and two laboratory periods a week, second semester. Prerequisite, Foods 2, 3; Nut. 10 or 110 or consent of instructor. Collins, Pelcovits.

Inst. Mgt. 164. Food Service Administration and Personnel Management. (2)
One lecture and one laboratory period a week, second semester. Prerequisites, Inst. Mgt. 160, 161, 162, or equivalent. Pelcovits.

Inst. Mgt. 165. School Lunch. (3)
Two lectures and one laboratory period a week, second semester and Summer Session. Prerequisites, Foods 2, 3; Nut. 110, or equivalent. Collins.

Inst. Mgt. S166. Nutrition and Meal Planning. (2)
Summer Session. One lecture and two laboratory periods. Prerequisite, Inst. Mgt. 160 or Equivalent.

Inst. Mgt. 200. Advanced Food Service Management and Supervision. (3)
One lecture and two laboratory periods a week, first semester. Prerequisites, Inst. Mgt. 162, 165 or equivalent.

D. FOODS AND NUTRITION

Professor: King.
Associate Professor: Braucher.

For Graduates and Advanced Undergraduates

Foods 100. Food Economics. (2)
One lecture and one laboratory period a week, first semester. Laboratory fee, $7.00. Prerequisite, Foods 1 or 2, 3. Cornell.

Foods 101. Meal Management. (2)
Two laboratory periods a week, first and second semesters. Laboratory fee, $7.00. Prerequisite, Foods 1 or 2, 3. Cornell.

Foods 102. Experimental Foods. (3)
One lecture and two laboratory periods a week, first semester. Laboratory fee, $7.00. Prerequisites, Foods 2, 3; Chem. 31, 32, 33, 34. King.

Foods 104. Advanced Foods. (2-3)
First semester. Prerequisite, Foods 2, 3; Chem. 31, 32, 33, 34. King.

Foods 105. Foods of Other Countries. (3)
One lecture and two laboratory periods a week, second semester Alternate years. Laboratory fee, $7.00. Prerequisite, Foods 1 or 2, 3, or equivalent. Cornell.

Nut. 110. Nutrition. (3)
First and second semesters. Prerequisites, Foods 2, 3; Chem. 31, 32, 33, 34. Laboratory fee, $7.00. Braucher.

Nut. 111. Child Nutrition. (2)
One lecture and one laboratory period a week, first and second semesters. Prerequisite, Foods 1 or 2, 3; Nut. 10 or 110. Collins.

Nut. 112. Dietetics. (3)
One lecture and two laboratory periods a week, second semester. Laboratory fee, $7.00. Prerequisite, Nut. 110. Pelcovits.

Nut. 113. Diet and Disease. (2)
Second semester. Alternate years. Prerequisite, Nut. 110.

Nut. 114. Nutrition for Health Services. (3)
Second semester. Prerequisite, Nut. 10 or equivalent. Braucher.

For Graduates

Foods 200. Advanced Experimental Foods. (3-5)
Two lectures and three laboratory periods a week, second semester. Laboratory fee, $7.00 King.

Nut. 208. Recent Progress in Human Nutrition. (3)
Second semester. Braucher.

Foods 210. Readings in Foods. (3)
Prerequisite, Foods 102, 104. King.

Nut. 210. Readings in Nutrition. (3)
First semester. Braucher.

Nut. 211. Problems in Nutrition. (3-5)
Second semester. Braucher.

Nut. 212. Nutrition for Community Service. (3)
First semester. Braucher.

Foods and Nut. 204. Recent Advances in Foods and Nutrition. (2-3)
Second semester. King, Braucher.

Foods and Nut. 220. Seminar. (1, 1).
First and second semesters. Staff.

Foods and Nut. 221. Research.
First and second semesters. Laboratory fee, $7.00. Staff.

HOME ECONOMICS—GENERAL

H. E. 103. Demonstrations. (2)
Second semester. Two laboratory periods a week. Prerequisites, Clo. 20; Foods 1 or 2, 3; Tex. 1. Laboratory fee, $7.00. Experience in planning and presenting demonstrations.

HORTICULTURE

Professors: *Haut, Link, Scott, Shanks, Stark, and Thompson.*
Associate Professor: *Reynolds.*
Assistant Professors: *Britton and Wiley.*

This Department offers graduate work in the fields of Floriculture and Ornamental Horticulture, Horticultural Processing, Olericulture, and Pomology leading to the Master of Science or Doctor of Philosophy degrees.

Departmental requirements, supplementary to this Graduate Catalog have been formulated for the administration and guidance of graduate students. Copies of these requirements may be obtained from the department.

For Graduates and Advanced Undergraduates

Hort. 101, 102. Technology of Fruits. (2, 2)
Two hours a week, first and second semesters. Prerequisite, Bot. 101. Thompson.

Hort. 103, 104. Technology of Vegetables. (2, 2)
Two hours a week, first and second semesters. Prerequisite, Bot. 101. Stark.

Hort. 105. Technology of Ornamentals. (2)
Two hours a week, first semester. Prerequisite, Bot. 101. Link.

Hort. 106. World Fruits and Nuts. (2)
Second semester. Haut.

Hort. 107, 108. Plant Materials. (3, 3)
Two lectures and one laboratory period a week, first and second semesters. Prerequisite, Bot. 11 or equivalent. Enright.

Hort. 114. Systematic Pomology. (3)
Two lectures and one laboratory period a week, first semester. Given in alternate years. Haut.

Hort. 116. Systematic Olericulture. (3)
Two lectures and one laboratory period a week, first semester. Given in alternate years. Reynolds.

Hort. 122. Special Problems. (2, 2)
First and second semesters. Credit arranged according to work done. For major students in horticulture or botany. Staff.

Hort. 123. Grades and Standards for Canned and Frozen Products. (2)
Second semester. One lecture and one laboratory period a week. Prerequisites, Hort. 124. Kramer.

Hort. 124. Quality Control. (3)
First semester. Two lectures and one laboratory period a week. Prerequisite, Hort. 58, 155, 156. Kramer.

Hort. 126. Nutritional Analyses of Processed Crops. (2)
Second semester. Two laboratory periods a week. Prerequisites, Chem. 33 and 34, Bot. 101, Hort. 123.

Hort. 150, 151. Commercial Floriculture. (3, 3)
First and second semesters. Two lectures and one laboratory period a week. Prerequisite, Hort. 11. Link.

Hort. 155. Commercial Processing I. (3)
First semester. Two lectures and one laboratory period a week. Laboratory fee, $5.00. Prerequisites, Chem. 32, 34, Hort. 61. Wiley.

Hort. 156. Commercial Processing II. (2)
Second semester. One lecture and one laboratory period a week. Prerequisite, Hort. 155. Wiley.

Hort. 159. Nursery Management. (3)
Second semester. Two lectures and one laboratory period a week. Prerequisites, or concurrently, Hort. 62, 107, 108. Enright.

For Graduates

Hort. 200. Experimental Procedures in Plant Sciences. (3)
First semester. Prerequisite, permission of instructor. Haut.

Hort. 201, 202. Experimental Pomology. (3, 3)
First and second semesters. Prerequisite, Bot. 101. Thompson.

Hort. 203, 204. Experimental Olericulture. (2, 2)
First and second semesters. Prerequisite, Bot. 101. (Not offered 1957-58.) Stark.

Hort. 205. Experimental Olericulture. (2)
First semester. Prerequisite, Bot. 101. Stark.

Hort. 206. Experimental Floriculture. (3)
First semester. Prerequisite, Bot. 101. Link.

Hort. 207. Methods of Horticultural Research. (3)
Second semester. One lecture and one four-hour laboratory period a week. Scott.

Hort. 208. Advanced Horticultural Research. (2-12)
First and second semesters. Credit granted according to work done. Staff.

Hort. 209. Advanced Seminar. (1, 1)
First and second semesters. Five credit hours for five semesters can be obtained. Haut and Staff.

Hort. 210. Experimental Processing. (2)
Second semester. Prerequisite, permission of instructor. Kramer.

MATHEMATICS

Professors: *Jackson, Martin and Stellmacher.*
Research Professors: *Diaz*, Montroll*, and Weinstein*.*
Associate Professors: *Fullerton, Good and Ludford.*
Associate Research Professor: *Payne.**
Assistant Professors: *Brace and Ehrlich.*

For admission to graduate study in mathematics the Department requires, in addition to the Graduate School requirements, an official transcript of the student's previous work for its files and evidence that the candidate for admission has received sufficient prior training in mathematics to indicate that he will be able successfully to undertake graduate training.

Before being recommended for admission to candidacy for the master's degree in mathematics, in addition to the Graduate School requirements, the student must demonstrate a reading knowledge of one foreign language of scientific importance and must have completed the major part of the course work required for the degree and must have received an average grade of B or better in all graduate courses taken.

A student preparing for the degree of Doctor of Philosophy with a major in mathematics will be offered a choice of two curricula, one with an emphasis on pure mathematics, the other with an emphasis on applied mathematics.

The Department requires successful completion of a preliminary oral examination before giving its recommendation for admission to candidacy for the doctorate. Before presenting himself for this examination the student is expected to have acquired a background of mathematical knowledge equivalent to the following group of graduate studies. In the pure mathematics curriculum: Algebra, six hours; Analysis, twelve hours; Geometry and Topology, six hours; Mathematical Methods or Mathematical Physics or Physics or (further) Analysis, six hours. In the applied mathematics curriculum: Analysis, eighteen hours (including Math, 286, 287, 288, 289 212); Mathematical Methods, six hours; Mathematical Physics, six hours (including Math. 260); Algebra or Geometry or Topology as related to the student's individual work.

A student who intends to present a minor in mathematics of more than nine credit hours for the degree of Doctor of Philosophy must include at least three credit hours of 200-level courses in mathematics. If the program includes more than 12 credit hours, at least six credit hours must be in 200-level courses in mathematics.

The Mathematics Department Colloquium meets frequently throughout the academic year for reports on current research by the resident staff, visiting

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* Member of the Institute for Fluid Dynamics and Applied Mathematics.

lecturers, and graduate students. In addition the Institute for Fluid Dynamics and Applied Mathematics Colloquium meets at frequent intervals for reports on research in those fields. All colloquium meetings are open to the public.

A. ALGEBRA

For Graduates and Advanced Undergraduates

Math. 100. Higher Algebra. (3)
First semester. Prerequisite, Math. 21 or equivalent. Raleigh.

Math. 103, 104. Introduction to Modern Algebra. (3, 3)
Prerequisite, Math. 21 or equivalent. For Math. 104, the usual prerequisite of Math. 103 may be waived upon consent of instructor. MacCarthy.

Math. 106. Introduction to the Theory of Numbers. (3)
Summer School (2). Prerequisite, Math. 21 or equivalent. Good.

For Graduates

Math. 200, 201. Modern Algebra. (3, 3)
Prerequisite, Math. 103 or consent of instructor. Ehrlich.

Math. 202. Matrix Theory. (3)
Second semester. Prerequisite, Math. 103 or consent of instructor. Ehrlich.

Math. 204, 205. Topological Groups. (3, 3)
Prerequisite, consent of instructor. Good.

Math. 271. Selected Topics in Algebra. (3)
Arranged.

B. ANALYSIS

For Graduates and Advanced Undergraduates

Math. 110, 111. Advanced Calculus. (3, 3)
Prerequisite, Math. 21 or equivalent. Hummel.

Math. 114. Differential Equations. (3)
Second semester. Prerequisite, Math. 110 or equivalent. Martin.

Math. 115. Partial Differential Equations. (3)
Prerequisite, Math. 114 or equivalent. Martin.

Math. 116. Introduction to Complex Variable Theory. (3)
Prerequisite, Math. 21 or equivalent. Open to students in engineering and the physical sciences. Graduate students in mathematics should enroll in Math. 286. Ludford.

Math. 117. Fourier Series. (3)
Prerequisite, Math. 114 or equivalent. Ludford.

For Graduates

Math. 212. Special Functions. (3)
Second semester. Prerequisite, Math. 287 or consent of instructor. Diaz.

Math. 215, 216. Advanced Differential Equations. (3, 3)
Prerequisite, Math. 100, 111 and 114, or consent of instructor. Horvath.

Math. 217. Existence Theorems in Differential Equations. (3)
Second semester. Prerequisite, Math. 114 or equivalent. Horvath.

Math. 218. Integral Equations. (3)
First semester. Prerequisite, Math. 100 and 287, or consent of instructor. Douglis.

Math. 272. Selected Topics in Analysis. (3)
Arranged.

Math. 280, 281. Linear Spaces. (3, 3)
Prerequisite, Math. 287 or equivalent. Brace.

Math. 286, 287. Theory of Functions. (3, 3)
Prerequisite, Math. 111 or equivalent. Rosen.

Math. 288. Theory of Analytic Functions. (3)
Prerequisite, Math. 287 or a course in complex variables. Stellmacher.

Math. 289. Measure and Integration. (3)
Prerequisite, Math. 287 or a course in real variables. Brace.

C. GEOMETRY AND TOPOLOGY

For Graduates and Advanced Undergraduates

Math. 122, 123. Elementary Topology. (3, 3)
Prerequisite, Math. 21 or equivalent. Rosen.

Math. 124, 125. Introduction to Projective Geometry. (3, 3)
Prerequisite, Math. 21 or equivalent. Jackson.

Math. 126, 127. Introduction to Differential Geometry and Tensor Analysis. (3, 3)
Prerequisite, Math. 21 or equivalent. Jackson.

Math. 128, 129. Higher Geometry. (3, 3)
Prerequisite, Math. 21 or consent of instructor. Math. 128 is not a prerequisite for Math. 129. Open to students in the College of Education. Mayor.

For Graduates

Math. 220, 221. Differential Geometry. (3, 3)
Prerequisite, Math. 111 and 152, or consent of instructor. Jackson.

Math. 223, 224. Algebraic Topology. (3, 3)
Prerequisite, Math. 103 and 123, or consent of instructor. Fullerton.

Math. 225, 226. Set-theoretic Topology. (3, 3)
Prerequisite, Math. 123 or consent of instructor. Fullerton.

Math. 273. Selected Topics in Geometry and Topology. (3)
Arranged.

D. PROBABILITY AND STATISTICS

For Graduates and Advanced Undergraduates

Math. 130. Probability. (3)
First semester. Prerequisite, Math. 21 or equivalent. Hsu.

Math. 132. Mathematical Statistics. (3)
Second semester. Prerequisite, Math. 21 or equivalent. Hsu.

Math. 133. Advanced Statistical Analysis. (3)
Second semester. Prerequisite, Math. 132 or equivalent. Hsu.

E. HISTORY

For Graduates and Advanced Undergraduates

Math. 140. History of Mathematics. (3)
Summer School (2). Prerequisite, Math. 21 or consent of instructor. Jackson.

F. MATHEMATICAL METHODS

For Graduates and Advanced Undergraduates

Math. 150, 151. Advanced Mathematics for Engineers and Physicists. (3, 3)
Prerequisite, Math. 21 or equivalent. Esser.

Math. 152. Vector Analysis. (3)
Summer School (2). Prerequisite, Math. 21 or equivalent. Esser.

Math. 153. Operational Calculus. (3)
First semester. Prerequisite, Math. 21 or equivalent. Esser.

Math. 155. Numerical Analysis. (3)
First semester. Prerequisite, Math. 110 and 114, or consent of instructor. Good.

Math. 156. Programming for High Speed Computers. (3)
Second semester. Prerequisite, Math. 21 or equivalent. Davis.

For Graduates

Math. 250. Tensor Analysis. (3)
First semester. Prerequisite, Math. 100 and 152, or consent of instructor. Stellmacher.

Math. 251. Hilbert Space. (3)
First semester. Prerequisite, Math. 100 and 287, or consent of instructor. Weinstein.

Math. 252. Variational Methods. (3)
Second semester. Prerequisite, Math. 260 or consent of instructor. Payne.

Math. 255, 256. Advanced Numerical Analysis. (3, 3)
Prerequisite, Math. 100 and 155, or consent of instructor. Davis.

G. MATHEMATICAL PHYSICS

For Graduates and Advanced Undergraduates

Math. 160, 161. Analytic Mechanics. (3, 3)
Prerequisite, Math. 21 or equivalent. Martin.

For Graduates

Math. 260. Foundations of Mathematical Physics. (3)
First semester. Prerequisite, consent of instructor. Diaz.

Math. 261, 262. Fluid Dynamics. (3, 3)
Prerequisite, Math. 260 or consent of instructor. Ludford.

Math. 263, 264. Elasticity. (3, 3)
Prerequisite, Math. 100 and 260, or consent of instructor. Payne.

Math. 265. Hyperbolic Differential Equations. (3)
Second semester. Prerequisite, Math. 260 or consent of instructor. Stellmacher.

Math. 266. Elliptic Differential Equations. (3)
First semester. Prerequisite, Math. 260 or consent of instructor. Pucci.

Math. 274. Selected Topics in Applied Mathematics. (3)
Arranged.

H. FOR TEACHERS OF MATHEMATICS AND SCIENCE

For Graduates and Advanced Undergraduates

Math. 181. Foundations of Number Theory. (3)

Summer School. Prerequisite, one year of college mathematics or consent of instructor. Designed primarily for those enrolled in programs with emphasis in the teaching of mathematics and science. Not open to students seeking a major directly in the physical sciences, since the course content is usually covered elsewhere in their curriculum. Jackson.

Math. 182. Foundations of Algebra. (3)

Summer School. Prerequisite, one year of college mathematics or consent of instructor. Designed primarily for those enrolled in programs with emphasis in the teaching of mathematics and science. Not open to students seeking a major directly in the physical sciences, since the course content is usually covered elsewhere in their curriculum. Ehrlich.

Math. 183. Foundations of Geometry. (3)

Summer School. Prerequisite, one year of college mathematics or consent of instructor. Designed primarily for those enrolled in programs with emphasis in the teaching of mathematics and science. Not open to students seeking a major directly in the physical sciences, since the course content is usually covered elsewhere in their curriculum. Jackson.

Math. 184. Foundations of Analysis. (3)

Summer School. Prerequisite, one year of college mathematics or consent of instructor. Designed primarily for those enrolled in programs with emphasis in the teaching of mathematics and science. Not open to students seeking a major directly in the physical sciences, since the course content is usually covered elsewhere in their curriculum. Good.

I. RESEARCH

For Graduates and Advanced Undergraduates

Math. 190, 191. Honors Reading Course. (3, 3)

Prerequisite, permission by the department to work for honors. Jackson.

For Graduates

Math. 298. Proseminar in Research. (1)

Second semester. Prerequisite, one semester of graduate work in mathematics. Fullerton.

Math. 300. Research.

Arranged.

MECHANICAL ENGINEERING

Graduate Faculty: Professors: *Younger, Jackson, Long and Shreeve.*
Associate Professor: *Allen.*
Assistant Professor: *Sayre.*

Instruction and research facilities are available for the degrees of Master of Science and Doctor of Philosophy in Mechanical Engineering.

For the Master of Science degree in Mechanical Engineering, a minimum of six semester hours of course work in Mechanical Engineering must be taken in classes conducted by members of the resident graduate faculty. For the Doctor of Philosophy degree, the minimum is eighteen semester hours.

Registration for six credits of research (M.E. 221, Research) for the M.S. thesis is required. Arrangements for faculty supervision of this research must be made and approved by the department chairman before registration in the course.

For Graduates and Advanced Undergraduates

M. E. 100. Thermodynamics. (3)

First semester. Two lectures and one laboratory period a week. Prerequisites, Phys. 20; Math. 21, concurrently. Eyler, Sayre.

M. E. 101. Heat Transfer. (3)

Second semester. Two lectures and one laboratory period a week. Prerequisites, M.E. 100; M.E. 102 concurrently. Eyler.

M. E. 102. Fluid Mechanics. (3)

Second semester. Two lectures and one laboratory period a week. Prerequisites, M.E. 100. Laboratory fee, $3.00. Sayre.

M. E. 103. Metallography. (3)

Second semester. Two lectures and one laboratory period a week. Prerequisites, M.E. 20, 21, 23. Jackson, Eyler.

M. E. 104. Kinematics. (2)

Second semester. One lecture and one laboratory period a week. Prerequisites, M.E. 24 and Math. 21. Long.

M. E. 150, 151. Heat Power, Chemical and Nuclear. (4, 4)

First and second semesters. Three lectures and one laboratory period a week. Prerequisites, M.E. 100; M.E. 102, concurrently. Shreeve, Cather.

M. E. 152, 153. Mechanical Engineering Design. (4, 3)

First semester, two lectures and two laboratory periods a week. Second semester two lectures and one laboratory period a week. Prerequisites, M.E. 103, M.E. 104. Jackson, Long, Hayleck.

M. E. 154, 155. Mechanical Laboratory. (2, 2)

First and second semesters. One lecture and one laboratory period a week. Prerequisite, senior standing. Laboratory fee $3.00 per semester. Staff.

M. E. 156. Heating and Air Conditioning. (3)

Second semester. Two lectures and one laboratory period a week. Prerequisites M.E. 100; M.E. 101, concurrently. Allen, Eyler.

M. E. 157. Refrigeration. (3)

First semester. Two lectures and one laboratory period a week. Prerequisites, M.E. 100, M.E. 101, M.E. 156; M.E. 102 concurrently. Laboratory fee, $3.00 per semester. Allen, Eyler.

M. E. 158, 159. Applied Elasticity. (3, 3)
First and second semesters. Three lectures a week. Prerequisites, Math. 64 and M.E. 23. Long.

M. E. 160, 161. Advanced Dynamics. (3, 3)
First and second semesters. Three lectures a week. Prerequisites, Math. 64, M.E. 24. Younger.

M. E. 162, 163. Advanced Thermodynamics. (3, 3)
First and second semesters. Three lectures a week. Prerequisites, M.E. 100, 102; Math. 64. Allen, Shreeve.

M. E. 164. Research. (3)
First or second semester. Prerequisite, B average and senior standing in mechanical engineering. Arrangements must be made in advance of registration. Staff.

M. E. 165. Creative Engineering. (3)
First or second semester. Prerequisite, senior standing in mechanical engineering. Shreeve.

M. E. 166, 167. Advanced Fluid Mechanics. (3, 3)
First and second semesters. Three lectures a week. Prerequisites, M.E. 102, Math. 64. Sayre.

For Graduates

M. E. 200, 201. Advanced Dynamics. (3, 3)
First and second semesters. Prerequisites M.E. 24, Math. 64, M.E. 153, M.E. 155. Younger, Long.

M. E. 202, 203. Applied Elasticity. (3, 3)
First and second semesters. Prerequisites, M.E. 23, Math. 64, M.E. 153. Younger, Long.

M. E. 204, 205. Advanced Thermodynamics. (3, 3)
First and second semesters. Three lectures a week. Prerequisites, M.E. 101, M.E. 151, Math. 64. Shreeve, Allen.

M. E. 206, 207. Advanced Machine Design. (3, 3)
First and second semesters. Two lectures and one laboratory period a week. Prerequisites, Math. 64, M.E. 153. Jackson.

M. E. 208, 209. Steam Power Design. (3, 3)
First and second semesters. One lecture and two laboratory periods a week. Prerequisite, M.E. 151. Shreeve.

M. E. 210, 211. Advanced Fluid Mechanics. (3, 3)
First and second semesters. Prerequisites, M.E. 102, Math. 64. Sayre.

M. E. 212, 213. Advanced Steam Power Laboratory. (2, 2)
First and second semesters. One lecture and one laboratory period a week. Prerequisite, registration in M.E. 204, 205. Shreeve.

M. E. 214, 215. Advanced Applied Mechanics Laboratory. (2, 2)
First and second semesters. One lecture and one laboratory period a week. Prerequisites, registration in M.E. 200, 201 and M.E. 202, 203. Long.

M. E. 216, 217. Advanced Internal Combustion Engine Design. (3, 3)
First and second semesters. One lecture and two laboratory periods a week. Prerequisites, M.E. 150, 151; M.E. 152, 153, and registration in M.E. 200, 201 and M.E. 204, 205. Shreeve.

M. E. 218, 219. Advanced Internal Combustion Engine Laboratory. (2, 2)
First and second semesters. One lecture and one laboratory period a week. Prerequisite, registration in M.E. 216, 217. Shreeve.

M. E. 220. Seminar.
Credit in accordance with work outlined by mechanical engineering staff. Prerequisite, graduate standing in mechanical engineering. Staff.

M. E. 221. Research.
Credit in accordance with work outlined by mechanical engineering staff. Prerequisite, graduate standing in mechanical engineering. Staff.

M. E. 222. Advanced Metallography. (3)
First semester. Two lectures and one laboratory period a week. Prerequisite, M.E. 103, M.E. 23. Jackson.

M. E. 223, 224. Steam and Gas Turbine Design. (3, 3)
First and second semesters. Three lectures a week. Prerequisites, M.E. 101, M.E. 151, Math. 64. Shreeve.

M. E. 225, 226. Advanced Properties of Metals and Alloys. (2, 2)
First and second semesters. Two lectures a week. Prerequisites, M.E. 23, M.E. 103, M.E. 152, M.E. 153. Jackson.

M. E. 227, 228. Theory of Elasticity. (3, 3)
First and second semesters. Three lectures a week. Prerequisites, M.E. 202, 203. Younger, Long.

M. E. 229, 230. Jet Propulsion. (3, 3)
First and second semesters. Three lectures a week. Prerequisites, M.E. 101, M.E. 150, M.E. 151. Shreeve.

M. E. 231, 232. Advanced Heat Transfer. (3, 3)
First and second semesters. Three lectures a week. Prerequisite, M.E. 101. Shreeve, Allen.

M. E. 233, 234. Compressible Flow. (3, 3)
First and second semesters. Three lectures a week. Prerequisites, M.E. 210, 211 or equivalent. Sayre.

MICROBIOLOGY

Professors: *Faber, Hansen and Pelczar.*
Associate Professors: *Laffer and Doetsch.*

The Department of Microbiology offers the degrees of Master of Science and Doctor of Philosophy.

Graduate students associated with institutions away from the College Park campus are required to take a minimum of 12 credit hours, exclusive of research, during one semester at College Park for the degree of Master of Science, and a minimum of 24 credit hours, exclusive of research, during two semesters at College Park for the degree of Doctor of Philosophy.

The research project, the experimental approach employed, and progress made must meet with the approval of the head of the department.

Further information concerning graduate work in Microbiology may be obtained from the department.

For Graduates and Advanced Undergraduates

Microb. 101. Pathogenic Microbiology. (4)
Two lectures and two laboratory periods a week, first semester. Laboratory fee, $10.00. Prerequisite, Microb. 5. Faber.

Microb. 103. Serology. (4)
Two lectures and two laboratory periods a week, second semester. Laboratory fee, $10.00. Prerequisite, Microb. 101. Faber.

Microb. 104. History of Microbiology. (1)
One lecture period a week, first semester. Prerequisite, a major or minor in microbiology. Doetsch.

Microb. 105. Clinical Methods. (4)
Two lectures and two laboratory periods a week, first semester. Laboratory fee, $10.00. Prerequisite, consent of instructor. Faber.

Microb. 108. Epidemiology and Public Health. (2)
Two lecture periods a week, second semester. Prerequisite, Microb. 101. Faber.

Microb. 121. Advanced Methods. (4)
Two lectures and two laboratory periods a week, second semester. Laboratory fee, $10.00. Prerequisite, consent of instructor. Hansen and Pelczar.

Microb. 131. Food and Sanitary Microbiology. (4)
Two lectures and two laboratory periods a week, second semester. Laboratory fee, $10.00. Prerequisite, Microb. 1. Laffer.

Microb. 133. Dairy Microbiology. (4)
Two lecture and two laboratory periods a week, first semester. Laboratory fee, $10.00. Prerequisite, Microb. 1. Doetsch.

Microb. 135. Soil Microbiology. (4)
Two lecture and two laboratory periods a week, second semester. Laboratory fee, $10.00. Prerequisite, Microb. 1. **Hansen.**

Microb. 161. Systematic Bacteriology. (2)
Two lecture periods a week, first semester. Prerequisite, 8 credits in microbiology. **Hansen.**

Microb. 181. Microbiological Problems. (3)
First and second semesters. Prerequisite, 16 credits in microbiology. Laboratory fee, $10.00. Registration only upon the consent of the instructor. **Staff.**

For Graduates

Microb. 201. Medical Mycology. (4)
Two lecture and two laboratory periods a week, first semester. Laboratory fee $10.00. Prerequisite, 30 credits in microbiology and allied fields. **Laffer.**

Microb. 202. Genetics of Microorganisms. (2)
Two lecture periods a week, second semester. Prerequisite, consent of instructor. **Hansen.**

Microb. 204. Bacterial Metabolism. (2)
Two lecture periods a week, first semester. Prerequisite, 30 credits in microbiology and allied fields, including Chem. 161 and 162. **Pelczar.**

Microb. 206, 208. Special Topics. (*1, 1*)
One lecture period a week, first and second semesters. Prerequisite, 20 credits in microbiology. **Staff.**

Microb. 210. Virology and Tissue Culture. (2)
Two lecture periods a week, second semester. Prerequisite, Microb. 101 or equivalent. **Warren.**

Microb. 211. Virology and Tissue Culture Laboratory. (2)
Two three-hour laboratory periods a week, second semester. Laboratory fee, $20.00. Prerequisite, Microb. 101 or equivalent. Registration only upon consent of instructor. **Hilleman.**

Microb. 214. Advanced Bacterial Metabolism. (*1*)
One lecture period a week, second semester. Prerequisite, Microb. 204 and consent of instructor. **Pelczar.**

Microb. 280. Seminar—Research Methods. (*1*)
First semester. **Staff.**

Microb. 282. Seminar—Microbiological Literature. (*1*)
Second semester. **Staff.**

Microb. 291. Research.
First and second semesters. Laboratory fee, $10.00. **Staff.**

PHILOSOPHY

Professor: *Garvin.*
Assistant Professors: *Robinson and Schlaretzki.*

This Department is now offering the Master of Arts degree and providing minor work for related areas.

For Graduates and Advanced Undergraduates

Phil. 101. Ancient Philosophy. (3)
First semester. Robinson.

Phil. 102. Modern Philosophy. (3)
Second semester. Lavine, Schlaretzki.

Phil. 111. Medieval Philosophy. (3)
First semester. Robinson.

Phil. 114. Contemporary Movements in Philosophy. (3)
First semester. Garvin.

Phil. 120. Oriental Philosophy. (3)
First semester. Robinson.

Phil. 121. American Philosophy. (3)
First semester. Schlaretzki.

Phil. 123, 124. Philosophies Men Live By. (2, 2)
Staff.

Phil. 130. The Conflict of Ideals in Western Civilization. (3)
Second semester. Schlaretzki.

Phil. 135. Philosophy of Social and Historical Change. (3)
Second semester. Lavine.

Phil. 140. Philosophical Bases of Educational Theories. (3)
Second semester. Robinson.

Phil. 151. Ethics. (3)
First semester. Garvin, Schlaretzki.

Phil. 153. Philosophy of Art. (3)
First semester. Robinson.

Phil. 154. Political and Social Philosophy. (3)
Second semester. Lavine, Schlaretzki.

Phil. 155. Logic. (3)
Second semester. Garvin, Schlaretzki.

Phil. 156. Philosophy of Science. (3)
First semester. Summer School (2). Robinson.

Phil. 158. Philosophy of Language. (3)
Second semester. Schlaretzki.

Phil. 191, 192, 193, 194. Topical Investigations. (1-3)
Each semester. Staff.

For Graduates

Graduate instruction in the Department of Philosophy is carried on mainly by independent investigation of special topics under individual supervision. Any of the courses listed below may be elected more than once. Course selections require the approval of the department chairman.

Phil. 201. Research in Philosophy. (1-3)
Each semester. Staff.

Phil. 203. Selected Problems in Philosophy. (1-3)
Each semester. Staff.

Phil. 205. Seminar in the History of Philosophy. (1-3)
First semester. Staff.

Phil. 206. Seminar in the Problems of Philosophy. (1-3)
Second semester. Staff.

PHYSICAL EDUCATION, RECREATION AND HEALTH

Professors: *Fraley, Deach, Humphrey, Johnson, Massey, and Mohr.*
Associate Professors: *Eyler and Harvey.*

The graduate student majoring in Physical Education, Recreation, or Health Education may pursue any of the following degrees: Master of Arts in Physical Education, Doctor of Education, and Doctor of Philosophy. Undergraduate requirements to be met by every candidate before admission to candidacy for a graduate degree in Physical Education are: basic sciences (human anatomy and physiology, physiology of exercise), kinesiology, therapeutics, sport skills, methods, human development, measurement, administration, and student teaching. In cases where a student has had successful experience in teaching Physical Education, the prerequisites of sport skills, methods, and student teaching may be waived. Undergraduate prerequisites in Recreation are: psychology, sociology, principles, administration, basic sciences, recreational activities, and practical experience. Undergraduate prerequisites in Health Education are: biological sciences, bacteriology, human anatomy and physiology, nutrition, chemistry, psychology, measurement, administration, principles, and field work.

Every graduate student majoring in Physical Education, Recreation, or Health Education is required to take the following courses (or transfer their equivalent) before taking the qualifying examination; P. E. 201, Foundations in Physical Education, Recreation and Health; P. E. 210, Methods and Techniques of Research; and P. E. 196 Quantitative Methods or P. E. 230, Source Material Survey. In addition, every graduate student must register for and complete P. E. 200, Seminar in Physical Education, Recreation, and Health, at some time during his graduate program.

A. PHYSICAL EDUCATION

For Graduates and Advanced Undergraduates

P. E. 100. Kinesiology. (4)
First and second semesters and summer. Three lectures and two laboratory hours a week. Prerequisites, Zool. 1, 14, and 15, or the equivalent. Massey.

P. E. 120. Physical Education for the Elementary School. (3)
First and second semesters and summer. Humphrey.

P. E. 155. Physical Fitness of the Individual. (3)
First and second semesters and summer. Massey.

P. E. 160. Theory of Exercise. (3)
First and second semesters and summer. Prerequisite, P. E. 100. Massey.

P. E. 170. Supervision in Elementary School Physical Education. (3)
First and second semesters and summer. Prerequisite, P. E. 120. Humphrey.

P. E. 180. Measurement in Physical Education and Health. (3)
First and second semesters. Two lectures and two laboratory periods a week. Eyler, Mohr.

P. E. 182. History of Dance. (3)
First semester. Prerequisites, P. E. 52, 54, 56, 58, or permission of instructor. Madden.

P. E. 184. Theory and Philosophy of Dance. (3)
First and second semesters. Madden.

P. E. 189. Field Laboratory Projects and Workshop. (1-6)
First and second semester and summer. Staff.

P. E. 190. Administration and Supervision of Physical Education, Recreation and Health. (3)
First and second semesters, and summer. Johnson.

P. E. 191. The Curriculum in Elementary School Physical Education. (3)
First and second semesters and summer. Prerequisite, P. E. 120. Humphrey.

P. E. 195. Organization and Administration of Elementary School Physical Education. (3)
First and second semesters and summer. Prerequisite, P. E. 120. Humphrey.

P. E. 196. Quantitative Methods. (3)
First and second semesters and summer. Massey.

For Graduates

P. E. 200. Seminar in Physical Education, Recreation and Health. (1)
First and second semesters and summer. Staff.

P. E. 201. Foundations in Physical Education, Recreation and Health. (3)
First and second semesters and summer. Johnson, Eyler.

P. E. 202. Status and Trends in Elementary School Physical Education. (3)
First and second semesters and summer. Humphrey.

P. E. 203. Supervisory Techniques in Physical Education, Recreation and Health. (3)
First and second semesters and summer. Mohr.

P. E. 204. Physical Education and the Development of the Child. (3)
Three lectures a week. First and second semesters and summer. Humphrey.

P. E. 205. Analysis of Contemporary Athletics. (3)
First and second semesters and summer. Eyler.

P. E. 210. Methods and Techniques of Research. (3)
First and second semesters and summer. Mohr.

P. E. 215. Principles and Techniques of Evaluation. (3)
First and second semesters and summer. Mohr.

P. E. 230. Source Material Survey. (3)
First and second semesters and summer. Eyler.

P. E. 250. Mental and Emotional Aspects of Sports and Recreation. (3)
First and second semesters and summer. Johnson.

P. E. 280. The Scientific Bases of Exercise. (3)
First and second semesters and summer. Massey.

P. E. 287. Advanced Seminar. (1-2)
First and second semesters and summer. Deach.

P. E. 288. Special Problems in Physical Education, Recreation and Health. (1-6)
First and second semesters and summer. Staff.

P. E. 289. Research-Thesis. (1-5)
First and second semesters and summer. Staff.

P. E. 290. Administrative Direction of Physical Education, Recreation and Health. (3)
First and second semesters and summer. Deach.

P. E. 291. Curriculum Construction in Physical Education and Health. (3)
First and second semesters and summer. Mohr.

B. HEALTH EDUCATION

For Graduates and Advanced Undergraduates

Hea. 150. Health Problems of Children and Youth. (3)
First and second semesters and summer. Johnson.

Hea. 160. Problems in School Health Education in Elementary and Secondary School. (2-6)
First and second semesters and summer. Johnson and Staff.

Hea. 170. The Health Program in The Elementary School. (3)
First and second semesters and summer. Prerequisite, Hea. 2 and 4, or Hea. 40. Humphrey.

Hea. 178. Fundamentals of Sex Education for Teachers. (3)
First and second semesters and summer. Johnson.

Hea. 180. Measurement in Physical Education and Health. (3)
First and second semesters and summer. Eyler, Mohr.

Hea. 189. Field Laboratory Projects and Workshop. (1-6)
First and second semesters and summer. Staff.

Hea. 190. Organization and Administration of Health Education. (3)
First and second semesters and summer. Johnson.

For Graduates

Hea. 200. Seminar in Physical Education, Recreation and Health. (1)
First and second semesters and summer. Staff.

Hea. 203. Supervisory Techniques in Physical Education, Recreation and Health. (3)
First and second semesters and summer. Mohr.

Hea. 210. Methods and Techniques of Research. (3)
First and second semesters and summer. Mohr.

Hea. 220. Scientific Foundations of Health Education. (3)
First and second semesters and summer. Johnson.

Hea. 230. Source Material Survey. (3)
First and second semesters and summer. Eyler.

Hea. 240. Advancements in Modern Health. (3)
First and second semesters and summer. Johnson.

Hea. 250. Health Problems in Guidance. (3)
First and second semesters and summer. Johnson.

Hea. 260. Public Health Education. (3)
First and second semesters and summer. Johnson.

Hea. 280. Scientific Bases of Exercise. (3)
First and second semesters and summer. Massey.

Hea. 287. Advanced Seminar. (1-2)
First and second semesters and summer. Deach.

Hea. 288. Special Problems in Physical Education, Recreation and Health. (1-6)
First and second semesters and summer. Staff.

Hea. 289. Research—Thesis. (1-5)
First and second semesters and summer. Staff.

Hea. 290. Administrative Direction of Physical Education, Recreation and Health. (3)
First and second semesters and summer. Deach.

Hea. 291. Curriculum Construction in Physical Education and Health. (3)
First and second semesters and summer. Mohr.

C. RECREATION

For Graduates and Advanced Undergraduates

Rec. 120. Program Planning. (3)
First and second semesters. Prerequisite, Rec. 30. Harvey.

Rec. 150. Camp Management. (3)
First and second semesters and summer. Harvey.

Rec. 180. Leadership Techniques and Practices. (3)
First and second semesters. Harvey.

Rec. S184. Outdoor Education. (6)
Summer only. Staff.

Rec. 189. Field Laboratory Projects and Workshops. (1-6)
First and second semesters and summer. Staff.

Rec. 190. Organization and Administration of Recreation. (3)
First and second semesters. Harvey.

Rec. 196. Quantitative Methods. (3)
First and second semesters and summer. Massey.

For Graduates

Rec. 200. Seminar in Physical Education, Recreation and Health. (1)
First and second semesters and summer. Staff.

Rec. 201. Foundations in Physical Education, Recreation and Health. (3)
First and second semesters and summer. Johnson, Eyler.

Rec. 202. Philosophy of Recreation. (2)
First and second semesters and summer. Harvey.

Rec. 203. Supervisory Techniques in Physical Education, Recreation and Health. (3)
First and second semesters and summer. Mohr.

Rec. 204. Modern Trends in Recreation. (3)
First and second semesters and summer. Harvey.

Rec. 210. Methods and Techniques of Research. (3)
First and second semesters and summer. Mohr.

Rec. 215. Principles and Techniques of Evaluation. (3)
First and second semesters and summer. Mohr.

Rec. 230. Source Material Survey. (3)
First and second semesters and summer. Eyler.

Rec. 240. Industrial Recreation. (3)
First and second semesters and summer. Harvey.

Rec. 260. Hospital Recreation. (3)
First and second semesters and summer. Harvey.

Rec. 287. Advanced Seminar. (1-2)
First and second semesters and summer. Deach.

Rec. 288. Special Problems in Physical Education, Recreation and Health. (1-6)
First and second semesters and summer. Staff.

Rec. 289. Research—Thesis. (1-5)
First and second semesters and summer. Staff.

Rec. 290. Administrative Direction of Physical Education, Recreation and Health. (3)
First and second semesters and summer. Deach.

PHYSICS

Professors: *Toll, Morgan, and Myers.*
Research Professors: *Burgers* and Montroll*.*
Part-time Professors: *de Launay, Herzfeld, Kennard, and Wangsness.*
Associate Professors: *Anderson, Ferrell, Hornyak, Iskraut, and Singer.*
Assistant Professor: *MacDonald.*
Assistant Research Professor: *Swetnick.*
Research Associates: *Hinnov and Isihara*.*
Part-time Lecturers: *Aitken, Bass, Friedman, Green, Harrington, Hayward, Jastrow, Lide, Marton, O'Rourke, Overton, Shapiro, M. Slawsky, Snavely, F. Stern, Snow, Wada and Wolcott.*

It is expected that the following courses should have been taken preliminary to graduate work. Any deficiencies should be made up at once. A limited amount of graduate credit will be allowed for courses so taken.

General Physics
Heat
Intermediate Mechanics
Optics
Electricity and Magnetism
Modern Physics
Differential and Integral Calculus

Candidates for both the Master's and Doctor's degree are required to take Introduction to Theoretical Physics (Physics 200, 201). The course runs for a full year and carries 12 semester hours credit. The minimum prerequisites in mathematics are differential and integral calculus, but advanced calculus, differential equations, and vector analysis are recommended.

Candidates for the Doctor's degree should follow the Introduction to Theoretical Physics with Quantum Mechanics. No other courses are specifically required for students doing experimental thesis research, but Relativistic Quantum Mechanics is required for students doing dissertations in theoretical physics. It is recommended in the selection of further courses that the student avoid overspecialization in any field. In particular, he should take a wide variety of classical courses as well as courses in selected fields of Modern Physics. Some of the advanced courses are given only every second or third year; the student should check with the Physics office to confirm when a given course is available.

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*Member of the Institute for Fluid Dynamics and Applied Mathematics.

Candidates for advanced degrees in Physics may have a minor in either chemistry, mathematics, engineering, and/or in those fields of Physics other than General Physics and their field of major specialization.

Thesis (Ph.D.):

The student must outline his topic to the graduate staff for approval. This outline must clearly set forth the nature of the problem, proposed method of procedure and the possible results that may be obtained. The completed thesis will also be presented to the graduate staff for approval.

Off-Campus Courses:

The Physics Department offers courses at convenient times and places so as to accommodate the greatest number of students. In order to facilitate graduate study and supervision of research in the Washington area, the Department has part-time professors in certain government laboratories where a large number of students are interested in graduate study and where there are facilities for research. All students who began graduate work in the University of Maryland courses after 1954 will be required to complete on the College Park campus at least 18 credits of their graduate work for the Ph.D. degree in physics: these credits must include at least 2 credits of Physics 230, Seminar, and the remainder can be divided among major and minor courses and thesis research. Normally, students will complete a much greater proportion of their graduate study on the College Park campus. At government agencies where there is no part-time professor, employees desiring to do graduate work in physics should contact a member of the graduate staff in the Physics Department.

A. GENERAL PHYSICS

For Graduates and Advanced Undergraduates

Phys. 100. Advanced Experiments.
Three hours of laboratory work for each credit hour, each semester. One or more credits may be taken concurrently. Prerequisite, Phys. 52 or 54. Laboratory fee, $10.00. per credit hour. Marion.

Phys. 101. Laboratory Arts.
Three hours laboratory a week for each credit hour. One or more credits may be taken concurrently. Prerequisite, Phys. 100 or consent of instructor. Laboratory fee, $10.00 per credit hour. Abe.

Phys. 102. Optics. (3)
Three lectures a week, second semester. Prerequisites, Phys. 11 or 21; Math. 21. Morgan.

Phys. 103. Applied Optics. (3)
Three lectures a week, first semester. Prerequisite, Phys. 102. Morgan.

Phys. 104, 105. Electricity and Magnetism. (3, 3)
Three lectures a week, first and second semesters. Prerequisites, Phys. 11 or 21; Math. 21. Daen.

Phys. 106, 107. Theoretical Mechanics. (3, 3)
Three lectures a week, first and second semesters. Prerequisites, Phys. 51 or consent of instructor. Martin.

Phys. 108. Physics of Electron Tubes. (3)
Three lectures a week, first semester. Prerequisite, Phys. 104 must be taken previously or concurrently. Hornyak.

Phys. 109. Electronic Circuits. (4)
Four lectures a week, second semester. Prerequisite, Phys. 105 must be taken previously or concurrently. Hornyak.

Phys. 110. Applied Physics Laboratory. (1, 2, or 3)
Three hours laboratory work for each credit hour. One to three credits may be taken concurrently, each semester. Prerequisites, Phys. 52 or Phys. 54; and one credit in Phys. 100. Marion.

Phys. 111. Physics Shop Techniques. (1)
One three-hour laboratory per week, first semester. Prerequisite, Phys. 100 or consent of instructor. Laboratory fee, $10.00. Horn.

Phys. 114, 115. Introduction to Biophysics. (2, 2)
Two lectures a week, first and second semesters. Prerequisites, intermediate physics and calculus.

Phys. 118. Introduction to Modern Physics. (3)
Three lectures a week, first semester. Prerequisites, Math. 21 and Phys. 11 or 21. Hornyak.

Phys. 119. Modern Physics. (3)
Three lectures a week, second semester. Prerequisite, Phys. 118. Maradudin.

Phys. 130, 131. Basic Concepts of Physics. (2, 2)
Two lectures a week, first and second semesters. Prerequisite, junior standing. Lecture demonstration fee, $2.00 per semester. A primarily descriptive course intended mainly for those students in the liberal arts who have not had any other course in Physics. This course does not satisfy the requirements of professional schools nor serve as a prerequisite or substitute for other physics courses. The main emphasis in the course will be on the concepts of physics, their evolution and their relation to other branches of human endeavor. Laster.

For Graduates

Phys. 200, 201. Introduction to Theoretical Physics. (6, 6)
Six lectures per week, first and second semesters. Prerequisite, Phys. 106 or consent of instructor. Myers.

Phys. 202, 203. Advanced Dynamics. (2, 2)
Two lectures a week, first and second semesters. Prerequisite, Phys. 200. Myers.

Phys. 204. Electrodynamics. (4)
Four lectures a week. Prerequisite, Phys. 201. Iskraut.

Phys. 206. Physical Optics. (3)
Prerequisite, Phys. 201. Myers.

Phys. 208. Thermodynamics. (3)
Three lecturers per week, first semester. Prerequisite, Phys. 201 or equivalent. Schamp.

Phys. 212, 213. Introduction to Quantum Mechanics. (4, 4)
Four lectures a week, first and second semesters. Prerequisite Phys. 201. Ferrell.

Phys. 222, 223. Boundary-Value Problems of Theoretical Physics. (2, 2)
Prerequisite, Phys. 201. de Launay.

Phys. 236. Theory of Relativity. (3)
Three lectures a week. Prerequisite, Phys. 200. Iskraut.

Phys. 240, 241. Theory of Sound and Vibrations. (3, 3)
Three lectures a week. Prerequisite, Phys. 201. Snavely.

B. ATOMIC AND MOLECULAR PHYSICS

For Graduates and Advanced Undergraduates

Phys. 126. Kinetic Theory of Gases. (3)
Three lectures a week. Prerequisites, Phys. 107 and Math. 21, or equivalent. Kennard.

For Graduates

Phys. 210. Statistical Mechanics. (3)
Three lectures a week, second semester. Prerequisites, Phys. 119 and 201. Schamp.

Phys. 214. Theory of Atomic Spectra. (3)
Three lectures a week, first semester. Prerequisite, Phys. 213. Anderson.

Phys. 215. Theory of Molecular Spectra. (3)
Three lectures a week, second semester. Prerequisite, Phys. 214. Anderson.

Phys. 216, 217. Molecular Physics. (2, 2)
Two lectures a week, prerequisite, Phys. 213. Jansen.

C. SOLID STATE PHYSICS

For Graduates and Advanced Undergraduates

Phys. 122. Properties of Matter. (4)
Four lectures a week, first semester. Prerequisite, Phys. 118 or equivalent. Maradudin.

For Graduates

Phys. 218, 219. X-Rays and Crystal Structure. (3, 3)
Three lectures per week, first and second semesters. Prerequisite, Phys. 201 or consent of instructor. Morgan.

Phys. 220. Application of X-Ray and Electron Diffraction Methods. (2)
Two laboratory periods a week. Prerequisite, concurrent enrollment in Phys. 218. Morgan.

Phys. 242, 243. Theory of Solids. (2, 2)
Two lectures a week, first and second semesters. Prerequisite, Phys. 213. Montroll.

D. NUCLEAR PHYSICS

For Graduates and Advanced Undergraduates

Phys. 120. Nuclear Physics. (4)
Four lectures a week, second semester. Prerequisite, Phys. 118 or equivalent. Hornyak.

Phys. 121. Neutron Physics and Fission Reactors. (4)
Four lectures a week, second semester. Prerequisite, Phys. 120. Shapiro.

For Graduates

Phys. 234, 235. Theoretical Nuclear Physics. (3, 3)
Three lectures a week. Prerequisite, Phys. 213. MacDonald.

E. ELEMENTARY PARTICLE PHYSICS

For Graduates

Phys. 237. Relativistic Quantum Mechanics. (3)
Three lectures a week, first semester. Prerequisite, Phys. 213. Ferrell.

Phys. 238. Quantum Theory—Selected Topics. (3)
Three lectures a week. Prerequisites, Phys. 212 and 236. Staff.

Phys. 239. Elementary Particles. (3)
Three lectures a week. Prerequisite, Phys. 237. Toll.

F. ASTROPHYSICS AND GEOPHYSICS

For Graduates and Advanced Undergraduates

Phys. 124. Introduction to Astrophysics and Geophysics. (3)
Three lectures a week, first semester. Prerequisites, Phys. 118 or the consent of the instructor. Singer.

For Graduates

Phys. 221. Upper Atmosphere and Cosmic Ray Physics. (2)
Two lectures a week, second semester. Prerequisite, Phys. 200 or consent of instructor. Singer.

G. FLUID DYNAMICS

For Graduates and Advanced Undergraduates

Phys. 116, 117. Fundamental Hydrodynamics. (3, 3)
Three lectures a week. Prerequisites, Phys. 107. and Math. 21. Hama.

For Graduates

Phys. 224, 225. Supersonic Aerodynamics and Compressible Flow. (2, 2)
Two lectures a week. Prerequisite, Phys. 201. Pai.

Phys. 226, 227. Theoretical Hydrodynamics. (3, 3)
Three lectures a week. Prerequisite, Phys. 201. Burgers.

Phys. 232, 233. Hydromechanics Seminar. (*1, 1*)
Kennard.

Phys. 246, 247. Special Topics in Fluid Dynamics. (2, 2)
Prerequisites, advanced graduate standing and consent of the instructor. Burgers.

Phys. 262, 263. Aerophysics. (3, 3)
Three lectures a week. Prerequisite, consent of the instructor. Pai.

H. RESEARCH, SEMINARS AND SPECIAL TOPICS

For Graduates and Advanced Undergraduates

Phys. 150. Special Problems in Physics.
Research or special study. Credit according to work done. Laboratory fee, $10.00 per credit hour when appropriate. Given each semester. Prerequisite, major in physics and consent of instructor. Staff.

For Graduates

Phys. 230. Seminar.
Seminars on various topics in advanced physics are held each semester, with the contents varied each year. One credit for each seminar each semester. Staff.

Phys. 231. Applied Physics Seminar.
(One credit for each semester). Staff.

Phys. 245. Special Topics in Applied Physics.
(2 credits each semester.) Two lectures a week. Staff.

Phys. 248, 249. Special Topics in Modern Physics. (2, 2)
Two lectures a week. Prerequisites, Calculus and consent of instructor. Staff.

Phys. 250. Research.
Credit according to work done, each semester. Laboratory fee, $10.00 per credit hour. Prerequisite: An approved application for admission to candidacy or special permission of the Physics Department. Staff.

I. SPECIAL PHYSICS COURSES FOR HIGH SCHOOL SCIENCE TEACHERS

The courses in this section were especially designed for high school teachers and are not applicable to B.S., M.S. or Ph.D. degrees in physics without special permission of the physics department. However, these courses can be included as part of a physics minor or as electives. No prerequisites are required.

Phys. 118A. Atoms, Nuclei, and Stars. (3)
Three lectures per week. Herzfeld.

Phys. 122A. Properties of Materials. (3)
Three lectures per week. Myers.

Phys. 160A. Physics Problems. (1, 2, 3)
Lectures and discussion sessions arranged. Goodwin.

Phys. 170A. Applied Physics. (3)
Three lectures per week. Montroll.

Phys. 199. National Science Foundation Summer Institute for Teachers of Science and Mathematics. (1)
Five two-hour seminars each week in the last three weeks of Summer School. Enrollment limited to participants in the N.S.F. Summer Institute. Laboratory Fee, $5.00.
Laster and Staff.

POULTRY HUSBANDRY

Professors: *Shaffner and Combs.*
Research Professor: *Shorb.*
Assistant Professors: *Creek and Wilcox.*

Course work and research leading to the Master of Science and the Doctor of Philosophy degrees are offered. The student may pursue work with the

major emphasis either in nutrition, physiology, physiological genetics, or the technology of eggs and poultry.

Department requirements, supplementary to the Graduate School, have been formulated for the guidance of candidates for graduate degrees. Copies of these requirements may be obtained from the Department of Poultry Husbandry.

For Graduates and Advanced Undergraduates

P. H. 104. Technology of Market Eggs and Poultry. (3)
Two lectures and one laboratory period a week, first semester. Helbacka.

A. E. 117. Economics of Marketing Eggs and Poultry. (3)
Three lectures a week, second semester. (See A. E. 117.) Smith.

P. H. 107. Poultry Industrial and Economic Problems. (2)
First semester. Staff.

P. H. 108. Special Poultry Problems. (1-2)
Assigned problems, first and second semesters. Staff.

Poultry Hygiene.
See V. S. 107.

Avian Anatomy.
See V. S. 108.

For Graduates

P. H. 201. Advanced Poultry Genetics. (3)
First semester. Prerequisites, P. H. 100, and Zool. 104 or equivalents. Wilcox.

P. H. 202. Advanced Poultry Nutrition. (3)
Three lectures a week, second semester. Prerequisites, P. H. 101, Chem. 31, 32, 33, and 34 or permission of instructor. Combs.

P. H. 203. Physiology of Reproduction of Poultry. (3)
Two lectures and one laboratory period a week, first semester. Prerequisite, P. H. 102, or equivalent. Shaffner.

P. H. 204. Poultry Seminar. (1)
First and second semesters. No more than two credits in Seminar may be applied towards the graduate degree. Staff.

P. H. 205. Poultry Literature. (1-4)
First and second semesters. Staff.

P. H. 206. Poultry Research. (1-6)
Credit in accordance with work done. Staff.

P. H. 207. Poultry Nutrition Laboratory. (2)
One lecture and one laboratory period a week, first semester. (Not given in 1959-60). Creek, Combs.

PSYCHOLOGY

Professors: *Andrews, Cofer, Gustad, and Ross.*
Associate Professors: *McGinnies, Magoon and Solem.*
Assistant Professors: *Brush, Pumroy and Wegner.*
Lecturer: *Brady.*

All graduate students who have deficiencies in their undergraduate preparation in psychology will be required to remove the particular deficiencies by completing the required courses or by individual study. Deficiencies in the following course areas can be removed only by registering in and satisfactorily completing these courses: Experimental Psychology, Statistical Methods, and Tests and Measurements.

Departmental requirements toward the Master of Arts or the Master of Science degrees: 20 hours in the following courses: Psych. 191-192, 198, 252-253, and 266-267; 6 hours of research (Psych. 290-291); a minimum of 8 hours in approved specialized courses; total 34 hours.

Departmental requirements toward the Doctor of Philosophy degree: 30 hours in the following courses: Psych. 191-192, 198, 203, 205-206, 252-253, 266-267; 18 hours of graduate research including 12 hours for Ph.D. Thesis; a minimum of 26 hours in approved specialized courses and research; total 72 hours.

For Graduates and Advanced Undergraduates

Graduate credit will be assigned only for students certified by the Department of Psychology as qualified for graduate standing.

Psych. 106. Statistical Methods in Psychology. (3)
First and second semesters. Prerequisite, Psych. 1 and Math. 1, 5, or 10, or equivalent. Brush, Pliskoff.

Psych. 110. Educational Psychology. (3)
Second semester. Prerequisite, Psych. 1. Wegner.

Psych. 122. Advanced Psychology. (3)
Second semester. Prerequisites, Psych. 21 and consent of instructor. McGinnies, Wegner.

Psych. 123. Language and Social Communication. (3)
Second semester. Prerequisite, Psych. 21. Wegner.

Psych. 128. Human Motivation. (3)
First and second semesters. Prerequisite, Psych. 21. Cofer.

Psych. 131. Abnormal Psychology. (3)
First and second semesters. Prerequisite, 3 courses in Psychology.
Magoon, Pumroy.

Psych. 136. Applied Experimental Psychology. (3)
Second semester. Prerequisite, Psych. 1. Ross.

Psych. 140. Psychological Problems in Advertising. (3)
Second semester. Prerequisite, Psych. 1. Gonzalez.

Psych. 142. Techniques of Interrogation. (3)
First and second semesters. Prerequisite, Psych. 21. Gonzalez.

Psych. 145. Introduction to Experimental Psychology. (4)
First and second semesters. Prerequisite, Psych. 106. Laboratory fee, $4.00.
Ross, Brush.

Psych. 148. Psychology of Learning. (3)
First semester. Prerequisite, Psych. 145. Cofer, Brush.

Psych. 150. Tests and Measurements. (3)
First semester. Prerequisite, Psych. 106. Laboratory fee, $4.00. Gustad, Magoon.

Psych. 161. Industrial Psychology. (3)
Second semester. Solem.

Psych. 180. Physiological Psychology. (3)
Prerequisite, Psych. 145. Ross, Brady.

Psych. 181. Animal Behavior. (3)
(Same as Zool. 181). Second semester. Prerequisite, consent of instructor.
Ross, Brady.

Psych. 191, 192. Advanced General Psychology. (3, 3)
First and second semesters. Prerequisite, 15 hours of Psychology including Psych. 145 and consent of instructor. Staff.

Psych. 194. Independent Study in Psychology. (1-3)
First and second semesters. Prerequisite, written consent of individual faculty supervisor. Staff.

Psych. 195. Minor Problems in Psychology. (1-3)
First and second semesters. Prerequisite, written consent of individual faculty supervisor. Staff.

Psych. 198. Proseminar: Professional Aspects of Psychological Science. (2)
Second semester. Prerequisite, consent of faculty adviser. Staff.

For Graduates

(All the following courses require consent of the instructor.)

Psych. 201. Sensory Processes. (3)
Second semester. Prerequisite, Psych. 180, and 191. Ross.

Psych. 202. Perception. (3)
First semester. Prerequisite, Psych. 191. Andrews.

Psych. 203, 204. Graduate Seminar. (2, 2)
First and second semesters. Staff.

Psych. 205, 206. Historical Viewpoints and Current Theories in Psychology. (3, 3)
First and second semesters. Cofer.

Psych. 207. Learning Theory. (3)
Second semester. Prerequisite, Psych. 192. Brush, Gonzalez.

Psych. 208. Language and Thought. (3)
First semester. Prerequisite, Psych. 192. Cofer.

Psych. 220. Psychological Concepts in Mental Health. (2)
Second semester. Gustad, Magoon.

Psych. 221. Seminar in Counseling Psychology. (2)
Gustad.

Psych. 222. Seminar in Clinical Psychology. (2)
Prerequisites, Psych. 150, 220. Magoon.

Psych. 223. Diagnosis and Correction of Reading Difficulties. (3)
Second semester. Prerequisites, Psych. 150, 220. Magoon.

Psych. 224. Advanced Procedures in Clinical and Counseling Psychology. (2)
Staff.

Psych. 225. Practicum in Counseling and Clinical Procedures. (1-3)
First and second semester. Prerequisite, Psych. 220. Gustad, Magoon.

Psych. 228. Seminar in Student Personnel. (2)
(Same as Ed. 228.) First semester. Prerequisite, permission of instructor.
Byrne, Gustad.

Psych. 229. Advanced Industrial Psychology. (3)
First semester. Prerequisite, Psych. 161 or equivalent. Solem, Gonzalez.

Psych. 230. Determinants of Human Performance. (3)
Second semester. Ross.

Psych. 231. Training Procedures in Industry. (3)
Second semester. Solem.

Psych. 232. Personnel Selection and Job Analysis. (3)
Second semester. Prerequisite, Psych. 161 or equivalent. Solem, Gonzalez.

Psych. 233. Social Organization in Industry. (3)
First semester. Solem.

Psych. 240. Interview and Questionnaire Techniques. (3)
Second semester. Staff.

Psych. 241. Mass Communication and Persuasion. (3)
Second semester. McGinnies.

Psych. 242. Seminar in Social Psychology. (3)
Second semester. McGinnies.

Psych. 250. Mental Test Theory. (2)
First semester. Prerequisite, Psych. 253. Gustad.

Psych. 251. Development of Predictors. (3)
First semester. Prerequisite, Psych. 253. Andrews.

Psych. 252, 253. Advanced Statistics. (3, 3)
First and second semesters. Prerequisite, Psych. 106. Andrews, Brush.

Psych. 255. Seminar in Psychometric Theory. (2)
Prerequisite, Psych. 253. Andrews.

Psych. 260. Individual Tests. (3)
Prerequisite, Psych. 150. Laboratory fee, $4.00. Magoon, Pumroy.

Psych. 262. Appraisal of Personality. (3)
Prerequisite, Psych. 150. Cofer.

Psych. 264. Projective Tests. (3)
Second semester. Prerequisite, Psych. 260. Laboratory fee, $4.00. Staff.

Psych. 265. Advanced Development Psychology. (2)
Staff.

Psych. 266, 267. Theories of Personality and Motivation. (3, 3)
First and second semesters. Cofer.

Psych. 270. Advanced Abnormal Psychology. (3)
Prerequisite, Psych. 131. Cofer, Gustad.

Psych. 271. Special Testing of Disabilities. (3)
Second semester. Prerequisite, Psych. 260. Magoon.

Psych. 272, 273. Individual Clinical Diagnosis. (3, 3)
Prerequisite, Psych. 260. Gustad.

Psych. 280. Advanced Psychophysiology. (2)
First semester. Andrews, Ross, Brady.

Psych. 288, 289. Special Research Problems. (1-3)
First and second semesters. Staff.

Psych. 290, 291. Research for Thesis (credit arranged).
First and second semesters. Staff.

SOCIOLOGY

Professors: *Hoffsommer and Lejins.*
Associate Professors: *Melvin and Shankweiler.*
Assistant Professors: *Anderson, Coates, Cussler and Rohrer.*

The Department of Sociology grants the degrees of Master of Arts and Doctor of Philosophy. Fields of specialization include Anthropology, Criminology, Rural and Urban Sociology, Mental Health, The Family, Industrial Sociology, Social Theory, Social Psychology and Research Methods.

Prerequisites for graduate study leading to an advanced degree with a major in sociology consist of either (1) an undergraduate major (totalling at least 24 semester hours) in sociology or (2) 12 semester hours of sociology (including 6 semester hours of advanced courses) and 12 additional hours of comparable work in economics, political science, or psychology. Reasonable substitutes for these prerequisites may be accepted in the case of students majoring in other departments who desire a graduate minor or several courses in sociology.

For Graduates and Advanced Undergraduates

Soc. 102. Intercultural Sociology. (3)
First semester. Prerequisite, Soc. 2. Melvin.

Soc. 105. Cultural Anthropology. (3)
Second semester. Summer School (2). Anderson.

Soc. 106. Archeology. (3)
Second semester. Anderson.

Soc. 112. Rural-Urban Relations. (3)
First semester. Summer School (2). Cussler.

Soc. 113. The Rural Community. (3)
Second semester. Prerequisite, Soc. 1, or its equivalent. Hoffsommer, Fitzgerald.

Soc. 114. The City. (3)
First semester. Summer School (2). Prerequisite, Soc. 1, or its equivalent. Schmidt.

Soc. 115. Industrial Sociology. (3)
Second semester. Summer School (2). Prerequisite, Soc. 2, or it equivalent. Coates.

Soc. 116. Military Sociology. (3)
First semester. Coates.

Soc. 118. Community Organization. (3)
First semester. Summer School (2). Prerequisite, Soc. 1, or its equivalent. DiBella, McElhenie.

Soc. 121, 122. Population. (3, 3)
Three hours a week, first and second semesters. Summer School (2). Prerequisite, Soc. 1 or its equivalent. Hirzel.

Soc. 123. Ethnic Minorities. (3)
First semester. Summer School (2). Prerequisite, Soc. 1, or its equivalent. Lejins, Felton.

Soc. 124. The Culture of the American Indian. (3)
Second semester. Prerequisite, Soc. 1, or its equivalent. Anderson.

Sec. 131. Introduction to Social Service. (3)
First and second semesters. DiBella.

Soc. 136. Sociology of Religion. (3)
First semester. Summer School (2). Prerequisite, Soc. 1, or equivalent. Anderson.

Soc. 141. Sociology of Personality. (3)
First semester. Summer School (2). Prerequisite, Soc. 1, or its equivalent. Motz, Cussler, Schmidt.

Soc. 144. Collective Behavior. (3)
Second semester. Prerequisite, Soc. 1, or its equivalent. Cussler.

Soc. 145. Social Control. (3)
First semester. Prerequisite, Soc. 1, or its equivalent. Motz.

Soc. 147. Sociology of Law. (3)
First semester. Prerequisite, Soc. 1, or its equivalent. Lejins.

Soc. 153. Juvenile Delinquency. (3)
First semester. Summer School (2). Prerequisite, Soc. 1, or its equivalent. Lejins.

Soc. 154. Crime and Delinquency Prevention. (3)
Second semester. Prerequisites, Soc. 1, or its equivalent; Soc. 52, Soc. 153, or consent of instructor. Lejins.

Soc. 156. Institutional Treatment of Criminals and Delinquents. (3)
Second semester. Summer School (2). Prerequisites, Soc. 1, or its equivalent; Soc. 52, Soc. 153, or consent of instructor. Lejins.

Soc. 160. Interviewing in Social Work. (1½)
Summer School only. DiBella.

Soc. 161. The Sociology of War. (3)
First semester. Summer School (2). Coates.

Soc. 162. Basic Principles and Current Practice in Public Welfare. (3)
Summer School only. DiBella.

Soc. 163. Attitude and Behavior Problems in Public School Work. (1½)
Summer School only. DiBella.

Soc. 164. The Family and Society. (3)
Summer School (2). Shankweiler.

Soc. 171. Family and Child Welfare. (3)
First semester. Summer School (2). Prerequisite, Soc. 1, or its equivalent. DiBella.

Soc. 173. Social Security. (3)
First semester. Prerequisite, Soc. 1, or its equivalent. DiBella.

Soc. 174. Public Welfare. (3)
Second semester. Prerequisite, Soc. 1, or its equivalent. DiBella.

Soc. 180. Small Group Analysis. (3)
Franz.

Soc. 183. Social Statistics. (3)
Second semester. Prerequisite, Soc. 1, or its equivalent. Schmidt.

Soc. 185. Advanced Social Statistics. (3)
Second semester. Prerequisite, Soc. 183, or its equivalent. Schmidt.

Soc. 186. Sociological Theory. (3)
Second semester. Prerequisite, Soc. 1, or its equivalent. Melvin.

Soc. 191. Social Field Training. (*1*-3)
First and second semesters. Prerequisites: For social work field training, Soc. 131; for crime control field training, Soc. 52 and 153. Enrollment restricted to available placements. Lejins, DiBella.

Soc. 196. Senior Seminar. (3)
Second semester. Hoffsommer.

For Graduates

Soc. 201. Methods of Social Research. (3)
First semester. Hoffsommer.

Soc. 215. Community Studies. (3)
First semester. Coates, Fitzgerald.

Soc. 221. Population and Society. (3)
Second semester. Hirzel.

Soc. 224. Race and Culture. (3)
Second semester. Anderson.

Soc. 230. Comparative Sociology. (3)
Second semester. Melvin.

Soc. 241. Personality and Social Structure. (3)
Second semester. Cussler.

Soc. 246. Public Opinion and Propaganda. (3)
Second semester. Motz.

Soc. 253. Advanced Criminology. (3)
First semester. Lejins.

Soc. 254. Seminar: Criminology. (3)
Second semester. Lejins.

Soc. 255. Seminar: Juvenile Delinquency. (3)
First semester. Lejins.

Soc. 256. Crime and Delinquency as a Community Problem. (3)
Second semester. Lejins.

Soc. 257. Social Change and Social Policy. (3)
First semester. Melvin.

Soc. 262. Family Studies. (3)
Second semester. Shankweiler.

Soc. 263. Marriage and Family Counseling. (3)
Second semester. Prerequisites, Soc. 64 or Soc. 164 or consent of instructor.
Shankweiler.

Soc. 264. The Sociology of Mental Health. (3)
First semester. Melvin.

Soc. 282. Sociological Methodology. (3)
Second semester. Staff.

Soc. 285. Seminar: Sociological Theory. (3)
First semester. Melvin.

Soc. 290. Research in Sociology.
Credit to be determined. Staff.

Soc. 291. Special Social Problems.
First and second semester. Credit to be determined. Staff.

SPEECH AND DRAMATIC ART

Associate Professors: *Strausbaugh and Hendricks.*
Lecturer: *Shutts.*

The Department offers work leading to the Master of Arts degree in the field of Speech and Hearing Science.

For Graduates and Advanced Undergraduates

Speech 102. Radio Production. (3)
Second semester. Prerequisite, Speech 22. Laboratory fee, $2.00. Batka.

Speech 103, 104. Speech Composition and Rhetoric. (3, 3)
First and second semesters. Staff.

Speech 105. Speech-Handicapped School Children. (3)
Second semester. Prerequisite, Speech 3 or consent of instructor. Craven and Staff.

Speech 106. Clinical Practice. (1-5 credits, up to 9)
Each semester and summer. Prerequisite, Speech 105. Laboratory fee, $1.00 per hour. Conlon.

Speech 107. Advanced Oral Interpretation. (3)
Second semester. Prerequisite, Speech 13. Provensen.

Speech 109. Speech and Language Development of Children. (3)
Second semester. Admission by consent of instructor. An analysis of normal and abnormal processes of speech and language development in children. Hendricks.

Speech 111. Seminar. (3)
First and second semesters. Prerequisite, senior standing and consent of instructor. Strausbaugh.

Speech 112. Phonetics. (3)
First semester. Prerequisite, Speech 3 or consent of instructor. Laboratory fee, $3.00. Conlon.

Speech 113. Play Production. (3)
Second semester. Prerequisite, Speech 16 or consent of instructor. Pugliese.

Speech 114. The Film as an Art Form. (3)
A study of the motion picture as a developing form of entertainment, communication, and artistic expression. Laboratory fee, $7.50. Niemeyer.

Speech 115. Radio in Retailing. (3)
First semester. Limited to students in the College of Home Economics. Prerequisites, Speech 1 and 2 or 7. Laboratory fee, $2.00. Batka.

Speech 116. Radio Announcing. (3)
Second semester. Prerequisite, Speech 4 and 22 or consent of instructor. Laboratory fee, $2.00. Batka.

Speech 117. Radio Continuity Writing. (3)
First semester. Prerequisite, Speech 22 or consent of instructor. Bedwell.

Speech 118. Advanced Radio Writing. (3)
Second semester. Prerequisites, Speech 117 and consent of instructor. Aylward.

Speech 119. Radio Acting. (3)
Second semester. Prerequisite, Speech 22. Pugliese.

Speech 120. Speech Pathology. (3)
First semester. Prerequisite, Speech 105. A continuation of Speech 105. Laboratory fee, $3.00. Hendricks.

Speech 122, 123. Radio Workshop. (3, 3)
First and second semesters. Prerequisite, Speech 102 or 116. Laboratory fee, $2.00 per semester. Batka.

Speech 126. Semantic Aspects of Speech in Human Relations. (3)
Second semester. Prerequisite, one course in public speaking. Hendricks.

Speech 131. History of the Theatre. (3)
First semester. Niemeyer.

Speech 132. History of the Theatre. (3)
Second semester. Niemeyer.

Speech 133. Staff Reports, Briefings and Visual Aids. (3)
Second semester. Limited to students in the College of Military Science. Prerequisite, Speech 6 or Speech 104. Linkow.

Speech 135. Instrumentation in Speech and Hearing Science. (2)
First semester. The use of electronic equipment in the measurement of speech and hearing. Prerequisite, Speech 3. Laboratory fee $2.00. Linkow.

Speech 136. Principles of Speech Therapy. (3)
Prerequisite, Speech 120. Laboratory fee, $3.00. Hendricks.

Speech 137. Experimental Phonetics. (3)
Prerequisite, Speech 112 or equivalent. Laboratory fee, $3.00. Hendricks.

Speech 138. Methods and Materials in Speech Therapy. (3)
Prerequisite, Speech 120 or equivalent. Laboratory fee $3.00. Craven.

Speech 139. Theatre Workshop. (3)
Prerequisite, Speech 8 or Speech 14. Strausbaugh.

Speech 140. Principles of Television Production. (3)
First semester. Prerequisite, Speech 22. A study of the theory, methods, techniques and problems of television direction and production. Batka.

Speech 141. Introduction to Audiometry. (2)
First semester. Prerequisite, Speech 3. Laboratory fee, $2.00. Analysis of various methods and procedures in evaluating hearing losses. Required for students whose concentration is in Speech and Hearing Therapy. Craven.

Speech 142. Speech Reading and Auditory Training. (2)
Second semester. Prerequisite, Speech 3. Laboratory fee, $2.00. Methods of training individuals with hearing loss to recognize, interpret, and understand spoken language. Required for students whose concentration is in Speech and Hearing Therapy. Conlon.

For Graduates

(All the following courses require consent of instructor.)

The Department maintains a reciprocal agreement with Walter Reed General Hospital whereby clinical practice may be obtained at the Army Audiology and Speech Correction Center, Forest Glen, Maryland, under the direction of James P. Albrite, M.D., Director.

Speech 200. Thesis. (3-6)
Credit in proportion to work done and results accomplished. Hendricks.

Speech 201. Special Problems Seminar (A through K), (1-3) (6 hrs. applicable toward M.A. degree).
A. Stuttering; B. Cleft Palate; C. Delayed Speech; D. Articulation; E. Cerebral Palsy; F. Voice; G. Special Problems of the Deaf; H. Foreign Dialect; I. Speech Intelligibility; J. Neurophysiology of Hearing; K. Minor Research Problems. Hendricks and Staff.

Speech 202. Techniques of Research in Speech and Hearing. (3)
First semester. Analysis of research methodology including experimental techniques, statistical analysis and preparation of reports for scientific investigations in speech and hearing science. Required of candidates for Master's degree in Speech and Hearing Therapy. Williams.

Speech 210. Anatomy and Physiology of Speech and Hearing. (3)
Laboratory fee, $3.00. Gerlach.

Speech 211. A, B, C, D. Advanced Clinical Practice (1-3 up to 12) (6 hrs. applicable toward M.A. degree).
Supervised training in the application of clinical methods in the diagnosis and treatment of speech and hearing disorders. Laboratory fee, $1.00 per hour. Craven.

Speech 212. Advanced Speech Pathology. (3)
Second semester. Laboratory fee, $3.00. Hendricks.

Speech 214. Clinical Audiometry. (3)
First semester. Laboratory fee, $3.00. Shutts.

Speech 216. Communication Skills for the Hard-of-Hearing. (3)
First semester. Speech reading, auditory training, and speech conservation problems in the rehabilitation of the hard-of-hearing. Causey.

Speech 217. Selection of Prosthetic Appliances for the Acoustically Handicapped. (3)
Second semester. Laboratory fee, $3.00. Shutts.

Speech 218. Speech and Hearing in Medical Rehabilitation and Special Education Programs. (3)
Second semester. Administrative problems involved in the organization and operation of speech and hearing therapy under different types of programs. Hendricks.

Speech 219. Speech Disorders of the Brain-Injured. (3)
Laboratory fee, $3.00. Hendricks.

Speech 221. Communication Theory and Speech and Hearing Problems. (3)
Second semester. Analysis of current theories of communication as they apply to research and therapy in speech and hearing. Hendricks.

VETERINARY SCIENCE

Professor: Hansen.

For Graduates and Advanced Undergraduates

V. S. 101. Comparative Anatomy. (3)
Two lectures and one laboratory period a week, first semester. Sperry.

V. S. 102. Animal Hygiene. (3)
Two lectures and one laboratory period a week, second semester. Sperry.

V. S. 103. Regional Comparative Anatomy. (3)
One lecture and one laboratory period a week, first semester. Sperry.

V. S. 104. Advanced Regional Comparative Anatomy. (2)
Two laboratory periods a week, second semester. Sperry.

V. S. 107. Poultry Hygiene. (3)
Two lectures and one laboratory period a week, second semester. DeVolt.

V. S. 108. Avian Anatomy. (3)
Two lectures and one laboratory period a week, first semester. DeVolt.

For Graduates

V. S. 201. Animal Disease Problems. (2-6)
Arranged. Poelma, DeVolt, Hansen, Brueckner.

V. S. 202. Animal Disease Research.
Arranged. Poelma, DeVolt, Hansen, Brueckner.

V. S. 203. Electron Microscopy. (2)
One lecture and one laboratory period a week, first semester. Reagan, Byrne.

ZOOLOGY

Professors: *Wharton and Schoenborn.*
Associate Professors: *Anastos, Brown, and Littleford.*
Assistant Professors: *Allen, Grollman, Highton, Ramm, and Winn.*

The Department of Zoology offers work leading to the Master of Science and the Doctor of Philosophy degrees. The general academic requirements which must be fulfilled for these degrees are described earlier in the catalog.

The special fields which graduate students may emphasize in working toward these degrees are cytology, ecology, embryology, fisheries, parasitology, physiology, and systematics. In some fields opportunities for training and summer employment in nearby research laboratories are available to qualified students, and under certain circumstances graduate students may work, under supervision, with the unrivaled collections of the U. S. National Museum of the Smithsonian Institution in Washington, D. C. Information concerning the specific requirements in each of these fields may be obtained from the department.

All zoology courses with laboratory have a laboratory fee of $8.00 per course per semester.

For Graduates and Advanced Undergraduates

Zool. 102. General Animal Physiology. (4)
Second semester. Occasional Summer Session. Two lectures and two three-hour laboratory periods a week. Prerequisites, one year of zoology and one year of chemistry. Grollman.

Zool. 104. Genetics. (3)
First semester. Summer Session. Three lectures a week. Prerequisite, one course of zoology or botany. Highton.

Zool. 108. Animal Histology. (4)
Second semester. Occasional Summer Session. Two lectures and two three-hour laboratory periods a week. Prerequisite, one year of zoology. Brown.

Zool. 110. Parasitology. (4)
First semester. Occasional Summer Session. Two lectures and two two-hour laboratory periods a week. Prerequisite, one year of zoology. Haley.

Zool. 111. Veterinary Parasitology. (4)
Second semester. Two lectures and two two-hour laboratory periods a week. Prerequisite, one year of zoology or permission of the instructor. Alternate years. Not offered 1958-59. Anastos.

Zool. 112. Wildlife Parasitology. (4)
Second semester. Two lectures and two two-hour laboratory periods a week. Prerequisite, one year of zoology or permission of the instructor. Alternate years. Not offered 1958-59. Anastos.

Zool. 118. Invertebrate Zoology. (4)
First semester. Occasional Summer Session. Two lectures and two three-hour laboratory periods a week. Prerequisite, one year of zoology. Allen.

Zool. 121. Principles of Animal Ecology. (3)
Second semester. Occasional Summer Session. Two lectures and one three-hour laboratory period a week. Prerequisites, one year of zoology and one year of chemistry. Henson.

Zool. 125. Fisheries Biology and Management. (3)
First semester. Two lectures and one three-hour laboratory period a week. Prerequisites, Zool. 1 and 2 or equivalent. Allen.

Zool. 126. Shellfisheries. (3)
Second semester. Two lectures and one three-hour laboratory period a week. Prerequisite, Zool. 2 or equivalent. Allen.

Zool. 127. Ichthyology. (4)
Second semester. Two lectures, one two-hour and one three-hour laboratory periods a week. Prerequisites, Zool. 5 and 20. Alternate years. To be offered 1958-59. Winn.

Zool. 128. Zoogeography. (4)
First semester. Two lectures and two two-hour laboratory periods a week. Prerequisite, one year of zoology, botany, or geology, Alternate years. To be offered 1958-59. Henson.

Zool. 181. Animal Behavior. (3)
(Same as Psych. 181). Second semester. Three lectures a week. Prerequisite, permission of the instructor. Alternate years. Not offered 1958-59. Ross.

Zool. 199S. National Science Foundation Summer Institute for Teachers of Science and Mathematics. Seminar (1).
Summer Session. Seminar fee, $5.00. Brown and Staff.

For Graduates

Zool. 200. Marine Zoology. (4)
Second semester. Two lectures and two three-hour laboratory periods a week. Alternate years. Not offered 1958-59. Allen.

Zool. 202. Animal Cytology. (4)
First semester. Two lectures and two three-hour laboratory periods a week. Prerequisite, Zool. 108. Alternate years. To be offered 1958-59. Brown.

Zool. 203. Advanced Embryology. (4)
Second semester. Two lectures and two three-hour laboratory periods a week. Prerequisite, Zool. 20. Alternate years. Not offered 1958-59. Ramm.

Zool. 204. Advanced Physiology. (4)
First semester. Two lectures and two three-hour laboratory periods a week. Prerequisites, Zool. 102 and one year of organic chemistry. Schoenborn.

Zool. 205. Limnology. (4)
First semester. Two lectures and two three-hour laboratory periods a week. Alternate years. Not offered 1958-59. Henson.

Zool. 206. Research (credit to be arranged).
First and second semesters. Summer Session. Work on thesis project only. A—Cytology; B — Embryology; C — Fisheries; E — Parasitology; F — Physiology; G — Systematics; H—Ecology; and I—Behavior. Staff.

Zool. 207. Zoology Seminar (credit to be arranged).
First and second semesters. Summer Session. One lecture a week for each credit hour. A—Cytology; B—Embryology; C—Fisheries; D—Genetics; E—Parasitology; F—Physiology; G—Systematics; H—Ecology; I—Behavior; and S—Recent Advances.
Staff.

Zool. 208. Special Problems in Zoology (credit to be arranged).
First and second semesters. Summer Session. A—Cytology; B—Embryology; C—Fisheries; E—Parasitology; F—Physiology; G—Systematics; H—Ecology; and I—Behavior.
Staff.

Zool. 209. Advanced Parasitology. (4)
First semester. Three lectures and one three-hour laboratory period a week. Prerequisite, Zool. 110 or permission of the instructor. Alternate years. To be offered 1958-59.
Anastos.

Zool. 210. Systematic Zoology. (4)
Second semester. Three lectures and one three-hour laboratory period a week. Alternate years. To be offered 1958-59.
Highton.

Zool. 211, 212. Lectures in Zoology. (3, 3)
First and second semesters. Three lectures a week.
Visiting Lecturers.

Zool. 215S. Fisheries Technology. (4)
To be offered as needed during the Summer Session at the Sea Food Processing Laboratory, Crisfield, Maryland. Two lectures and two three-hrour laboratory periods a week.
Littleford.

Zool. 216. Physiological Cytology. (4)
First semester. Two lectures and two three-hour laboratory periods a week. Prerequisites, Chem. 161, 162, Phys. 11, and Zool. 102, or permission of the instructor. Alternate years. Not offered 1958-59.
Brown.

Zool. 220. Advanced Genetics. (4)
Second semester. Two lectures and two three-hour laboratory periods a week. Prerequisite, Zool. 104. Alternate years. Not offered 1958-59.
Highton.

Zool. 223. Analysis of Animal Structure. (4)
Second semester. Two lectures and two three-hour laboratory periods a week. Alternate years. To be offered 1958-59.
Ramm.

Zool. 231S. Acarology. (3)
Summer Session. Lecture and laboratory.
Camin.

Zool. 232S. Medical and Veterinary Acarology. (3)
Summer Session. Lecture and laboratory.
Strandtmann.

Zool. 233S. Agricultural Acarology. (3)
Summer Session. Lecture and laboratory.
Baker.

Zool. 234. Experimental Mammalian Physiology. (4)
First semester. Two four-hour laboratory periods a week. Prerequisites, Zool. 102 and one year of chemistry above general chemistry. Alternate years. Not offered 1958-59. Grollman.

Zool. 235. Comparative Behavior. (4)
Second semester. Two lectures and two three-hour laboratory periods a week. Prerequisites, Zool. 121 and 181, or permission of the instructor. Alternate years. Not offered 1958-59. Winn.

SCHOOL OF DENTISTRY

ANATOMY

Professor: *Hahn.*
Associate Professor: *Thompson.*
Lecturer: *Dr. Lindenberg.*

For Graduates and Advanced Undergraduates

Anat. 111. Human Gross Anatomy. (8)
Two lectures and two laboratory periods per week throughout the year. Hahn, Thompson.

Anat. 112. Human Neuroanatomy. (2)
Two lectures and two laboratory periods for eight weeks. Prerequisite Anatomy 111. Hahn, Thompson, Lindenberg.

For Graduates

Anat. 211. Human Gross Anatomy. (8)
Same as course 111 but with additional work on a more advanced level. Hahn, Thompson.

Anat. 212. Human Neuroanatomy. (2)
Same as course 112 but with additional instruction of a more advanced nature. Hahn, Thompson, Lindenberg.

Anat. 214. The Anatomy of the Head and Neck. (3)
One conference and two laboratory periods per week for one semester. Hahn, Thompson.

Anat. 216. Research.
Credit determined by amount and quality of work performed. Staff.

BIOCHEMISTRY

Professor: *Vanden Bosche.*

For Graduates and Advanced Undergraduates

Biochem. 111. Principles of Biochemistry. (6)
First year. Prerequisites, inorganic and organic chemistry, with additional training in quantitative and physical chemistry desirable. Two lectures and one laboratory period throughout the year. Vanden Bosche.

For Graduates

Biochem. 211. Advanced Biochemistry. (6)

Prerequisite, Biochemistry 111. Two lectures, one conference and one laboratory period throughout the year. Vanden Bosche.

Biochem. 212. Research in Biochemistry.

Prerequisite, Biochemistry 211. Vanden Bosche.

HISTOLOGY AND EMBRYOLOGY

Professor: *Provenza.*

For Graduates and Advanced Undergraduates

Hist. 111. Mammalian Histology and Embryology. (8)

First year. First and second semesters. Two lectures and two laboratory periods. Provenza.

For Graduates

Hist. 212. Mammalian Histology and Embryology. (6)

This course is the same as Histology 111, except that it does not include the dental phases of 111, but does include additional instruction and collateral reading of an advanced nature. Provenza.

Hist. 213. Mammalian Oral Histology and Embryology. (2)

Prerequisite, Histology 111 or 212, or an equivalent course. This course covers the dental aspects of Histology 111, and includes additional instruction in the relations of histologic structure and embryologic development of the teeth, their adnexa, and the head and facial regions of the human body. Provenza.

Hist. 214. Research in Histology.

Number of hours and credit by arrangement. Staff.

Hist. 215. Research in Embryology.

Number of hours and credit by arrangement. Staff.

MICROBIOLOGY

Professor: *Shay.*

For Graduates and Advanced Undergraduates

Microb. 121. Dental Microbiology and Immunology. (4)

First semester. Two lectures and two laboratory periods per week. Shay.

For Graduates

Microb. 200, 201. Chemotherapy. (*1, 1*)

Prerequisite, Microbiology 121 or equivalent. One lecture a week. Offered in alternate years. A study of the chemistry, toxicity, pharmacology and therapeutic value of drugs employed in the treatment of disease. Shay.

Microb. 202, 203. Reagents and Media. (*1, 1*)
One lecture a week. Offered in alternate years. A study of the methods of preparation and use of bacteriological reagents and media. Shay.

Microb. 210. Special Problems in Microbiology.
Laboratory course. Credit determined by amount and quality of work performed. Shay.

Microb. 211. Public Health. (2)
Prerequisite, Microbiology 121 or equivalent. Lectures and discussions on the organization and administration of state and municipal health departments and private health agencies. The course also includes a study of laboratory methods. Shay.

Microb. 221. Research in Microbiology.
Credit determined by amount and quality of work performed. Shay.

ORAL SURGERY

Professor: *Dorsey.*
Associate Professor: *Cappuccio.*

For Graduates

Surg. 201. Clinical Anesthesiology. (6)
Forty hours a week for thirteen weeks. Heldrich and Staff.

Surg. 220. General Dental Oral Surgery. (4)
Two lectures and two laboratory periods a week for one semester. Dorsey and Staff.

Surg. 221. Advanced Oral Surgery. (4)
Two lectures and two laboratory periods a week for one semester. Dorsey and Staff.

Surg. 222. Research.
Time and credit by arrangement. Staff.

PATHOLOGY

Professor: *M. Aisenberg.*

For Graduates and Advanced Undergraduates

Path. 121. General Pathology. (4)
Two lectures and two laboratory periods per week for one semester. Aisenberg.

For Graduates

Path. 211. Advanced Oral Pathology. (8)
Two lectures and two laboratory periods throughout the year. This course is presented with the objective of correlating a knowledge of histopathology with the various aspects of clinical practice. Studies of surgical and biopsy specimens are stressed. Aisenberg.

Path. 212. Research.
Time and credit by arrangement. Aisenberg.

PHYSIOLOGY

Professor: *Oster.*
Assistant Professors: *Shipley and Pollack.*

For Graduates and Advanced Undergraduates

Physiol. 121. Principles of Physiology. (6)
Second year. 132 hours. Three lectures and one laboratory period in first semester, two lectures in second semester. Oster, Shipley, Pollack.

For Graduates

Physiol. 211. Principles of Mammalian Physiology. (6)
Prerequisite, permission from the department. Same as course 121 but with collateral reading and additional instruction. Oster, Shipley, Pollack.

Physiol. 212. Advanced Physiology.
Hours and credit by arrangement. Lectures and seminars during the second semester. Oster, Shipley, Pollack.

Physiol. 213. Research.
Hours and credit by arrangement. Oster, Shipley, Pollack.

SCHOOL OF MEDICINE

ANATOMY

Professor: *Figge.*
Research Professor: *Uhlenhuth.*
Associate Professors: *Krahl and Mack.*
Assistant Professor: *Leveque.*

The graduate degrees offered by the Department of Anatomy are the Master of Science and the Doctor of Philosophy.

A. GROSS ANATOMY

For Graduates and Advanced Undergraduates

Anat. 101. Human Gross Anatomy. (8)
This course gives the student an opportunity to develop a basic concept of the morphology of the human body. It is closely interwoven with the study of neuroanatomy, histology and embryology, and some time is devoted to roentgen anatomy. The entire human body is dissected. Four conferences or lectures, 12 laboratory hours per week throughout the first semester. Laboratory fee, $25.00.
Figge, Krahl, Mack, Leveque, Mech, McCafferty, and Saunders.

Anat. 103. Practical Anatomy. (4)

Two lectures and two two-hour laboratories per week for 16 weeks. Second semester. This course is designed to bridge the gap between abstract anatomy and clinical anatomy as applied to the study and practice of medicine and surgery. It will be required of all majors in Anatomy. The study of surface anatomy will be correlated with physical diagnosis. Laboratory fee, $20.00. Brantigan and Staff.

For Graduates

Anat. 201. General Anatomy of the Human Body. (8)

Same course as 101, but on a more advanced level. It can be taken by graduate as well as post-graduate students. Laboratory fee, $25.00. Figge and Staff.

Anat. 202. The Anatomy of the Human Pelvis. (2)

Fifteen periods of four hours each, mornings by arrangement. This course is open to graduate students, medical students, and post-graduate students. Uhlenhuth.

Anat. 203. Clinical Anatomy. (4)

Same course as 103 but on a more advanced level. Laboratory fee, $20.00. Brantigan and Staff.

Anat. 204. Fetal and Infant Anatomy. (2)

Fifteen periods of three hours each, every Thursday from 2 to 5 p.m. for 15 weeks during the first semester. This course is open to graduate students and post-graduates interested in Pediatrics. Laboratory fee, $10.00. Krahl.

Anat. 205. Research in Anatomy.

Maximum credits, 12 per semester. Research work may be taken in any one of the branches of Anatomy. Figge and Staff.

B. NEURO-ANATOMY

For Graduates and Advanced Undergraduates

Neuroanat. 101. Human Neuro-Anatomy. (4)

The study of the detailed anatomy of the central nervous system is coordinated with structure and function of the entire nervous system. The dissection of the human brain and the examination of stained microscopic sections of various levels of the brain stem are required. Two lectures and four laboratory hours per week for 16 weeks of the first semester. Laboratory fee, $15.00. Figge, Nauta, Kuypers.

For Graduates

Neuroanat. 201. Human Neuro-Anatomy. (4)

Same course as Neuroanat. 101, but with additional work of a more advanced nature. Laboratory fee, $15.00. Figge, Nauta, Kuypers.

Neuroanat. 202. Research in Neuro-Anatomy.

Maximum credits, 12. Research work involving the central or peripheral nervous system. Figge, Nauta, Kuypers, Leveque.

C. MICRO-ANATOMY

For Graduates and Advanced Undergraduates

Microanat. 101. Mammalian Histology. (6)

This course presents an integrated study of the histology and embryology of the human body. An attempt is made to correlate this with gross anatomy as well as other subjects in the medical curriculum. Special emphasis is placed on the dynamic and functional aspects of the subject. Three lectures and six laboratory hours a week for 16 weeks during the first semester. Laboratory fee, $15.00. Figge, Mack, Leveque.

For Graduates

Microanat. 201. Mammalian Histology. (6)

Same course as Micro-Anatomy 101, but with additional work of a more advanced nature. Laboratory fee, $15.00. Figge, Mack, Leveque.

Microanat. 202. Normal and Atypical Growth. (2)

Lectures in Problems of Growth. Two hours per week, time to be arranged. Sixteen weeks, second semester. Figge.

Microanat. 203. Research.

Maximum credits, 12. Research work may be taken in any one of the branches which form the subject of Micro-Anatomy (including cancer research).

Figge, Mack, Leveque.

INTERDEPARTMENTAL COURSES

ID. 101. Man and His Environment. (2)

Distinguished leaders in American medicine participate in the presentation of these weekly sessions. The course is broad in scope, stressing the cultural aspects of anthropology with emphasis directed toward the sociological, psychological, physiological, and geneological relationships of man and his surroundings. All departments of the School of Medicine participate.

One-hour lecture and one-hour panel discussion Saturday mornings from 9 to 11 a.m. throughout the year.

BIOLOGICAL CHEMISTRY

Professor: *Schmidt.*
Associate Professor: *Herbst.*
Lecturer: *Summerson.*

Graduate degrees offered by the Department of Biological Chemistry are the Master of Science and Doctor of Philosophy.

For Graduates and Advanced Undergraduates

Biochem. 101. Principles of Biochemistry. (8)
Seven lectures and conferences and two three-hour laboratory periods a week, second semester. Prerequisites, inorganic, organic, and quantitative or physical chemistry. Laboratory fee, $20.00. Schmidt, Herbst, Rudolph, Emery, Brown.

For Graduates

Biochem. 201. Principles of Biochemistry. (8)
Same course as Biochem. 101, but on a more advanced level for graduate students. Laboratory fee, $20.00. Schmidt, Herbst, Rudolph, Emery, Brown.

Biochem. 202. Special Topics in Biochemistry. (*1, 1*)
Prerequisite, Biochem. 101 or 201. Schmidt.

Biochem. 203. Research.
Maximum credits, 12. Credit proportioned to extent and quality of work accomplished. Schmidt, Herbst, Rudolph, Emery.

Biochem. 204, 205. Seminar. (*1, 1*)
First and second semesters. Schmidt.

Biochem. 206. Enzymes and Metabolism. (3)
First semester. Herbst.

Biochem. 207. Biochemical Preparation. (*1-4*)
Credit according to work done. Schmidt, Herbst, Rudolph, Emery.

Biochem. 209. Enzymes Laboratory. (*1*)
First semester. Herbst.

LEGAL MEDICINE

Professor: *Fisher.*
Assistant Professors: *Freimuth and Lovett.*

Leg. Med. 201. Legal Medicine. (*1*)
One hour of lecture for twelve weeks, 4 hours assigned reading, first semester. Fisher, Lovett, Guerin, Freimuth.

Leg. Med. 202. Toxicology. (*10*)
Two hours lecture, 8 laboratory hours per week for 1 year. Freimuth, Fisher.

Leg. Med. 203. Gross Pathologic Anatomy as Related to Toxicology. (2)
Two hours per week for one year. Fisher, Lovett, Guerin.

Leg. Med. 204. Research in Toxicology leading to preparation of a Thesis for the M.S. (6)
Minimum credits, six. Freimuth, Fisher.

Leg. Med. 205. Research in Toxicology leading to preparation of a Thesis for the Ph.D. (30)

Fisher, Freimuth.

The Department of Legal Medicine offers schedules leading to the degrees of Master of Science and Doctor of Philosophy in Toxicology. Candidates are expected to have completed undergraduate work as follows: Eight semester hours each in general chemistry, organic chemistry, analytical chemistry (qualitative and quantitative), physical chemistry, physics, biology and four semester hours in organic qualitative analysis.

Candidates for the Master's Degree must complete the following courses:
Leg. Med. 201, 202, 203 and 204.
Pharm. 101, f. s. and Chem. 258.

Candidates for the doctorate must complete the following courses:
Leg. Med. 201, 202, 203, 205.
Pharm. 101, f.s., Physiol. 102, Microb. 101, Microb. 102, Biochem. 201, Chem. 206, 208, Chem. 221, 223, Chem. 148, Chem. 150, Pharm. Chem. 111, 113, Pharm. Chem. 112, 114.

Part of the above work is offered at College Park with the remainder to be done at the Baltimore Schools. Some of the course work in Legal Medicine and Toxicology will be given at the Laboratories of the Division of Legal Medicine located at the Office of the Chief Medical Examiner, 700 Fleet Street, Baltimore, Md.

MICROBIOLOGY

Professor: *Wisseman.*
Associate Professor: *Smith.*
Assistant Professors: *Snyder and Sweet.*

The Department of Microbiology offers the degree of Doctor of Philosophy. While the degree of Master of Science may be offered in special instances, priority for research facilities will be given aspirants to the Ph.D. degree.

Emphasis is placed on medical aspects of Microbiology. Research programs are available in virology, rickettsiology, medical bacteriology and mycology, microbial physiology and bacterial cytology. Opportunities are open for experience in teaching and in diagnostic bacteriology and serology.

Copies of Departmental regulations covering prerequisites and procedures may be obtained from the Department of Microbiology.

For Graduates and Advanced Undergraduates

Microb. 101. Medical Microbiology and Immunology. (8)

Four lectures and eight laboratory hours per week for sixteen weeks, first semester. Laboratory fee, $10.00. Wisseman and Staff.

For Graduates

Microb. 201. Medical Microbiology and Immunology. (8)
This course is built upon Microb. 102 by the addition of advanced supplementary reading and laboratory exercises. Laboratory fee, $10.00. Wisseman and Staff.

Microb. 203. Bacterial Physiology. (3)
Three lectures per week, but no laboratory, first semester. To be announced. Registration by consent of instructor.

Microb. 204. Research.
Maximum credits, 12 hour per semester. Wisseman, Smith, Sweet.

Microb. 205. Genetics of Microorganisms. (1)
One lecture per week, second semester. Smith.

Microb. 206, 207. Seminar. (1, 1)
One session per week, first and second emesters. Wisseman and Staff.

Microb. 208. Medical Mycology. (2)
One lecture and one laboratory per week, second semester. Laboratory fee, $10.00. Registration by consent of instructor. Smith.

PHARMACOLOGY

Professor: *Krantz.*
Associate Professors: *Burgison and Truitt.*

All students majoring in the Department of Pharmacology with a view to obtaining the degree of Master of Science or Doctor of Philosophy should secure special training in anatomy, mammalian physiology, organic chemistry, and physical chemistry.

For Graduates and Advanced Undergraduates

Pharmacol. 101, f.s., General Pharmacology. (8)
Three lectures and one laboratory. This course consists of 90 lectures and 30 laboratory periods of three hours each, offered each year. Laboratory fee, $20.00.
Krantz, Truitt, Burgison, Musser, White, Harne.

For Graduates

Pharmacol. 201, f.s., General Pharmacology. (8)
Same as 101, for students majoring in pharmacology. Additional instruction and collateral reading are required. Laboratory fee, $20.00. Krantz, Truitt, Burgison.

Pharmacol. 205. Research.
Maximum credits, 12. Credit in accordance with the amount of work accomplished.
Krantz, Truitt, Burgison.

Pharmacol. 206, f.s., Pharmacologic Methodology. (4)
Prerequisites, Pharmacol. 201. f.s. Truitt.

Pharmacol. 207, 208. Chemical Aspects of Pharmacodynamics. (2-2)
Burgison.

For Graduates at Army Chemical Center, Edgewood, Md.

Instructors: *Brown, Hart, Wills, and Horton.*

Graduate degrees offered at the Army Chemical Center are the Master of Science and Doctor of Philosophy.

Pharmacol. 220, 222. Principles of Pharmacology. (3, 3)
Three lectures a week, first and second semesters. Prerequisites, Biochemistry 221-224 and Physiology 221 and 222, or their equivalents. To be taken concurrently with Pharmacology 221 and 223 except by special arrangement with the instructor
Brown, Wills.

Pharmacol. 221, 223. Experimental Pharmacology. (1, 1)
One three-hour laboratory period a week, first and second semesters. Prerequisites, Bio-chemistry 221-224 and Physiology 221 and 222, or their equivalents. To be taken concurrently with Pharmacology 220 and 222 except by special arrangement with the instructor. Brown, Wills.

Pharmacol. 225. Biometric Principles. (1 1/3)
One lecture and one one-hour laboratory period a week. Woodson.

Pharmacol. 226. Advanced Biometry and Bioassay Techniques. (2)
Two hours of lecture and demonstration a week. Prerequisite, Pharmacology 225.
Horton, Wills.

Pharmacol. 228. Seminar. (1)
Brown, Wills.

Pharmacol. 229. Research.
Maximum credits, 12. Brown, Wills.

PHYSIOLOGY

Professors: *Amberson, Ferguson, and Smith.*
Assistant Professor: *White.*
Lecturer: *Wills.*

The Department of Physiology prefers to accept students who have already had some graduate training elsewhere. Before admission to candidacy for the Doctor of Philosophy degree the Department gives a qualifying examination, both oral and written, which must be satisfactorily passed.

In the usual case a student majoring in Physiology will be expected to take Physiol. 101 before, or concurrently with, courses 201 to 206 below. Such a student will extend his program by taking courses in other departments of this University, and by enrolling in the summer course in physiology at the Marine Biological Laboratory, Woods Hole, Massachusetts.

For Graduates and Advanced Undergraduates

Physiol. 101. The Principles of Physiology. (9)
Five lectures, two conferences and two 4-hour laboratory periods per week for 16 weeks; second semester. Laboratory fee, $15.00. Amberson and Staff.

For Graduates

Physiol. 201. Experimental Mammalian Physiology.
Time and credit by arrangement. Amberson and Staff.

Physiol. 202. Blood and Tissue Proteins. (2)
Two lectures a week, for 15 weeks. White.

Physiol. 204. Physiological Techniques.
Time and credit by arrangement. Amberson and Staff.

Physiol. 205. Physiology of Kidney and Body Fluids. (2)
Two hours a week, lectures, seminars, and conferences, for 15 weeks. Ferguson.

Physiol. 206. Seminar.
Credit according to work done. Staff.

Physiol. 207. Research.
By arrangement with the head of the department. Staff.

Physiol. 225. Cellular Physiology. (2)
Two hours a week, lectures, conferences, and seminars, for 15 weeks. Wilber.

Physiol. 226. Physiology of Circulation and Respiration. (2)
Two hours a week, lectures, conferences and seminars, for 15 weeks. Wills.

Physiol. 227. Environmental Physiology. (2)
Two hours a week, lectures, conferences and seminars, for 15 weeks. Wilber.

Physiol. 228. Comparative Physiology. (2)
Two hours a week, lectures, conferences and seminars, for 15 weeks. Wilber.

Physiol. 231. Introduction to Microphysiology. (*1 or 2*)
One or two hours per week, as arranged, lectures, conferences and seminars, for 15 weeks. Anderson.

Physiol. 232. Special Topics in Physiology. (*1 or 2*)
One or two hours per week, as arranged, lectures, conferences and seminars for 15 weeks. Wills.

PSYCHIATRIC NURSING, MATERNAL AND CHILD HEALTH AND MEDICAL-SURGICAL NURSING

Professor: *Gipe.*
Associate Professors: *Carl and Grenell.*

The Master of Science Degree in Nursing is designated primarily to prepare registered nurses in psychiatric nursing, maternal and child nursing and medical-surgical nursing as clinical specialists, teachers and administrators in these clinical specialties.

For admission to a graduate program in nursing, the applicant is required to be a registered nurse and must have completed an undergraduate degree program with academic standing which is recognized by the Graduate School. In addition, the applicant must have had clinical experience equivalent to the requirements in the basic undergraduate nursing program of the University of Maryland.

Requirements for the Master of Science Degree include the satisfactory completion of at least thirty semester hours of graduate work. The thirty hour program includes twenty-four semester hours of course work and six semester hours for the thesis. At least twelve semester hours and not more than sixteen semester hours can be taken in the major field. At least eight semester hours must be taken in the minor field, namely, education or sociology. It is required that at least twelve semester hours of the twenty-four hours of course work be taken in courses numbered in the catalogue as 200 courses.

A thesis representing research in the major field must be approved by the student's advisor and presented to the Dean of the Graduate School as a partial requirement for the Master of Science degree. Final approval of the thesis is given by the examination committee appointed by the Dean of the Graduate School.

The requirements in regard to advancement to candidacy, transfer of credits, and final oral examination are the same as described for the Master of Arts and Master of Science Degrees.

Nurs. 201. Trends of Higher Education in Nursing. (2)
First semester. One lecture or two hour conferences a week. Gipe and Staff.

Nurs. 202. Interpersonal Interaction. (2)
First semester. One lecture and one two-hour laboratory period a week.
Fernandez, Psychiatric Institute Staff.

Nurs. 203. Nursing in the Somatic Therapies. (2)
First semester. One lecture and one two-hour laboratory period a week.
Carl, Grenell.

Nurs. 204. Psychiatric Nursing. (2)
First semester. One lecture and two three-hour laboratory periods a week.
Fernandez and others.

Nurs. 205. Psychiatric Nursing. (2)
Second semester. One lecture or conference and two four-hour laboratory periods a week. Fernandez and others.

Nurs. 206. Philosophical Concepts in Health. (2)
Second semester. Two hour lecture a week.

Nurs. 207. Nursing in Child Health Services. (2)
First semester. One lecture and two three-hour laboratory periods a week. Sellew and others.

Nurs. 208. Nursing in Child Health Services. (2)
Second semester. One lecture and two four-hour laboratory periods a week. Sellew and others.

Nurs. 209. Nursing in Maternal and Newborn Services. (2)
First semester. One lecture and two three-hour laboratory periods a week. Hydorn and others.

Nurs. 210. Nursing in Maternal and Newborn Services. (2)
Second semester. One lecture and two four-hour laboratory periods a week. Hydorn and others.

Nurs. 211. Seminar in Maternal and Child Health Services. (2)
Second semester. One two-hour period a week. Sellew and others.

Nurs. 212. Medical-Surgical Nursing. (2)
First semester. One lecture and two three-hour laboratory periods a week.

Nurs. 213. Medical-Surgical Nursing. (2)
Second semester. One lecture and two four-hour laboratory periods a week.

Nurs. 214. Application of Principles of Physical and Social Sciences in Nursing. (2)
First semester. One lecture and one two-hour laboratory period a week.

Nurs. 286. Research Methods and Materials in Nursing. (2)
Second semester. One two-hour lecture or conference period a week. Carl and others.

Nurs. Ed. 287. Seminar in Nursing. (2)
Second semester. One two-hour lecture or conference period a week. Carl and others.

Nurs. 289. Research-Thesis. (1-6)
Staff.

SCHOOL OF PHARMACY

Professors: *Foss, Estabrook, Ichniowski, Purdum, Richeson, Shay, and Slama.*
Associate Professors: *Allen and Miller.*
Assistant Professor: *Doorenbos.*

BIOCHEMISTRY

For Graduates and Advanced Undergraduates

Chem. 153. Biochemistry. (5)
Four lectures and conferences and one four-hour laboratory period a week, first semester. Prerequisites, Chem. 35, 36, 37, 38, 15. Schmidt and Staff.

BOTANY AND PHARMACOGNOSY

For Graduates and Advanced Undergraduates

Bot. 101, 102. Taxonomy of the Higher Plants. (2, 2)
One lecture and one laboratory period a week. Prerequisites, Bot. 1, 21. Given in alternate years. Slama.

Bot. 111, 113. Plant Anatomy. (2, 2)
Two lectures a week. Prerequisites, Bot. 1, 21, 22. Slama.

Bot. 112, 114. Plant Anatomy. (2, 2)
Two laboratory periods a week. Prerequisites, Bot. 111, 113. Slama.

For Graduates

Pharmacognosy 201, 202. Advanced Study of Vegetable Powders. (4, 4)
Two lectures and two laboratory periods a week. Prerequisites, Bot. 111, 113, 112, 114. Given in alternate years. Slama.

Pharmacognosy 211, 212. Advanced Pharmocognosy. (4, 4)
Two lectures and two laboratory periods a week. Prerequisites, Bot. 111, 113, 112, 114. Slama.

Pharmacognosy 220. Research.
Credit according to amount and quality of work performed. Slama.

MATHEMATICS

Math. 152, 153. Mathematical Statistics. (2, 2)
Prerequisites, Math. 20, 21. Richeson.

MICROBIOLOGY

This Department offers work leading toward the Master of Science and the Doctor of Philosophy degrees. Requirements for the doctoral degree are fulfilled by supplementing the courses offered in this Department with selected courses from the College Park curriculum.

For Graduates and Advanced Undergraduates

Microb. 115. Serology and Immunology. (4)
Third year, two lectures and two laboratory periods a week, second semester. Shay.

For Graduates

Microb. 200, 201. Chemotherapy. (1-2)
One lecture a week. Offered in alternate years. Shay.

Microb. 202, 203. Reagents and Media. (1-1)
One lecture a week. Offered in alternate years. Shay.

Microb. 210. Special Problems in Microbiology.
Laboratory course. Credit determined by amount and quality of work performed. Shay.

Microb. 211. Public Health. (1-2)
One lecture a week. Prerequisites, Microb. 1, 115. Shay.

Microb. 221. Research in Microbiology.
Credit determined by amount and quality of work performed. Shay.

PHARMACEUTICAL CHEMISTRY

For Graduates and Advanced Undergraduates

Chem. 101. Advanced Inorganic Chemistry. (2)
Two lectures a week, first or second semester. Prerequisites, Chem. 15, Pharm. Chem. 53 or equivalent, and Chem. 37, 38. Doorenbos.

Pharm. Chem. 111, 113. Chemistry of Medicinal Products. (3, 3)
Three lectures a week, first and second semesters. Prerequisites, Chem. 35, 37, 53. Doorenbos.

Pharm. Chem. 112, 114. Chemistry of Medicinal Products. (2, 2)
Two laboratory periods a week, either or both semesters. Prerequisites, Pharm. Chem. 111, 113, or may be taken simultaneously with Pharm. Chem. 111, 113. Doorenbos.

Chem. 141, 143. Advanced Organic Chemistry. (2, 2)
Two lectures a week, first and second semesters. Prerequisites, Chem. 37, 38. Miller.

Chem. 142, 144. Advanced Organic Laboratory. (2, 2)
Two laboratory periods a week, any one or both semesters. Prerequisites, Chem. 19 or 23, and Chem. 37, 38. Miller.

Chem. 146, 148. Identification of Organic Compounds. (2, 2)
One lecture and two laboratory periods a week, any one or both semesters. Prerequisites, Pharm. Chem. 111, 113, or Chem. 141, 143. Miller.

For Graduates

Pharm. Chem. 201, 203. Survey of Pharmaceutical Chemistry. (2, 2)
Two lectures a week, first and second semesters. Prerequisites, Pharm. Chem. 111, 113. Miller and Doorenbos.

Pharm. Chem. 211, 213. Chemistry of the Alkaloids. (2, 2)
Two lectures a week, first and second semesters. Prerequisites, Pharm. Chem. 111, 113. Doorenbos.

Pharm. Chem. 220. Advanced Pharmaceutical Synthesis. (2-6)
Laboratory and conferences, either or both semesters. Prerequisites, Chem. 142, 144, or Pharm. Chem. 112, 114. Miller and Doorenbos.

Pharm. Chem. 222. Instrumental Methods of Pharmaceutical Analysis. (1-4)
Laboratory and conferences, either or both semesters. Prerequisites, Chem. 146, 148. Doorenbos.

Pharm. Chem. 230. Pharmaceutical Chemistry Seminar. (1)
Required of students majoring in pharmaceutical chemistry each semester. Miller and Doorenbos.

Pharm. Chem. 235. Research in Pharmaceutical Chemistry.
Credit determined by amount and quality of work performed. Miller and Doorenbos.

Chem. 258. The Identification of Organic Compounds.
An advanced course. Two to four laboratory periods a week, either semester. Prerequisites, Chem. 146, 148, or equivalent. Miller.

PHARMACOLOGY

For Graduates and Advanced Undergraduates

Pharmacology 111. Official Methods of Biological Assay. (4)
Two lectures and two laboratory periods a week, first semester. Prerequisite, Pharmacology 81, 82. Ichniowski.

For Graduates

Pharmacology 201, 202. Methods of Biological Assay. (4, 4)
Laboratory and conferences, first and second semesters. Prerequisite, Pharmacology 111. Offered in alternate years. Ichniowski.

Pharmacology 211, 212. Special Studies in Pharmacodynamics. (4, 4)
Laboratory and conferences, first and second semesters. Prerequisite, Pharmacology 81 and 82 and the approval of the instructor. Offered in alternate years. Ichniowski.

Pharmacology 221, 222. Special Studies in Biological Assay Methods. (2-4, 2-4)
Credit according to amount of work undertaken after consultation with the instructor. Laboratory work and conferences, first and second semesters. Prerequisites, Pharmacology 111, 201, 202. Ichniowski.

Pharmacology 250. Research in Pharmacology.
Properly qualified students may arrange with instructor for credits and hours. Ichniowski.

PHARMACY

For Graduates and Advanced Undergraduates

Pharmacy 101, 102. Advanced Dispensing Pharmacy. (3, 3)
Two lectures and one laboratory period a week. Prerequisites, Pharmacy 1, 2, 51, 52. Allen and Staff.

Pharmacy 121. Hospital Pharmacy Administration. (2)
First semester, two lectures a week. Purdum.

Pharmacy 132. Cosmetics. (3)
Second semester, two lectures and one laboratory a week. Prerequisites, Pharmacy 1, 2, 51, 52, and 101. Allen and Staff.

For Graduates

Pharmacy 201, 202. Manufacturing Pharmacy. (2, 2)
Two lectures a week. Given in alternate years. Prerequisite, Pharmacy 101, 102. Foss and Staff.

Pharmacy 203, 204. Manufacturing Pharmacy. (2, 2)
Two laboratories a week. Prerequisites, Pharmacy 201, 202, or may be taken simultaneously with Pharmacy 201, 202. Foss and Staff.

Pharmacy 205. Manufacturing Pharmacy Control. (3)
Three lectures a week. Given in alternate years. Foss and Staff.

Pharmacy 207, 208. Physical Pharmacy. (2, 2)
Two lectures a week. Prerequisite, Physical Chemistry 187, 188, 189, 190. Staff.

Pharmacy 211, 212. Survey of Pharmaceutical Literature. (1, 1)
One lecture a week. Given in alternate years. Allen and Purdum.

Pharmacy 215, 216. Product Development. (2, 2)
Two laboratories a week. Prerequisites, Pharmacy 132, 201, 202, 203, 204. Allen.

Pharmacy 221, 222. History of Pharmacy. (2, 2)
Two lectures a week. Given in alternate years. Purdum.

Pharmacy 230. Pharmaceutical Seminar. (1)
Each semester. Foss and Staff.

Pharmacy 231, 232. Special Problems in Pharmaceutical Technology. (2, 2)
Two laboratory periods a week. Allen and Purdum.

Pharmacy 235. Research in Pharmacy.
Credit and hours to be arranged. Foss, Purdum and Allen.

PHYSICS AND PHYSICAL CHEMISTRY

For Graduates and Advanced Undergraduates

Chem. 187, 189. Physical Chemistry. (3, 3)
Three lectures a week, first and second semesters. Prerequisites, Phys. 11; Chem. 15, 35, 37. Math. 20, 21. Given in alternate years. Estabrook.

Chem. 188, 190. Physical Chemistry. (2, 2)
Two laboratory periods a week, first and second semesters. Prerequisite, Chem. 187, 189, or may be taken simultaneously with these courses. Estabrook.

Phys. 104, 105. Electricity and Magnetism. (3, 3)
Two lectures and one laboratory period a week, first and second semesters. Given according to demand. Prerequisites, Phys. 11; Math. 21. Estabrook.

Phys. 112, 113. Modern Physics. (2, 2)
Two lectures a week, first and second semesters. Prerequisites, Phys. Chem. 187, 189, 188, 190. Given according to demand. Estabrook.

For Graduates

Phys. 200, 201. Introduction to Theoretical Physics. (5, 5)
Five lectures a week, first and second semesters. Given according to demand. Estabrook.

Phys. 208, 209. Thermodynamics. (2, 2)
Two lectures a week, first and second semesters. Prerequisites, Phys. Chem. 187, 188, 189, 190. Given in alternate years. Estabrook.

—The University is the rear guard and the advance agent of society. It lives in the past, the present and the future. It is the storehouse of knowledge; it draws upon this depository to throw light upon the present; it prepares people to live and make a living in the world of today; and it should take the lead in expanding the intellectual horizons and the scientific frontiers, thus helping mankind to go forward —always toward the promise of a better tomorrow.

— From "The State and the University," the inaugural address of President Wilson H. Elkins, January 20, 1955, College Park, Maryland.

SEPARATE CATALOGS AVAILABLE

AT COLLEGE PARK

Individual catalogs of colleges and schools of the University of Maryland at College Park may be obtained by addressing the Office of University Relations, University of Maryland, College Park, Md.

1. General Information
2. College of Agriculture
3. College of Arts and Sciences
4. College of Business and Public Administration
5. College of Education
6. College of Engineering
7. College of Home Economics
8. Department of Air Science
9. College of Physical Education, Recreation and Health
10. College of Special and Continuation Studies

    The catalog of the European Program may be obtained by addressing the Dean, College of Special and Continuation Studies, College Park, Maryland.
11. Summer School
12. Graduate School Announcements

AT BALTIMORE

Individual catalogs for the professional schools of the University of Maryland may be obtained by addressing the Deans of the respective schools at the University of Maryland, Lombard and Greene Streets, Baltimore 1, Maryland.

13. School of Dentistry
14. School of Law
15. School of Medicine
16. School of Pharmacy
17. School of Nursing