



*The*  
OHIO STATE UNIVERSITY  
BULLETIN

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GRADUATE SCHOOL

1933-1934

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# UNIVERSITY CALENDAR

1933

## SUMMER QUARTER

May 31 to June 4  
June 16 to 23  
June 19  
  
June 20  
June 24  
July 4  
July 24, 25, 26  
July 21, 22  
July 26  
July 27  
July 29  
August 30, 31, September 1  
September 1  
September 1

Entrance Examinations.  
Physical Examinations for all new students.  
Latest day for registration and payment of fees without penalty. (See page 14.)  
Classes begin, 7:30 A.M.  
Intelligence Test for all new students (Saturday P.M.).  
Independence Day. No classes.  
Final Examinations, first term (at regular class hours).  
Physical Examinations for all new students.  
First term ends, 5:30 P.M.  
Second term begins, 7:30 A.M.  
Intelligence Test for all new students (Saturday P.M.).  
Final Examinations (at regular class hours).  
Summer Convocation (Commencement), 2:00 P.M.  
Summer Quarter ends, 6:00 P.M.

## AUTUMN QUARTER

September 25 to 29  
September 27 to October 2  
October 2  
October 2  
  
October 3  
October 7  
  
November 11  
November 29, 30, December 1, 2  
December 19, 20, 21, 22  
December 22  
December 22

Entrance Examinations.  
Freshman Week.  
Physical Examinations for students other than Freshmen.  
Latest day for registration and payment of fees without penalty. (See page 14.)  
Classes begin, 8:00 A.M.  
Intelligence Test for all new students other than Freshmen (Saturday A.M.).  
Armistice Day. No classes after 12 M.  
Thanksgiving Recess.  
Final Examinations.  
Autumn Convocation (Commencement), 2:00 P.M.  
Autumn Quarter ends, 6:00 P.M.

1934

## WINTER QUARTER

January 2 to 5  
January 2  
  
January 3  
January 6  
February 22  
March 16, 17, 19, 20  
March 16  
March 20

Physical Examinations for all new students.  
Latest day for registration and payment of fees without penalty. (See page 14.)  
Classes begin, 8:00 A.M.  
Intelligence Test for all new students (Saturday A.M.).  
University Day. No classes.  
Final Examinations.  
Winter Convocation (Commencement), 2:00 P.M.  
Winter Quarter ends, 6:00 P.M.

## SPRING QUARTER

March 26  
  
March 27  
March 27 to 30  
March 31  
May 28  
May 30  
June 9, 11, 12, 13  
June 9  
June 10  
June 11  
June 11  
June 13  
June 18  
August 31  
October 2

Latest day for registration and payment of fees without penalty. (See page 14.)  
Classes begin, 8:00 A.M.  
Physical Examinations for all new students.  
Intelligence Test for all new students (Saturday A.M.).  
R. O. T. C. Review and Presentation of Commissions.  
Memorial Day. No classes.  
Final Examinations.  
Alumni Day.  
Baccalaureate Sermon.  
Class Day.  
Spring Convocation (Commencement).  
Spring Quarter ends.  
Summer Quarter (1934) begins.  
Summer Quarter (1934) ends.  
Autumn Quarter (1934) begins.

## ADMINISTRATION

### BOARD OF TRUSTEES

HERBERT S. ATKINSON, Chairman.....	Columbus
HARRY A. CATON, Vice-Chairman.....	Coshocton
JULIUS F. STONE.....	Columbus
LAWRENCE E. LAYBOURNE.....	Springfield
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ALMA WACKER PATERSON.....	Columbus
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### ADMINISTRATIVE OFFICERS

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Office: Administration Building—UN-3148; Campus 312	
Residence: Ohio State University Campus—UN-3148; Campus 274	
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Residence: 55 Woodland Ave.—FA-9130	
<b>Secretary of the Board of Trustees and Business Manager</b> .....	CARL E. STEEB
Office: Administration Building—UN-3148; Campus 332	
Residence: 198 W. 11th Ave.—UN-4732	
<b>Vice President</b> .....	J. LEWIS MORRILL
Office: Administration Building—UN-3148; Campus 628	
Residence: 459 W. 8th Ave.—UN-9427-W	
<b>Assistant to the President</b> .....	GEORGE W. ECKELBERRY
Office: Administration Building—UN-3148; Campus 380	
Residence: 2023 Collingswood Rd., Upper Arlington—KI-1343	
<b>Registrar, University Editor, Secretary of the University Faculty, and Alumni Recorder</b> .....	EDITH D. COCKINS
Office: Administration Building—UN-3148; Campus 314, 459	
Residence: 1580 Guilford Rd., Upper Arlington—KI-2726	
<b>University Examiner</b> .....	BLAND L. STRADLEY
Office: Administration Building—UN-3148; Campus 412	
Residence: Canal Winchester—Canal Winchester Ex. 71	
<b>Executive Clerk</b> .....	KATHERINE A. VOGEL
Office: Administration Building—UN-3148; Campus 312	
Residence: 1040 Elmwood Ave.—KI-5883	
<b>Comptroller</b> .....	CHARLES A. KUNTZ
Office: Administration Building—UN-3148; Campus 332	
Residence: 123 Jeffrey Pl.—LA-3606	
<b>Cashier</b> .....	FLORIS D. HANE
Office: Administration Building—UN-3148; Campus 372	
Residence: 373 13th Ave.—WA-1054	
<b>Dean of Men</b> .....	JOSEPH A. PARK
Office: Administration Building—UN-3148; Campus 283	
Residence: 1474 Doone Rd., Upper Arlington—KI-1702	
<b>Dean of Women</b> .....	ESTHER ALLEN GAW
Office: Pomerene Hall—UN-3148; Campus 480, 288, 226	
Residence: 60 Jefferson Ave.	
<b>House Superintendent, Residence Halls</b> .....	EMMA E. PROUT
Office: Oxley Hall—UN-3148; Campus 346	
Residence: Mack Hall—UN-3148; Campus 264	

# THE GRADUATE SCHOOL

Dean.....WILLIAM McPHERSON

Office: 106 University Hall—UN-3148; Campus 466

Residence: 198 16th Ave.—WA-1579

## THE GRADUATE COUNCIL

THE DEAN OF THE GRADUATE SCHOOL, Chairman, *ex officio*  
 ALBERT E. AVEY, Ph.D., Professor of Philosophy  
 SPURGEON BELL, M.B.A., Director, Bureau of Business Research  
 CECIL E. BOORD, Ph.D., Professor of Chemistry  
 EDISON L. BOWERS, Ph.D., Associate Professor of Economics  
 RICHARD BRADFIELD, Ph.D., Representing the Ohio Agricultural Experiment Station  
 J. ERNEST CARMAN, Ph.D., Professor of Geology  
 WALLACE W. CHARTERS, Ph.D., LL.D., Director, Bureau of Educational Research  
 CHARLES A. DOAN, M.D., Director and Professor of Medical and Surgical Research  
 ERWIN E. DREESE, M.S., E.E., Professor of Electrical Engineering  
 WILLIAM M. DUFFUS, Ph.D., Professor of Business Organization  
 M. BLAKEMORE EVANS, Ph.D., Professor of German  
 RALPH FANNING, M.S., M.Arch., Professor of Fine Arts  
 JOSEPH H. GOURLEY, Ph.D., Professor of Horticulture  
 HARLAN H. HATCHER, Ph.D., Professor of English  
 GEORGE R. HAVENS, Ph.D., Professor of Romance Languages  
 H. GORDON HULLFISH, Ph.D., Associate Professor of Principles of Education  
 ARTHUR J. KLEIN, Ph.D., Professor of School Administration  
 CYRUS C. MacDUFFEE, Ph.D., Associate Professor of Mathematics  
 EARL N. MANCHESTER, B.A., University Librarian  
 FRANCIS N. MAXFIELD, Ph.D., Professor of Psychology  
 ALVAH PETERSON, Ph.D., Professor of Entomology  
 WILLIAM H. STONE, Ph.D., Professor of Practical Arts and Vocational Education  
 EDGAR N. TRANSEAU, Ph.D., Professor of Botany  
 EUGENE VAN CLEEF, Ph.D., Professor of Geography  
 JAMES R. WITHROW, Ph.D., Professor of Chemical Engineering  
 JOHN YOUNGER, B.Sc. in Engr., Professor of Industrial Engineering

### REPRESENTING OHIO UNIVERSITY AND MIAMI UNIVERSITY

EDWIN WATTS CHUBB, M.A., Litt. D., Professor of Rhetoric and English Literature, Ohio University  
 CHARLES H. HANDSCHIN, Ph.D., Professor of German, Miami University

## FELLOWS AND SCHOLARS

1932-1933

### UNIVERSITY FELLOWS

HOWARD HOLSTON ALDEN.....Mathematics  
 CLARENCE BREMER.....Chemistry  
 DONALD W. DUNIPACE.....Physics  
 GILFORD JOHN KENBERRY.....Botany  
 ELMER BAKER ROYER.....Psychology  
 RICHARD CARLTON STEINMETZ.....Sociology  
 SAMUEL UNGER.....History  
 CLAUDE C. WAKELAND.....Entomology  
 HAROLD MONROE WHITACRE.....Chemistry  
 GEORGE WILLARD WHITE.....Geology

### UNIVERSITY SCHOLARS

WILLIAM MORTON BARROWS, JR.....Physics  
 ANDREW BARTA.....Sociology  
 STANLEY J. CARPENTER.....Zoology



SANDY CRISAFULLI .....	French
ESTHER LUCILLE GRANT .....	Classical Languages
DAVID TRESSEL GRIGGS .....	Geology
WILLIAM MILLER HINTON .....	Psychology
NEWTON DENEL HOLBROOK, JR. ....	German
HELMUT ERNST LUDWIG KOHNKE .....	Soils
LEFEVER MACKEY LEE .....	Chemical Engineering
MARJORIE LEFFLER .....	Mathematics
KENNETH PALMER MILLER .....	English
FRANCIS JOSEPH ROBICHAUX .....	Chemistry
EDWARD CHRISTIAN SIMMONS .....	Economics
SAMUEL MORRIS STEWARD .....	English
RAYMOND H. TSENG .....	Chemical Engineering
SETH THOMAS WALTON .....	Bacteriology

## DELCO APPLIANCE CORPORATION FELLOW

CYRIL DONALDSON .....	Mechanical Engineering
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## RESEARCH FELLOW

A. A. HENDRICKSON .....	Soils
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## E. I. DUPONT DE NEMOURS &amp; COMPANY FELLOW

DAVID HAIGH DAWSON .....	Chemistry
GEORGE D. SCARSETH .....	Soils

## NATHANIEL WRIGHT LORD FELLOW

RODGER LEWIS SCHAEFER .....	Mine Engineering
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## ROBINSON FELLOW

ROBERT GARLAND KILGORE .....	Mechanical Engineering
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## BATTELLE MEMORIAL INSTITUTE FELLOW

GEORGE THOMAS MOTOK .....	Metallurgy
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## NATIONAL KRAUT PACKERS ASSOCIATION FELLOW

CECIL HERBERT WADLEIGH .....	Horticulture
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## BOILER FEEDWATER STUDIES FELLOW

SOLOMON FREDERICK WHIRL (Autumn and Winter Quarters only) .....	Chemistry
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## TIMKEN STEEL AND TUBE COMPANY FELLOW

JOHN EDWARD HARRIS (Autumn Quarter only) .....	Chemistry
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MARGARET H. HARDER PAN-AMERICAN SCHOLAR  
(The Ohio Federation of Women's Clubs)

EMA LASTENIA GONZALEZ .....	Principles of Education
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## ENGINEERING EXPERIMENT STATION FELLOW

WALTER W. BRAUN (Autumn Quarter only) .....	Chemistry
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## CROP PROTECTION INSTITUTE FELLOW

EDWARD PAUL BREAKEY .....	Entomology
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## TOBACCO BY-PRODUCTS AND CHEMICAL CORPORATION FELLOW

RAY MERTON BATCHELDER .....	Veterinary Medicine
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## HONORARY FELLOWS

CARROLL ELY AMOS .....	Physics
ALFRED W. BOSWORTH .....	Physiological Chemistry
ERNEST LAVERN BOWMAN .....	Practical Arts and Vocational Education
MERRITT MADISON CHAMBERS .....	School Administration
DOROTHY ROSE DISHER (Spring Quarter only) .....	Psychology
REUBEN HAMILTON ELIASSEN .....	School Administration
JOE WISEMAN HOWLAND .....	Zoology
JAMES L. HUPP .....	School Administration
RALPH ALDEN LORING .....	Physics
HENRY WILLIAM OLSON .....	Zoology
L. A. PARKER .....	Chemical Engineering
EDWARD G. PUNKE .....	English
LUCILE DOUGLAS SMITH .....	English
DAVID HOMER SUTTON .....	School Administration
SOLOMON FREDERICK WHIRL (Spring Quarter only) .....	Chemistry
GEORGE ZINZALIAN .....	Chemical Engineering

# THE OHIO STATE UNIVERSITY

## LOCATION

The Ohio State University is situated within the corporate limits of the city of Columbus. It is supported by appropriations from the State and Federal governments. The University land covers about 1,250 acres, 300 of which are in the campus. The total value of land, buildings, and equipment is \$22,081,674.04.

## ORGANIZATION

For convenience of administration the departments of the University are grouped into organizations called Colleges. The Ohio State University comprises ten Colleges and a Graduate School, each under the administration of a Dean and College Faculty, as follows:

Graduate School, College of Agriculture (including the School of Home Economics), College of Arts and Sciences, College of Commerce and Administration (including the Schools of Journalism and Social Administration), College of Dentistry, College of Education, College of Engineering (including the School of Mineral Industries), College of Law, College of Medicine (including the School of Nursing), College of Pharmacy, College of Veterinary Medicine.

## THE UNIVERSITY YEAR—FOUR QUARTERS

The University year is divided into four Quarters, each approximately eleven weeks in length. The Summer Quarter is further divided into two terms of approximately six weeks each. Complete courses that are so announced may be taken for either term or for the entire Quarter.

This *Bulletin* is devoted to the work of the Graduate School for the Autumn, Winter, and Spring Quarters, 1933-1934. The announcements for the Summer Quarter are printed in the Summer Quarter Bulletin.

NOTE: Bulletins describing the work of the several Colleges may be obtained by addressing the University Examiner, The Ohio State University, Columbus, and stating the College in which the writer is interested. (For list of bulletins, see the last page.)

## THE GRADUATE SCHOOL

### GENERAL INFORMATION

The office of the Graduate School is located in Room 106, University Hall, on the west side of the Campus. The office is open from 8:00 A. M. to 12 M. and 1:00 to 5:00 P. M. daily, except Saturday. On Saturday, it is open from 8:00 A. M. to 12:00 M.

The offices of the President of the University, the University Examiner, the Registrar, and the Bursar are located in the Administration Building.

### ORGANIZATION AND ADMINISTRATION

The instruction and training of graduate students has been one of the functions of The Ohio State University since 1878, when the first graduate student was in residence. For a number of years the graduate work of the University was unorganized and each department conducted its own work with little reference to that of other departments. After the University was divided

into colleges, each college controlled the graduate work offered in the various departments constituting that college. In 1902, however, the graduate work within the College of Arts had assumed sufficient proportions to warrant the organization of a Graduate School to secure an effective and systematic arrangement of the graduate work of that college. Finally in 1911, there was organized the Graduate School of the University to administer all the graduate work offered in the several departments of the University. This School is under the administration of a Graduate Council consisting of twenty-nine members. The membership of the Council is made up of the following: the Dean of the Graduate School, the Director of the Bureau of Business Research, the Director of the Bureau of Educational Research, the Director of the Engineering Experiment Station, a representative of the Ohio Agricultural Experiment Station, the University Librarian, twenty-one members of the instructional staff appointed from among those departments offering graduate work in The Ohio State University, and one representative each from the faculties of Ohio University and Miami University. This council reports directly to the University Faculty, which is the legislative body of the Graduate School, as well as of the ten colleges.

All communications and inquiries regarding matters connected with the Graduate School, whether from prospective students or from those whose work is in progress, should be directed to the Dean of the Graduate School.

#### AGREEMENTS BETWEEN THE OHIO STATE UNIVERSITY AND OTHER STATE-SUPPORTED INSTITUTIONS CONCERNING GRADUATE WORK

In order that the facilities of certain institutions of the State of Ohio may be utilized for the pursuit of research work in connection with the Graduate School of the University, certain agreements have been made between the Board of Trustees of The Ohio State University and similar boards of Ohio University and Miami University and of the Agricultural Experiment Station. Briefly, these agreements are as follows:

(a) With Ohio University and Miami University. Ohio University and Miami University are represented upon the Graduate Council of The Ohio State University. Part-time assistants connected with the instructional staffs of Ohio University or Miami University may pursue their graduate work for the Master's degree at Ohio University or Miami University subject to the supervision of the Graduate Council of The Ohio State University, and upon the successful completion of the same will receive their degrees from The Ohio State University.

(b) With the Ohio Agricultural Experiment Station. Persons engaged in investigation at the Ohio Agricultural Experiment Station may register in the Graduate School of the University and the research work carried on at the Station by such persons may be counted towards a graduate degree under appropriate restrictions. All such cases, however, shall be considered individual and subject to detailed examination on the part of the Graduate Council. It is possible for a student to complete his work for the Master's degree in residence at the Station alone. For the Doctor's degree he must spend at least one year in residence at The Ohio State University. In all cases, however, the work of the students is carried on under the general rules and regulations of the Graduate Council and the final examinations must be taken at the University in the presence of representatives of the Experiment Station Staff and of the Graduate Council.

In addition to the above, agreements have been entered into by the Board of Trustees of The Ohio State University and similar boards of The Merrill-Palmer School of Detroit, Michigan, and of Ohio Wesleyan University, and the State Bureau of Juvenile Research, as follows:

(a) With the Merrill-Palmer School. A graduate of The Ohio State University who has completed all the necessary undergraduate requirements may

fulfill the residence requirement for the Master's degree by satisfactorily completing one Quarter of acceptable work in residence at The Ohio State University, and two additional Quarters of acceptable work in residence at the Merrill-Palmer School. Before entering the Merrill-Palmer School, the candidate must confer with the Chairman of the department at The Ohio State University in which he wishes to specialize, under whose direction a general course of study for the Master's degree will be arranged. The thesis subject must be of such character as to enable the candidate to carry on experimental work at the Merrill-Palmer School.

The final examinations of the candidate will be conducted by a committee consisting of members of the instructional staff of this University together with representatives of the Merrill-Palmer School, according to the rules governing the Master's degree. The thesis must meet with the approval of both the Merrill-Palmer School and this University.

Students carrying on work at the Merrill-Palmer School under the above regulations must also register at the same time in the Graduate School of this University, but will not be required to pay fees in this University.

(b) With the Perkins Observatory of Ohio Wesleyan University. Students registered in the Graduate School of The Ohio State University who are specializing in Astrophysics may carry on their research work under the guidance of the Director of the Perkins Observatory. This plan applies only to students who wish to pursue research work in Astrophysics, the result of which is to be embodied in a dissertation for the Ph.D. degree.

The facilities of the Observatory are excellent. The principal instrument is a large reflecting telescope, the mirror for which was cast by the Bureau of Standards, and is the first large piece of optical glass made in this country. The reflecting surface measures 69 inches in diameter and offers an unusual equipment for astronomical and astrophysical research. There is an auxiliary photographic doublet of six-inch aperture, and a solar objective of 25 feet focal length.

The observatory is being provided with auxiliary scientific equipment which will afford special facilities for photometric, spectroscopic and radiometric investigations.

The main building houses the offices for the staff, a lecture room, a spacious library, research laboratory, photographic dark rooms, and an instrument shop for the construction of special apparatus.

A solar program is daily maintained in connection with Mount Wilson, Yerkes, Harvard, and the Naval Observatories, and automatic radio apparatus is used in the continuous study of the correlation of solar phenomena with electric wave transmission.

Opportunities are afforded for publication of observations and results through the series of Contributions from the Perkins Observatory.

(c) With the Bureau of Juvenile Research of the State of Ohio. Students who are registered in the Graduate School of The Ohio State University and who are candidates for a Master's degree, specializing in Clinical Psychology, may do not to exceed one-third of the work required for this degree at the Bureau of Juvenile Research. All such work must be approved in advance by a professional member of the Clinical Division of the Department of Psychology, and all credits received for such work must be submitted under his signature.

Candidates for the degree of Doctor of Philosophy specializing in Clinical Psychology, may likewise carry on work at the Bureau of Juvenile Research. The amount of such work shall be determined in each individual case by a professional member of the Division of Clinical Psychology of the Department of Psychology and the Dean of the Graduate School, but in no case will this

amount exceed one-third of the total requirements for the degree of Doctor of Philosophy.

Students carrying work at the Bureau of Juvenile Research must be registered in the Graduate School of this University during the time in which they are pursuing such work.

### THE UNIVERSITY LIBRARY

The University Library consists of all books owned by the University and numbers approximately 395,725 volumes. The main part of the Library, which is known as the General Library, is housed in the Library Building. Very important divisions of the book collection are housed in other buildings. A catalog of the entire collection is maintained in the General Library.

Any person is privileged to use the University Library for reference, but books may be drawn only by officers and registered students of the University.

The General Library is open, during the Autumn, Winter, and Spring Quarters, from 8:00 A. M. to 10:00 P. M., Monday to Friday; Saturday from 8:00 A. M. to 5:30 P. M. During the Summer Quarter, hours are from 7:30 A. M. to 10:00 P. M., Saturday from 7:30 A. M. to 5:30 P. M. Vacation hours are from 8:00 A. M. to 5:00 P. M., Monday to Friday; Saturday from 8:00 A. M. to 12:00 M. During the Autumn, Winter, and Spring Quarters, the Library is open on Sunday from 2:00 to 6:00 P. M. The Library is closed on legal holidays.

The University Library is a depository for the official publications of the United States and has a very complete collection of these documents. It also receives thousands of documents from states, cities, and foreign countries. The Library also possesses the British Parliamentary Papers including the rare early volumes. The numerous series of the publications of the League of Nations are well represented in the Library Collections. The exchanges of the Ohio Academy of Science, of the Ohio State University Scientific Association and of the Ohio Biological Survey are deposited in the University Library.

Through a gift from the Phi Eta Sigma fraternity, the General Library has established a rental library of significant current books for general reading. Its popularity suggests that this project fills a recognized need.

The University Library is a depository for the Library of Congress catalog.

Thirteen department libraries, organized divisions of the University Library, are in charge of library assistants.

The Botany and Zoology Library is located in the Botany and Zoology Building. The "Index to General Botanical Literature," the "Index to Zoological Literature" and the card index to the Concilium Bibliographicum are in this departmental library.

Brown Hall Library, located in Brown Hall, contains collections of books on Architecture, Engineering Drawing, and Civil Engineering. The collection of plates filed in this library is especially valuable for students in Architecture.

The Charles Cutler Sharp Library is located in the Chemistry Building. It contains not only the current periodicals and a large collection of dictionaries and handbooks on chemistry, but also complete sets of all important journals dealing with subjects lying within the general field of chemistry and related sciences.

The Commerce Library, in the Commerce Building, includes a working collection of books for the undergraduate students in the College of Commerce. A large study room is maintained and also a reserve collection for student use.

The Education Library is located in the Education Building. It is organized for graduate work and includes complete sets of important educational and psychological periodicals, city and state reports, textbooks, and other works of reference on educational and psychological subjects.

The Law Library is in Page Hall. It includes all of the United States and state reports, the English reports, the Irish reports, the latest statutes, codes and session laws of the states, complete sets of all the important legal peri-

odicals and an up-to-date collection of text-books. It is especially well equipped for the study of Ohio law.

The Lord Hall Library consists of collections of books on Ceramics, Mining, Metallurgy, and Mineralogy and is located in Lord Hall.

The Medical and Dental Library is in Hamilton Hall. It consists of a working collection of books and periodicals. The historical books and many of the foreign periodical sets are shelved in the General Library.

The Orton Memorial Library, located in Orton Hall, is one of the finest geological libraries in the country. In addition, the Ohio Geological Survey deposits its document exchanges with the library. These two collections constitute a very complete set of official geological reports from the states, foreign governments, and scientific societies.

The Pharmacy-Bacteriology Library is located on the first floor of the new Pharmacy and Bacteriology Building. It comprises files of journals and selected titles in pharmacy and bacteriology designed to furnish a reference collection for the students in these departments.

The Alfred D. Cole Memorial Library of Physics occupies two rooms in the Mendenhall Laboratory of Physics. The nucleus of the collection is the private library of Professor Cole, supplemented by files of journals and selected titles in the field of physics, transferred to this collection from the General Library. A memorial endowment fund contributed by friends of Professor Cole will ultimately provide for additions to this Library. The books and journals in the field of mathematics are shelved at present in the Cole Memorial Library rooms for the mutual convenience of the two departments.

Smaller collections selected with special reference to the needs of the various departments are housed near their offices. Collections of this type have been developed for Political Science, Room 100, University Hall, Veterinary Medicine in the Veterinary Laboratory, Journalism on the second floor of the Journalism Building, Agriculture in Room 309, Main Library. The books relating to the Department of Fine Arts are collected in the Mantel Room in the General Library, where students have every facility for research.

The Library of the Ohio Archaeological and Historical Society, which is on the University Campus, is at the service of the officers and students of the University. This library is specializing in the history of Ohio and the Northwest and a very valuable collection is being built up. Its large newspaper collection is one of the most valuable in the Middle West.

The special library of Batelle Memorial Institute and the collections of the State Library are open to faculty and students of the University and supplement in important fields the collections of the University Libraries.

### THE STATE LIBRARY

The State Library, consisting of approximately 300,000 volumes, is also available and is especially valuable in certain lines of work.

### TEACHERS PLACEMENT SERVICE

The Ohio State University maintains a Teachers Placement Service for the convenience of the Superintendent and Boards of Education of the State. Graduates and graduate students of the University are invited to enroll with the Appointments Office.

The Placement Service is under the direction of the Bureau of Educational Research. This service is rendered free of charge to the applicants. Graduates of experience who desire to better their locations are invited to communicate with the Appointments Office.

The Appointments Office has available such statistical information that advice and direction may be given in the matter of supply and demand for teachers in their various fields.

The service offered will be rendered on the exact basis of merit.

Superintendents and Boards of Education are invited to state their needs to the Appointments Office. Prompt attention to all calls is assured.

### STUDENT MEDICAL SERVICE

**Medical Staff:** Dr. James S. Wilson, Director; Dr. M. F. Osborn, Dr. John W. Wilce, Dr. J. M. Foley, Dr. James A. Beer, Dr. Shirley Armstrong, Dr. Charlotte Winnemore.

**Office Hours.** When the University is in session, daily 8:30 to 12:00 and 1:00 to 4:30; Saturday, 8:30 to 12:00. Phone: Campus 461.

The object of the Student Medical Service is to render first aid and casual treatment to students on the campus. It also plans to conduct periodic health examinations for those who desire them.

Two days hospital observation at the University Hospital is also free for those students who, in the judgment of the Student Medical Service, are in need of hospital service.

### STUDENT AUTOMOBILES

The University does not bar the use of automobiles by students. However, students can be given only very limited parking space on the campus, and the use of autos is discouraged. Unless the student drives a long distance to and from his home each day or is physically incapacitated, he does not need a car while attending the University. The cooperation of parents in this matter is earnestly desired.

### FEES AND EXPENSES

*Registration is not complete until all fees have been paid. No student will have any privileges in the classes or laboratories until all fees and deposits are paid.*

*Since all fees are due and payable as a part of the student's registration, before the day designated in the University Calendar for classes to begin, no person should come to the University for registration without money sufficient to cover all of his fees and deposits.*

*A penalty of \$5.00 for each succeeding day or fraction thereof will be assessed for failure to comply with this rule except in the case of a new student granted permission by the Dean of his College to register after the opening of the University.*

#### 1. Matriculation fee (non-returnable)

Required of every student on first admission to the University .....\$10.00

#### 2. Incidental fees

Incidental fees do not vary with the number of courses taken

Quarter fee for a resident of Ohio..... 20.00

\*Quarter fee for a non-resident of Ohio..... 70.00

#### 3. Special fees

(a) Ohio Union (Men) (Each Quarter)..... 1.00

Women's Union (Women) (Each Quarter)..... 1.00

The Union fees entitle the students to all the privileges of the Unions

(b) Student Activities and Medical Service fee..... 1.00

Required of all students each Quarter; to be used in support of Student Government Activities and the Student Medical Service

\* Non-resident fee. See page 15.

- (c) Laboratory Breakage deposit—Amount varies with course  
 ..... from 1.00 to 20.00

Students are required to pay for all materials consumed in laboratory work. The laboratory deposit must be made at the time of registration before the student may enter the laboratory. All laboratory supplies are sold to students at the Laboratory Supply Store, Chemistry Building, and charged against the deposits (See page 16). Instructors shall not permit students to engage in laboratory work unless the student has shown a receipt from the Bursar for deposit paid

- (d) Graduation fee

A graduation fee is required of each person receiving a diploma. The fee must be paid one week before the close of the Quarter in which the candidate expects to receive his degree

Bachelor's degree .....	5.00
Master's degree.....	10.00
Doctor's degree (Ph.D.) .....	10.00

- (e) Abstract fees

The abstracts of Masters' theses and Ph.D. dissertations are published in the form of a journal at the end of each Quarter and a special fee for editing, printing, and binding these abstracts is required for each person receiving such a degree from this University. This fee must be paid not later than five days *before* the Commencement date on which the candidate expects to receive his degree

Abstracts of Masters' theses.....	5.00
Abstracts of Ph.D. dissertations.....	50.00

NON-RESIDENT FEE

Every student who is not a legal resident of the State of Ohio is required to pay a non-resident fee of \$50.00 each Quarter (or \$25.00 each term of the Summer Quarter) of his residence in the University in addition to other University fees. The burden of registering under proper residence is placed upon the student. If there is any possible question of his right to legal residence the matter should be brought to the attention of the Registrar and passed upon, previous to registration or the payment of fees. Any student who registers improperly under this rule shall be required to pay not only the non-resident fee but shall be assessed a penalty of \$10.00. Students who do not pay this fee within thirty days after they have been notified that the non-resident fee has been assessed against them, will have their registration in the University cancelled.

No person shall be considered eligible to register in the University as a resident of the State of Ohio unless he has been a *bona fide* resident in the State twelve consecutive months next preceding the date of his original enrollment, and no person shall be considered to have gained or lost a residence in this State for the purpose of registering in the University by any conduct of his own while he is a student in the University; but persons whose legal residence follows that of other persons, as hereinafter provided, shall be considered to have gained or lost legal residence in this State for such purpose while students in the University according to changes of legal residence of such other persons, except that such legal residence shall not be considered to be so gained until twelve months after such other person becomes a legal resident of this State.



**MINORS:** The residence of minors shall follow that of the legal guardian, regardless of emancipation; but in case a resident of Ohio is appointed guardian of a non-resident minor, the legal residence of such minor for the purpose of this rule shall not be considered to be established in the State of Ohio until the expiration of twelve months after such appointment.

**WIVES:** The residence of wives shall follow that of husbands.

**ALIENS:** Aliens who have taken out their first citizenship papers and who have been residents of Ohio for twelve months next preceding the date of their enrollment in the University, shall be regarded as eligible for registration as residents of Ohio.

#### ROOM AND BOARD

Room and Board. (See Living Arrangements, page 19.)

#### RETURN OF FEES ON WITHDRAWAL

Fees are returnable in case a student withdraws on account of sickness or for other causes entirely beyond his control, if such withdrawal is made during the first thirty days of the Quarter. Students withdrawing under request from the University are not entitled to any return of fees. Permission to withdraw, given in writing by the Dean of the College, must be presented to the Bursar within this thirty-day period. Ordinarily no more than one-half of the fees paid will be refunded; if the case has exceptional circumstances it should be referred to the President for his judgment.

No fees will be returned in case of withdrawal of students until thirty days have elapsed from the date of withdrawal.

If fees are paid under mistake of law or fact they are returnable in full. Fees are not returnable except as provided in this rule.

**On Laboratory Deposits.** If a student is forced to withdraw from a laboratory course during a Quarter, he must first secure permission from his Dean.

No portion of a laboratory deposit of \$5.00 or less shall be returned, unless the course is officially dropped by the student within thirty days after the payment of the deposit.

On a laboratory deposit of \$6.00 or more the unexpended part of the deposit is returnable if called for on or before the close of the Spring Quarter of the fiscal year in which the deposit has been made.

An order for refund for the unexpended portion of the deposit may be obtained by applying at the Laboratory Supply Store, Chemistry Building. The unexpended part of the deposit will be paid at the Bursar's Office on presentation of the order for refund.

#### SPECIAL FEES—PENALTIES

##### PENALTY FOR FAILURE TO KEEP APPOINTMENT FOR PHYSICAL EXAMINATION

A fee of \$1.00 will be assessed for failure to keep appointment for Physical Examination or for change in date of Physical Examination.

##### PENALTY FOR RE-REGISTRATION

When checks given for payment of fees are not paid on presentation at bank, registration will be cancelled and receipts given considered null and void. A penalty of \$5.00 will be assessed for re-registration.

##### PENALTY FOR FAILURE TO REGISTER WITH THE DEAN OF WOMEN

Every woman student must register with the Dean of Women at her office in Pomerene Hall at the beginning of each Quarter. Registration closes on Thursday following the opening of the Quarter. Town students are requested to register on the day preceding the opening of classes. A penalty of \$5.00 will be assessed for failure to comply with this rule.

## ASSISTANTSHIPS, FELLOWSHIPS, AND SCHOLARSHIPS

### GRADUATE ASSISTANTSHIPS OPEN TO GRADUATE STUDENTS

In order to encourage graduates of this University and of other similar and approved institutions, especially those in Ohio, to continue their studies and to pursue advanced work leading to the higher degrees, the University has established graduate assistantships in several departments. Graduate assistants must be registered in the Graduate School as candidates for a graduate degree. They are elected for the year—four Quarters. During three Quarters, generally the Autumn, Winter, and Spring Quarters, they must devote approximately one-third of their time to assisting in the work of the department in which they are specializing; during the remaining Quarter the graduate assistants are free to carry on their work at the University or elsewhere. Each graduate assistant must confer with the chairman of the department in which he is specializing concerning the Quarters that he must be in residence. A graduate assistant receives a stipend of \$450, payable in nine monthly installments during the three Quarters in which he is rendering service. In addition, all fees are remitted except a matriculation fee of \$10.00. If a graduate degree is obtained, the assistant must also pay a diploma fee of \$10.00 as well as a fee for printing the abstract of his thesis or dissertation (\$5.00 in the case of the Master's degree and \$50.00 in the case of the degree of Doctor of Philosophy).

Students desiring to apply for graduate assistantships in any academic year *must present their applications not later than March 1 of the preceding year*. Application blanks may be obtained upon request by addressing the chairman of the department in which the candidate desires to secure such an assistantship.

### UNIVERSITY SCHOLARSHIPS AND FELLOWSHIPS

In addition to the graduate assistantships, a limited number of scholarships and fellowships have also been established. The scholarships are open to students having a baccalaureate degree from an approved institution, and have a value of \$250 with exemption from all fees, except the matriculation fee of \$10.00. The fellowships, on the other hand, are open only to students who have at least the Master's degree or its equivalent, and have a value of \$400 with like exemption from all fees, except the matriculation fee. If a graduate degree is obtained, a scholar or a fellow must pay a diploma fee of \$10.00 as well as a fee for printing the abstract of his thesis or dissertation (\$5.00 in the case of the Master's degree and \$50.00 in case of the degree of Doctor of Philosophy).

Scholars and fellows are selected on a basis of merit, irrespective of the departments in which they wish to work, and must devote all their time to graduate work, including research. They are elected for the year, four Quarters, but are required to be in attendance only three Quarters, generally the Autumn, Winter, and Spring Quarters, during the year. Candidates for these positions must file their applications not later than March 1. Application blanks may be obtained by addressing the Dean of the Graduate School. Appointments are made annually on April 1 in accordance with the regulations of the Association of American Universities, of which Association the University is a member.

**SPECIAL FELLOWSHIPS****THE STILLMAN W. ROBINSON FELLOWSHIP**

The fellowship endowed by Stillman W. Robinson, late Professor of Mechanical Engineering, for the encouragement of graduate research in engineering, has an annual value of \$750, and is open to graduates in Mechanical, Civil, and Electrical Engineering.

The holder of the fellowship must devote his entire time to graduate work. This should lead to the Master's or the Doctor's degree under the general regulations which obtain in reference to these degrees. For further information, or for application blanks, address the Dean of the Graduate School or the Secretary of the College of Engineering.

All applications should be filed with the Dean of the Graduate School not later than March 1.

**THE NATHANIEL WRIGHT LORD FELLOWSHIP**

The fellowship endowed by William Bartlett Calkins, an alumnus of the University, in memory of Nathaniel Wright Lord, late Professor of Metallurgy, has an annual value of \$750. This fellowship was established to encourage graduate research on solid fuels or products derived from solid fuels which have a practical application in the industrial world.

The holder of the fellowship must devote his entire time to graduate work. This should lead to the degree of Master of Science or Doctor of Philosophy, under the general regulations which obtain in reference to these degrees. For further information or for application blanks address the Dean of the Graduate School.

All applications should be filed with the Dean of the Graduate School not later than March 1.

**THE E. I. duPONT de NEMOURS FELLOWSHIP**

The E. I. duPont de Nemours & Company of Wilmington, Delaware, have established a fellowship in the Department of Soils of the University.

The holder of the fellowship must be prepared to engage at once in active research upon a problem in the field of Soils, there being no further limitations upon the fellowship. The stipend is \$750 per annum, and it is expected that at the conclusion of the period the holder of the fellowship will be able to present his research as a dissertation for the degree of Doctor of Philosophy. For further information, or for application blanks, address the Dean of the Graduate School.

All applications must be filed with the Dean of the Graduate School not later than March 1.

**THE BATTELLE MEMORIAL INSTITUTE FELLOWSHIPS**

The Battelle Memorial Institute of Columbus has established one or more fellowships at The Ohio State University. Each fellowship carries an honorarium of \$60.00 per month for ten months, September to June inclusive. All course work selected by the fellow will be taken at The Ohio State University, while the research work will be carried on at The Battelle Memorial Institute. Inasmuch as this institute was founded for the purpose of studying the application of science to industries, especially in Metallurgy, Fuels and allied fields, the candidate's research work must be in this general field. Ordinarily each fellow will be a candidate either for the degree of Master of Science or Doctor of Philosophy, and will devote his entire time to graduate work, including research.

Candidates may secure application blanks by addressing the Dean of the Graduate School. All applications should be received not later than March 1 of each academic year.

**THE MARGARET G. HARDER PAN-AMERICAN SCHOLARSHIP**

In May, 1930, the Ohio Federation of Women's Clubs established a scholarship to be known as the Margaret G. Harder Pan-American Scholarship. This scholarship carries an honorarium of \$800.00 payable in monthly installments, and in addition the holder of the scholarship is allowed the same exemption of fees as are the University Scholars and Fellows.

The scholarship is open to women graduates of reputable South American Colleges and Universities. For further information concerning this scholarship address Mrs. William N. Harder, 434 East Church Street, Marion, Ohio.

**HONORARY FELLOWSHIPS**

Persons who have already received their Doctor's degree and wish to carry on research work may be appointed Honorary Fellows. Honorary Fellowships carry no honorarium but persons holding these fellowships are given the complete freedom of the University and are exempt from the payment of all fees, but will be required to pay the cost of any materials consumed in the pursuit of their research.

**INDUSTRIAL FELLOWSHIPS**

A number of industrial fellowships are established each year by various organizations and societies, for the purpose of carrying on research work in definite fields of investigation. Some idea can be gained concerning these fellowships from the following list which have been filled in the present year:

- 1 Timken Steel and Tube Company Fellowship in Chemistry;
- 1 Crop Protection Institute Fellowship in Horticulture;
- 1 Delco Appliance Corporation Fellowship in Mechanical Engineering;
- 1 Tobacco By-Products and Chemical Corporation Fellowship in Veterinary Medicine;
- 1 Engineering Experiment Station Fellowship in Chemistry;
- 1 National Kraut Packers Association Fellowship in Horticulture;
- 1 Boiler Feedwater Studies Fellowship in Chemistry.

**LIVING ARRANGEMENTS**

The President of the University has the authority to supervise living arrangements of students not residents of the city of Columbus and to order the immediate withdrawal of any student from any boarding or lodging house in which the surroundings are undesirable.

**ROOMS AND BOARD FOR MEN**

The University does not possess any dormitory facilities for men. Furnished rooms can be obtained at prices varying from \$8.00 to \$15.00 a month, and the cost of the table board in the clubs and restaurants near the University is from \$4.50 to \$7.00 a week. Board can be secured at the Ohio Union at reasonable prices.

Board with furnished rooms can be obtained in private families within convenient distance from the University at rates varying around \$8.00 a week.

**MEN'S HOUSING BUREAU**

The absence of dormitories for men at Ohio State University causes the men students to reside in private rooming houses in the University district. In order to assist the students (especially those entering for the first time) in finding desirable rooms at the greatest saving, the University has created the Men's Housing Bureau, located in the office of the Dean of Men, first floor, Administration Building.

Classified lists of rooms available for every student and for any number of students are always available at this office. Boarding houses are likewise listed.

If the student signs the "Rooming House Agreement" he shall be expected to be responsible for the rental price of the room as specified in the agreement, unless he can present satisfactory reasons to the Men's Housing Bureau for moving out before the expiration of that period, or, unless he can secure a satisfactory substitute. If he moves out before the expiration of the Quarter without presenting a satisfactory excuse he shall forfeit one month's rent. The signing of such agreement is optional.

*The University warns students not to rent rooms which have not been placed on the approved list by the Men's Housing Bureau. Any one renting a room which is not on the approved list does so at his own risk.*

### WOMEN STUDENTS

The Ohio State University is open to women upon the same conditions and by the same methods of registration offered to men. Every woman student, whether undergraduate or graduate, must register with the Dean of Women at her office in Pomerene Hall during the first four days of each Quarter. The exact dates of registration will be fully announced each Quarter.

NOTE: A penalty of \$5.00 will be assessed for failure to comply with this rule.

#### LIVING ARRANGEMENTS FOR WOMEN

All living arrangements for women are under the supervision of the Dean of Women. Applications for residence in the residence halls and private rooming houses should be made directly to the Dean of Women. A limited number of graduate women can be accommodated in these types of residence.

#### RESIDENCE HALLS FOR WOMEN

The University has three modern Residence Halls under its jurisdiction, Oxley, Mack, and Neil Halls. All three Halls are governed by student government with the advice and supervision of the House Superintendent. Booklets describing these residence halls will be sent upon request to the Superintendent.

#### PRIVATE ROOMING HOUSES FOR WOMEN STUDENTS

Westminster Hall, 52 Fifteenth Avenue, under the supervision of the Presbyterian Church and St. Hilda's Hall, 169 West Eleventh Avenue, under the supervision of the Episcopal Church are open as places of residence to women students. Booklets describing Westminster Hall and St. Hilda's Hall will be sent upon request to the Superintendents. There are also about twenty-five privately owned rooming houses under the supervision of the Dean of Women.

Applications for residence in halls or private houses should be made directly to the Dean of Women, who will send a pamphlet of information and regulations governing the housing of women students on application.

#### OTHER ARRANGEMENTS

A list of light housekeeping rooms and apartments is available to graduate women in the office of the Dean of Women. A list of rooms in private homes is also available. Graduate women are not permitted to live in any house where men students live.

## ADMISSION

### METHOD OF ADMISSION

The admission of students is in charge of the University Entrance Board, which determines the credits that shall be issued on all entrance examinations and certificates, and furnishes all desired information to applicants. Correspondence relating to admission should be addressed to the University Examiner, The Ohio State University, Columbus.

### REQUIREMENTS FOR ADMISSION

Admission to the Graduate School is open to all graduates of The Ohio State University as well as to the graduates of all other colleges and universities of approved standing, provided their undergraduate records are satisfactory. Before entering upon graduate work in any department, the applicant must present evidence to the effect that he has had the necessary prerequisite training that will enable him to pursue with profit the courses desired. *It must be remembered also that admission to the Graduate School does not imply admission to candidacy for the degree.* No graduate student, not even one who is a graduate of The Ohio State University, is admitted to candidacy for a degree until he has been in residence a sufficient time to enable his instructors to judge of his ability to carry on graduate work.

Information concerning admission to candidacy will be found under the headings "Requirements for the Degrees of Master of Arts and Master of Science" and "Requirements for the Degree of Doctor of Philosophy."

A graduate of a college not on the approved list may be admitted to the Graduate School, provided that his college course, when checked by the University Examiner, entitles him to a credit of not less than one hundred and thirty-five Quarter-credit hours, or ninety semester hours. In all such cases, however, the residence requirement for the graduate degree will be correspondingly increased.

### METHOD OF PROCEDURE FOR ADMISSION

An applicant for admission to the Graduate School must first secure a statement from the registrar or other officer of the university or college of which he is a graduate, which contains the following information: (1) the date of graduation of the applicant; (2) the degree received; (3) a complete list of courses taken and grades received. This transcript, together with a catalog of the institution of which the applicant is a graduate, should be sent to the University Entrance Board not less than three weeks (an earlier date is preferable) before the opening of the Quarter in which the applicant expects to register. If the credentials are satisfactory, an admission card to the Graduate School will be mailed promptly to the applicant. If the credentials are not satisfactory or if further information is desired, the applicant will be notified at once by correspondence.

In case the applicant finds it impossible to send by mail the statement referred to in the preceding paragraph, he may present it in person when he reports for registration and receive his admission card. However, the Entrance Board is always crowded on the opening days of the Quarters, so that the applicant will find it greatly to his advantage to secure his admission card in advance by correspondence.

### METHOD OF PROCEDURE FOR REGISTRATION

The method of procedure for registration is as follows: The student, having secured from the University Entrance Board his admission card to the Graduate School, will present this card at the Office of the Graduate School in Room 106, University Hall. Here he will be given a course of study card and will be instructed as to the further method of procedure for registration. This procedure will include the appointment of an adviser who will assist the student in mapping out, and entering upon the course of study card, a suitable course of study and will sign the card in the appropriate place, thus indicating the adviser's approval of the course selected. While it is advisable to map out, tentatively at least, all the work for the degree in question, nevertheless, it is sometimes impossible to do this and only the work proposed for the year or for the Quarter is entered. The work for the degree, or for the year or Quarter, having been entered upon the course of study card, the student will then return the card to the office of the Graduate School and will receive his schedule card properly filled out and approved. The student will then immediately report to the Registrar's office in the Administration Building and obtain his fee card. He will then pay his fees at the office of the Bursar in the Administration Building. Registration is not complete until the fees have been paid. Even a student who for any reason is exempt from the payment of fees, must report to the Bursar's office and have his fee card stamped. All fees and laboratory deposits required by a student must be paid to the Bursar before the student is entitled to enter his classes.

No student is permitted to change his adviser without the approval of the Dean of the Graduate School.

### CHANGES IN COURSE

After a student's election card has been made out for the year, or Quarter, changes in his course of study will be made only upon the written request of the student's adviser, and the statement embodying the reasons for such changes must be left on file with the Dean of the Graduate School. No credit will be given on the University records for courses taken without the proper authorization.

### DATE OF REGISTRATION

Registration for any Quarter is permissible at any time during the two-weeks period previous to the opening day of the Quarter. If at all possible a student should register some time during this period. Students who find it impossible to register before the opening day of the Quarter will be allowed to register later within a reasonable length of time under such restrictions as the Dean of the Graduate School deems wise. In no case will a student be allowed to register late for a course without first obtaining the written permission of the instructor giving the course. Any student desiring to pursue research work only may be permitted to register at any time during the Quarter provided he first obtains the written permission of the instructor in charge of the work.

A student who is exempt from the payment of fees under the regulations of the Board of Trustees must complete his registration promptly in order to obtain such exemption.

### STUDENTS TRANSFERRING TO A COLLEGE IN THE UNIVERSITY

A student who desires to transfer from the Graduate School to a college of this University must make his application for such transfer to the University Examiner. This transfer must be approved by the University Examiner before the student will be permitted to proceed with his registration in the college which he is proposing to enter.

## WITHDRAWAL FROM THE UNIVERSITY

A student who desires to withdraw from the University must apply to the Dean of the Graduate School for permission to withdraw in good standing. *If the student leaves the University at any time during the Quarter, without communicating with the Dean, he will be marked as having failed in all of his courses for the Quarter.* If a personal interview is impossible, the Dean must be notified by mail. In order to retain his right to voluntary return, the reasons given for withdrawal must be satisfactory to the Dean, and must be so endorsed at the time the application is filed.

The written permission of the Dean shall be filed with the Registrar at once by the Secretary that the proper entry may be made upon the University records.

### COMBINATION ARTS AND SCIENCES-GRADUATE COURSE LEADING TO THE TWO DEGREES, BACHELOR OF ARTS AND MASTER OF ARTS

In accordance with an agreement made between the College of Arts and Sciences and the Graduate School, it is possible for students of exceptional ability to secure both the Bachelor of Arts and Master of Arts degrees by an extra Quarter of study in addition to the regular four-year period ordinarily required for the degree of Bachelor of Arts. Indeed, by the proper planning of the sophomore and junior schedule of study, it is even possible to secure both of these degrees in four years.

Admission to the Combination Arts and Sciences-Graduate course is limited to those students in the College of Arts and Sciences who have completed all junior division requirements and at least one hundred and forty-five Quarter hours of work with a point ratio of not less than 3.5.

Students who are eligible and wish to apply for admission to this combination course must do so as soon as they have finished the junior requirements. Such students should report to the office of the College of Arts and Sciences or to the Graduate School for detailed information as to method of procedure.

### CREDIT TOWARDS A MASTER'S DEGREE FOR COURSES REQUIRED FOR THE PROFESSIONAL DEGREES IN THE COLLEGE OF DENTISTRY AND IN THE COLLEGE OF MEDICINE

Students admitted by the University Examiner to both the Graduate School and either the College of Dentistry or the College of Medicine, may offer towards the Master's degree not to exceed 15 Quarter hours of work required for either the degree of D.D.S. or M.D. In order to obtain this privilege the candidate for the Master's degree must first secure a course card at the office of the Graduate School and present the same to the Chairman of the Department in either the College of Dentistry or the College of Medicine in which he wishes to major. The Chairman, after consultation with the candidate, will map out the course proposed for the Master's degree which may include a maximum of 15 Quarter hours of work referred to above, and sign the card, thus indicating his approval of the course. The candidate will then return the card to the office of the Graduate School. If the course so selected meets with the approval of the Dean of the Graduate School, the candidate will be registered in the Graduate School as well as in the appropriate professional college.

### DEGREES CONFERRED

The following higher degrees are conferred by the University: Master of Arts, Master of Science, Master of Business Administration, Master of Arts in Social Administration, Master of Science in Public Administration, Doctor



of Philosophy. The requirements for the Master's degree will be found on pages 26-30 and for the degree of Doctor of Philosophy on pages 30-32. All candidates must read these requirements carefully.

### GRADUATE STUDENTS NOT CANDIDATES FOR A DEGREE

Graduate students who are not candidates for a higher degree are designated as "Special Students" and are not required to name a field of specialization, but may elect their work with a view to the special purpose for which they are in attendance at the University. Any course of study announced for advanced undergraduates and graduates is open for election by such students upon the same conditions that are imposed upon those who are candidates for degrees.

Should a graduate student who has not arranged his work with a view to obtaining a degree, subsequently desire to become a candidate for a degree, the amount of credit he is to receive for work already done will be determined at the time he applies for admission to candidacy for the degree.

### REGISTRATION DURING THE QUARTER IN WHICH THE DEGREE IS SOUGHT

A candidate for any graduate degree must be registered in the Graduate School during the Quarter in which he expects to come up for the degree. Under exceptional conditions this requirement may be waived by the Graduate Council.

### GRADING SYSTEM FOR GRADUATE STUDENTS

The work of all graduate students performed in connection with the development of theses and dissertations is reported simply as "Prog" indicating progress. All other work is reported as "A" Excellent, "B" Good, "C" Average, "D" Poor, "E" Failed. In order to receive graduate credit, a student must receive a grade of either "A" or "B" in not less than two-thirds of his work. No credit is given for courses in which a grade lower than "C" is received.

Occasionally, for various reasons, a graduate student may receive a grade of "Incomplete" in a course with the privilege of finishing the work later on. In all such cases, however, this "Incomplete" must be made up within a period of twelve months after the close of the Quarter in which the "Incomplete" was received, or no credit will be allowed for the course.

All graduate students registered in "600" courses shall be required to complete a certain amount of work in addition to that required of undergraduates. This may consist of reading additional books on the subject and presenting a review of same, the presentation of reports, or of such other work as the instructor in charge of the course may deem wise.

### TOTAL CREDIT THAT MAY BE RECEIVED IN ANY ONE QUARTER

A graduate degree stands for concentration in a limited field of study. While a candidate for a degree may carry courses in excess of fifteen Quarter hours, nevertheless, *the maximum credit towards a graduate degree that may be obtained in any one Quarter is fifteen hours.*

### CREDIT HOURS FOR PART-TIME ASSISTANTS

The maximum credit toward a graduate degree that may be obtained in any one Quarter (a) by an assistant is ten hours, (b) by a graduate assistant, twelve hours. The maximum credit that may be obtained by members of the teaching staff other than graduate assistants and assistants will be decided in each case by the Dean of the Graduate School and the student's adviser.

## SENIORS TAKING COURSES FOR GRADUATE CREDIT

A Senior whose full time is not required for the completion of work for his baccalaureate degree may select certain courses for graduate credit, *but in order to do this the permission of the Graduate Council must be obtained before registering for the courses.*

## GRADUATE WORK IN THE SUMMER QUARTER

Candidates for the Master's degree may complete the residence requirement for such a degree by pursuing graduate work at the University for three full Quarters. For the benefit of those who cannot stay during the entire Summer Quarter, this Quarter is divided into two equal terms; and candidates for the Master's degree may complete their residence requirement by pursuing graduate work for *four* summer terms, provided that in the *ad interim* periods between the Summer Quarters fifteen Quarter hours of satisfactory work is completed under the direction of one or more members of the instructional staff of the department in which the student is specializing. The amount of such work that will be credited towards any advanced degree is limited to fifteen Quarter-hours, and the amount during any one *ad interim* period to eight Quarter-hours. Hence, under this plan the four terms cannot be taken in two Summer Quarters.

No student is allowed to pursue *ad interim* work unless he has been in residence in the Graduate School of this University at least one term of a Quarter. Moreover, it is optional with any member of the instructional force as to whether or not he will conduct such work.

A student who wishes to pursue *ad interim* work will proceed as follows: Before the close of the Summer term in which he is in residence he will obtain from the office of the Graduate School an appropriate card and, after consultation with the professor in charge of the proposed *ad interim* work, will enter upon this card a brief outline of the work to be pursued in the *ad interim* period. After securing the signature of the professor thus signifying his willingness to conduct the proposed *ad interim* work, the student will deposit this card in the office of the Graduate School. As an evidence of earnest intentions, he must also register in the University (this does not imply attendance) for at least one Quarter of each period during which the *ad interim* work is being pursued. He is also required to report to the professor conducting his work at least once a month and to pass such examinations as may be prescribed. He may borrow from the University Library such books as may be necessary for the successful conduct of the work, but will be required to pay for the cost of shipment. Requests for such books should be sent to the Dean of the Graduate School.

## OFF-CAMPUS RESEARCH WORK

A student who for any reason desires to carry on off-campus research work in connection with his thesis or dissertation must have his program approved in advance by the appropriate department and by the Graduate Council and must maintain his registration in the Graduate School during this entire period, and must pay the regular fees. No student may carry off-campus research work unless he has been in residence in the Graduate School of this University for at least one Quarter.

THE FRANZ THEODORE STONE LABORATORY  
(Formerly The Lake Laboratory)

The Franz Theodore Stone Laboratory on Gibraltar Island, Put-in-Bay, Ohio, affords exceptional opportunities for graduate students who wish to carry on research work in botany, entomology, and zoology during the summer. The general rules that apply to graduate work carried on at the University during the Summer Quarter apply equally to the graduate work taken at the Labora-

tory. The work of instruction is carried on by members of the University Faculty and by members of the faculties of other colleges and universities. Students interested in this work should send to the University Examiner for the Franz Theodore Stone Laboratory Bulletin.

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

The degree of Master of Arts will usually be conferred upon candidates whose work lies in the departments properly included in the College of Arts and Sciences, the College of Education, or the College of Commerce and Administration, while the degree of Master of Science will usually be conferred upon candidates whose work lies in the College of Agriculture, the College of Engineering, the College of Medicine, or the College of Veterinary Medicine.

**Residence Requirement.** A residence of three Quarters wholly devoted to graduate work is required; however, a student may reduce this residence requirement to two Quarters (taken in four terms of different summer Quarters) by completing in a satisfactory way fifteen Quarter-credit hours of *ad interim* work as outlined on page 25. Moreover, a graduate of The Ohio State University may do not to exceed one-half of the required work at another institution having equivalent opportunities for study. The candidate is, however, subject to final examination by The Ohio State University on all work offered for the degree.

A student holding a graduate assistantship must spend at least six weeks in addition to the three Quarters, in order to fulfill the residence requirement. For a part-time assistant, a minimum residence of four Quarters is required, during one of which he must devote full time to his graduate work.

Students entering from other accepted graduate schools will be credited with work already completed, provided authorized statements are presented to the effect that such students have credit in the graduate school for the work specified. *However, no student will be given a degree by The Ohio State University unless he has satisfactorily completed forty-five Quarter-hours of work under the guidance of this University.*

A candidate for the Master's degree must be registered in the Graduate School during the Quarter in which he expects to receive the degree, unless excused in advance by the Graduate Council from such registration.

**Course of Study.** The course of study shall be selected in consultation with the student's adviser (see page 22). It must show a reasonable degree of concentration on interrelated subjects and must be pursued under at least two professors. The course of study outlined shall be subject to the approval of the Dean of the Graduate School.

While qualification for the Master's degree is not based entirely upon the completion of a definite number of hours of work, nevertheless, the amount of work required will usually aggregate not less than the equivalent of fifteen hours of classroom work throughout three Quarters, inclusive of the thesis. This presupposes that the student has completed the necessary prerequisites for graduate work in his chosen field.

**Standard of Work Required.** A graduate student doing acceptable work for the Master's degree must attain the mark "A" or "B" in not less than two-thirds of the work included in the course of study outlined for his degree, and the mark "C" or higher in the remaining one-third.

**Admission to Candidacy.** A student desiring to be admitted to candidacy for a Master's degree must file his application for admission to candidacy for the degree with the Dean of the Graduate School at a date not later than two weeks after the opening of the Quarter in which the degree is sought. The applications are made upon special blanks secured from the office of the Graduate School. These applications are passed upon by the Executive Committee

of the Graduate Council. Admission to candidacy is based upon undergraduate training and ability to pursue graduate work as revealed by the official reports upon the student's course. No student will be admitted to candidacy until he has completed at least the equivalent of one Quarter's work.

**Examination.** A student working for a Master's degree is required to pass the regular final examinations in all courses for which he is registered and must receive grades in accordance with the regulations of the Graduate School. A general comprehensive examination also is required to test the candidate's knowledge of the study which he has mainly pursued. This general examination is held after the submission and approval of the thesis; it is conducted by a committee composed of the candidate's adviser (chairman) and at least one other member of the instructional force chosen by him. The general examination may be either written or oral at the option of the examining committee. The chairman of the committee is responsible for arranging the examination and for certifying its results to the Dean of the Graduate School. The report of this committee must be unanimous in order to be considered satisfactory.

A candidate who fails in his general examination must register in the Graduate School and carry on work for an additional Quarter before an opportunity will be given for a second general examination, unless special permission is granted by the Graduate Council for an earlier examination at the request of the department concerned.

**Thesis.** A satisfactory thesis is required. The subject of the thesis, together with the written approval of the professor directing the work, must be filed in the office of the Graduate School at a date not later than that on which the student applies for admission to candidacy.

A candidate who expects to receive his degree at the end of a given Quarter must submit the completed manuscript of his thesis ready for typewriting to his adviser not later than three weeks prior to Commencement Day. If the manuscript is approved the candidate must at once prepare two typewritten copies of the same, following specifications which may be obtained at the office of the Graduate School. If the thesis is then approved the candidate shall deposit it in duplicate with the University Editor *not later than a date which will be set by the Graduate School for each Quarter* and must pay to the Editor a fee covering the cost of binding the same.

In case the thesis has already been published, the candidate, instead of following the above procedure, may present two printed copies to his adviser, not later than three weeks prior to Commencement Day. The form of printing as well as the contents must be approved by his adviser. If the thesis is so approved the student must deposit these copies with the University Editor *not later than a date which will be set by the Graduate School for each Quarter* and must pay to the Editor a fee covering the cost of binding the same.

The thesis requirement may be waived by the Dean of the Graduate School upon the written recommendation of the candidate's adviser. In all cases where the requirement is waived, action must be taken prior to the date for the filing of the thesis subject.

**Abstract of Thesis.** In addition to the two approved copies of the thesis which must be deposited with the University Editor, each candidate must deposit in the office of the Graduate School one approved, typewritten copy of an abstract of the thesis of approximately three hundred words in length. At the close of each Quarter the Graduate Council proceeds immediately to print the abstracts of all the theses submitted during the Quarter, and to bind these together, in sufficient numbers to meet the exchange list of the University Library. Each candidate must deposit with the Bursar of the University not later than *a date which will be set by the Graduate School for each Quarter* the sum of \$5.00 in cash. This sum will be used by the Graduate Council to defray expenses connected with the editing, the printing, and the binding of the abstracts of theses.

**Time Limit on Work for Master's Degree.** The entire work for the Master's degree must be completed within a period of six years.

**Diploma Fee.** A special graduation fee of \$10.00 is required of each person receiving a graduate degree from the University. This fee must be paid one week *before* the close of the Quarter in which the candidate expects to receive his degree.

### GRADUATE COURSE IN SOCIAL ADMINISTRATION

There is apparent need for the social work executive of professional status, indoctrinated in the philosophy of social work, acquainted with its fundamental processes, and keenly appreciative of its objectives and accomplishments. The demonstrated values of specialization should be conserved and enriched by cooperative procedure based on executive grasp of the broad implications of local social work organization, whatever form such community organization may take. The principal object of this course is to prepare men and women for executive positions in Councils of Social Agencies, Playground and Recreation Associations, County Boards of Welfare, Community Chests, Family Service Societies, Municipal Welfare Departments, Probation Departments, Red Cross Organizations, State Boards of Charities, Child Welfare Agencies and other community organizations of charitable and philanthropic activities, both governmental and voluntary.

#### REQUIREMENTS FOR ADMISSION TO THE GRADUATE COURSE IN SOCIAL ADMINISTRATION

To be admitted to this course students must have had fundamental courses in the social sciences and in psychology.

Students whose general education, maturity, and experience justify it, may be admitted to the course, subject to the approval of the instructor, without becoming candidates for the degree and may pursue subjects for which they are qualified.

#### REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN SOCIAL ADMINISTRATION

This course for properly qualified students leads to the degree of Master of Arts in Social Administration. To receive this degree, students must be in residence at The Ohio State University for the Autumn, Winter, and Summer Quarters; in addition, the Spring Quarter must be devoted to field work with a social agency approved by the University. Upon the passing of an examination upon the subjects required and upon the completion of a satisfactory thesis, which is required of all candidates for the Master's degree, the degree of Master of Arts in Social Administration will be conferred.

### CURRICULUM IN SOCIAL ADMINISTRATION

Autumn Quarter		Winter Quarter		Spring Quarter	
Social Adm. (813) 4	(Elective)	Social Adm. (814) 4	Contemporary Social Work	Field Work	
The Community Chest Movement		Social Adm. (950)	Research in Special Problems	Summer Quarter	
Social Adm. (950)	Research in Special Problems	Social Adm. (846) 4	Methods of Sociological Investigation	Social Adm. (815) 4	Interpretation of Social Work
Social Adm. (845) 4	Methods of Sociological Investigation	Social Adm. (870) 3	Community Health Organization	Social Adm. (950)	Research in Special Problems
Social Adm. (838) 3	Social Case Work	Social Adm. (836) 3	(Elective)	Social Adm. (837) 3	Budgeting Community Social Work
Social Adm. (835) 3	(Elective)	Social Adm. (836) 3	(Elective)	Social Adm. (671) 3	Social Adm. (Elective)
The Social Worker and Community Groups		National Social Work Agencies and Local Programs		Community Health Organization	

In addition to the courses required or suggested above, there are available any "600" or "800" courses in Sociology or other departments of instruction, subject always to the approval of the appropriate instructor.

## GRADUATE COURSE IN PUBLIC ADMINISTRATION

It is the object of this course to prepare students for a career in the public service, particularly in municipal administration and in the foreign service.

REQUIREMENTS FOR ADMISSION TO THE GRADUATE COURSE  
IN PUBLIC ADMINISTRATION

To be admitted to this course, students must have completed the curriculum in Public Administration in the College of Commerce and Administration or its equivalent.

REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE  
IN PUBLIC ADMINISTRATION

This course, in connection with that offered in the College of Commerce and Administration, for properly qualified students, leads to the degree of Master of Science in Public Administration. To receive this degree, students must be in residence at The Ohio State University for at least three Quarters. Upon the passing of the usual examinations and upon completion of a satisfactory thesis, which is required of all candidates for the Master's degree, the degree of Master of Science in Public Administration will be conferred. The Master's degree should be received at the end of a year of four Quarters, one of which must be devoted to field work with some governmental or research agency approved by the adviser. A report upon such field work must be filed with the adviser and approved by him. Organizations with which field work may be done include: the State of Ohio, the principal cities of the state, the important counties of Ohio, the Ohio Institute, the Ohio Chamber of Commerce, and numerous other organizations of local or state-wide scope.

## CURRICULUM IN PUBLIC ADMINISTRATION

## GENERAL REQUIRED COURSES

Political Science (950)	Political Science (950)	Political Science (950)
Research Seminary	Research Seminary	Research Seminary

## MUNICIPAL ADMINISTRATION (OPTIONAL)

Social Adm. (813) 4	Social Adm. (870) 3	Social Adm. (668) 3
The Community Chest Movement	Community Health Organization	Community Organization
Accounting (603) 5	Accounting (604) 5	Social Adm. (671) 3
Cost Accounting	Cost Accounting	Community Health Organization
Political Science (809) 3-5	Political Science (807) 3-5	Political Science (808) 3-5
Municipal Government	Public Opinion and Political Parties	Public Administration

## FOREIGN SERVICE (OPTIONAL)

Geography (623) 3	History (630) 3	History (629) 3
Geography of South America	Diplomacy of Europe	Modern Germany
Political Science (611) 5	Geography (624) 3	History (628) 3
Jurisprudence	Caribbean Region	Reconstruction of Europe
Political Science (806) 3-5	Geography (634) 3	Geography (625) 3
Comparative Government	Trade Centers and Trade Routes	Geography of the Far East
	Political Science ((810) 3-5)	
	International Relations	

## DEGREE OF MASTER OF BUSINESS ADMINISTRATION

## GENERAL REQUIREMENTS

This course leads to the degree of Master of Business Administration. To receive this degree students must comply with all the regular requirements laid down for the degrees, Master of Arts and Master of Science (see pages 26-30). In addition to these requirements each candidate must meet the following general requirements.

**Prerequisites.** Before a student may become a candidate for the degree of Master of Business Administration he must have credit for the following sub-

jects: (Credit for the specific courses noted may be secured during either the undergraduate or the graduate years.) Principles of Economics, Principles of Accounting, Principles of Geography, the equivalent of six Quarter hours in Business Law, introductory courses in Corporation Finance, Industrial Management, Marketing, Economic Statistics, Money and Banking.

In addition to these general prerequisites, the department in which the candidate elects to specialize will have the following prerequisites:

The Department of Accounting: credit for additional courses in Business Law, three hours; Public Finance, six hours; Accounting, thirty-five hours.

The Department of Business Organization: approved courses in either Transportation or Public Utilities for a student wishing to specialize in any one of the fields in Business Organization.

The Department of Geography: at least eighteen Quarter hours in courses in Geography, including economic geography, the United States, and another regional course, if the student expects to specialize in one of the fields represented by that department.

A thesis will be required of all candidates for this degree and the credit granted for the thesis shall not exceed six Quarter hours.

The credit granted for work in the field of specialization shall be not less than twelve nor more than twenty Quarter hours.

The candidate shall take work in at least three fields other than his field of specialization.

#### REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

**Scholastic Requirements.** The general requirements for the degree of Doctor of Philosophy are: (1) A reasonable mastery of the field of specialization chosen, tested by a general comprehensive examination given approximately one year previous to the date on which the candidate expects to come up for the degree; (2) a reading knowledge of two foreign languages (usually French and German); (3) the presentation of an acceptable dissertation embodying the results of an original investigation; and (4) the passing of a final examination upon the dissertation and the immediate field in which the investigation lies.

**Residence Requirement.** While it is not intended that the degree shall be given as a certificate of faithful and industrious work for a specified length of time, yet it is not believed that the scholastic requirements as given above can be secured by less than the equivalent of three years work devoted wholly to graduate study and investigation with suitable facilities and under proper supervision. Of these years, at least one, and that except by permission of the Graduate Council, the last, must be spent in residence at this University. In case any part of the work is done elsewhere than in this University, such work shall be subject to the approval of the Graduate Council.

A candidate for the degree of Doctor of Philosophy must be registered in the Graduate School during the Quarter in which he expects to receive the degree, unless excused in advance by the Graduate Council from such registration.

**Course of Study.** The course of study to be pursued for the Doctor's degree will be arranged with each student by his adviser, but the choice of work must be approved as a whole by the Dean of the Graduate School. Work in other departments will be advised according to the needs of the individual student. In all cases the aim will be a reasonable concentration and a reasonable breadth of study, designed to foster both a knowledge of the specialty in relation to allied branches of learning and the power of productive scholarship.

**Language Requirement.** A reading knowledge is required in at least two foreign languages in which there is a substantial body of scholarly literature bearing upon the student's field of specialization. By a reading knowledge is

meant a knowledge sufficient to enable the student to use the languages for the purposes of research. Under this general provision it is within the province of each department to define more specifically its language requirement, subject to the approval of the Graduate Council, by specifying one or both of the two required languages and by designating, generally or specifically, more than two foreign languages to be required of the student.

Before a student will be permitted to take his general examination, he must pass an examination in the languages required. The examination is conducted by the language department concerned. The subject matter of the examination shall be drawn from the literature of the student's field of specialization. Blanks for reporting the results of the examination may be obtained at the office of the Graduate School.

**General Examination and Admission to Candidacy.** Not later than the middle of the second Quarter prior to the Quarter in which he expects to come up for his degree, a student working for the degree of Doctor of Philosophy is required to pass a general comprehensive examination on the fundamentals of the entire field in which he has elected to specialize without limitation to the courses which the student has pursued. For example, a student who expects to come up for the degree at the end of the Spring Quarter must pass this general examination not later than the middle of the Autumn Quarter. This examination must be a written one to be followed by an oral examination. The satisfactory passing of this examination carries with it admission to candidacy for the degree. After this general examination has been passed, the candidate will be given complete freedom from all course requirements during the remainder of his work and will be registered for "Dissertation" only. However, he will be permitted to audit any courses he may choose. No student will be permitted to take the general examination until after he has passed the language examinations.

The general examination is conducted by a committee appointed by the Dean of the Graduate School, after consultation with the student's adviser. This committee shall consist of the student's adviser (who acts as chairman), and such other examiners as the Dean may designate, including two who are not members of the department directly concerned. When the adviser decides that the student is ready for the general examination, he will so notify the office of the Graduate School, in writing, at the same time suggesting the personnel of the examining committee, for the approval of the Dean. After the committee has been approved by the Dean, appropriate blanks for reporting the results of the examination will be sent to the adviser. The selection of a time and place for the examination will be entirely in the hands of the adviser, but he is expected to consult with the various members of the committee before fixing a time for the examination. At the close of the examination the committee shall certify to the Graduate School, on the blank furnished the committee, whether or not the student has passed the examination. This report, when properly filled out and signed by the committee, shall be considered as the candidate's petition for admission to candidacy. In order to be considered satisfactory, the report of the examining committee must be unanimous.

**Dissertation.** A dissertation which is a definite contribution to knowledge of importance sufficient to warrant its publication shall be offered by the candidate. *A copy of the dissertation bearing the written approval of the candidate's adviser must be presented to the Dean not less than four weeks previous to the end of the Quarter in which the degree is sought.*

The Dean, after consultation with the candidate's adviser shall then appoint a Committee to consider the merit of the dissertation. The dissertation, together with the report of this Committee, shall be laid before the Council, who will then vote upon the question of its acceptance. In order to be considered satisfactory the report of the committee must be unanimous.



Each candidate must deposit in the office of the Graduate School, not later than a date which will be set by the Graduate School for each Quarter, two *approved* printed or typewritten copies of the complete dissertation, complying in form with specifications obtainable in the Graduate School office. Along with the copies of the dissertation, the candidate must also deposit a sum sufficient to cover the cost of binding the same (\$1.50).

**The Final Examination.** The final examination is held after the approval of the dissertation, at such time as the Dean shall appoint. It shall be conducted by a committee consisting of the candidate's adviser (who shall act as chairman) and such other examiners as the Dean of the Graduate School shall designate including at least one who is not a member of the department directly concerned. The examination shall be oral and shall deal intensively with the portion of the candidate's field of specialization in which his dissertation falls, though it need not be confined exclusively to the subject matter of the dissertation. A written examination also may be required at the discretion of the department concerned. In order to be considered satisfactory the report of the examining committee must be unanimous.

**Abstract of Dissertation.** Each candidate must also deposit in the office of the Graduate School, not later than a date which will be set by the Graduate School for each Quarter, one *approved* typewritten copy of an abstract of the dissertation, approximately three thousand words in length. He must also deposit with the Bursar of the University, not later than a date which will be set by the Graduate School for each Quarter, the sum of \$50.00 *in cash*. This sum will be used by the Graduate Council to defray the expenses connected with the editing, printing, and binding of the abstracts of dissertations.

**Diploma Fee.** A special graduation fee of \$10.00 is required of each person receiving a graduate degree from the University. This fee must be paid one week *before* the close of the Quarter in which the candidate expects to receive his degree.

### GRADUATE WORK IN EDUCATION

A student who undertakes to do graduate work in Education is subject to the rules of the Executive Committee of the Department of Education as well as the rules of the Graduate School. The Executive Committee of the Department of Education is charged with advisory and examining functions with reference to all graduate students in Education.

The method of procedure of registration for students majoring in Education is the same as that outlined on page 22, except that upon receipt of the course of study card from the office of the Graduate School, the student will report immediately to the Executive Committee of the Department of Education, Room 115, Education Building. Under the guidance of this committee the student's adviser is selected and he will assist the student in mapping out a suitable course of study for the degree sought. Further procedure is the same as that outlined on page 22.

In the case of candidates for the Ph.D. degree with a major in education, the adviser is appointed for temporary service only; a permanent advisory committee, nominated by the student and appointed by the Dean of the College of Education, will be substituted for the single adviser upon the initiative of the student, as soon as possible after the student has declared his intention of undertaking work for the Doctor's degree in Education. This advisory committee will be responsible for the guidance of the student and will determine, in consultation with the student, the principal areas of his work. Its members will ordinarily serve upon the larger examining committees appointed by the Graduate School to conduct the general examination and the examination upon the dissertation.

### COMMENCEMENT—CONVOCATION

A special Convocation or Commencement is held at the close of each Quarter for the conferring of degrees upon candidates who have fulfilled all the requirements of their respective courses.

### ATTENDANCE AT CONVOCATION EXERCISES

All candidates for degrees are required to be present at their graduation convocation unless excused by the President.

### THE PLANT INSTITUTE

The Plant Institute of The Ohio State University is an organization within the College of Agriculture for furthering research with plants. It affords graduate students the combined facilities of the departments of Botany, Horticulture, Agricultural Chemistry, and Agronomy.

The instructional force and graduate students of these departments meet in a seminary for the discussion of problems connected with plant life.

The Institute, through its executive committee consisting of representatives from the several departments, reviews all thesis projects of candidates for higher degrees majoring in plant subjects in the departments of the College.

### UNIVERSITY ORGANIZATIONS

There are a number of organizations in the University of especial interest to the graduate students. The Gamma Alpha Fraternity, the graduate scientific society, has its own house at which a number of the members of the society live and a still larger number board. There is also a Junior Open Court composed of not more than two representative members of the various departments; likewise the Graduate Club in social educational sciences, and the Graduate Women's Club.

The main object of all of these clubs is to bring members together for social purposes and for the discussion of the various problems in which the individual members are interested.

There are also chapters of the national honorary societies, Phi Beta Kappa and Sigma Xi, as well as a number of honorary fraternities. In addition to these, nearly every department offering graduate work has its own graduate club.

### UNIVERSITY LECTURES

Each year a number of lectures of special interest to graduate students are given by distinguished scholars from various educational institutions. Some of these lectures are of interest primarily to those in certain fields of work while others are of a general character and of interest to graduate students in general, no matter what their fields of activity may be.

## DEPARTMENTS OF INSTRUCTION

The general prerequisites for courses open to graduate students with credit toward a degree are given below. In some departments more detailed prerequisites are required, and in all such cases a statement of these will be found in the description of the courses listed in the departments.

General prerequisites for courses numbered from 600 to 799:

At least junior standing and prerequisites that amount to 20 Quarter hours in the same and allied subjects of which a minimum of at least 10 Quarter hours must be in the same subject; or 30 Quarter hours in not more than two allied subjects.

Special prerequisites as stated in the description of courses must be included within these requirements.

Certain 600 courses in the field of education require as a prerequisite graduate standing in the field of education. These courses are appropriately designated in the list given under the general heading of "EDUCATION."

General prerequisites for courses numbered 800 or above:

These courses are open only to students registered in the Graduate School and have prerequisites that amount to 30 Quarter hours in the same subjects and allied subjects, of which a minimum of 15 Quarter hours must be in the same subject.

### COURSES OF GENERAL INTEREST

The courses listed below are of such a character as to be of general interest to all graduate students irrespective of their fields of specialization. Experience has shown that the great majority of those students who are candidates for the degree of Doctor of Philosophy hope to become members of the instructional staffs of colleges. All such students should select the last course listed, viz., Education 711.

Survey Course 605. Foundations of Contemporary Civilization.

Survey Course 608. Development of Modern Science.

Survey Course 664. Student Economic Problems and the Adviser.

Survey Course 665. Principles of Psychology for Advisers.

(For a full description of these courses see page 180 of this Bulletin, under the heading "Survey Courses.")

\*Philosophy 805. Scientific Method.

(For a detailed description of this course see page 138 of this bulletin.)

Education 711. Survey of Higher Education.

(For a detailed description of this course see page 82 of this Bulletin.)

### ACCOUNTING

Office, 309 Commerce Building

ASSOCIATE PROFESSORS TAYLOR, HECKERT, AND MILLER, ASSISTANT PROFESSOR WILLCOX, MR. BOLON, MR. WALL, MR. SHONTING, MR. FRICKEY

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," see above.

602. Advanced Principles of Accounting. Five credit hours. One Quarter. Autumn, Winter, Spring. Five lectures and recitations each week. Mr. Taylor, Mr. Miller.

The accounting procedure in connection with corporate reorganization and dissolution. Consolidated balance sheets and income statements, branch house accounting, foreign exchange accounting.

\* Not given in 1933-1934.

**603-604. Cost Accounting.** Five credit hours. Two Quarters. 603, Autumn and Winter; 604, Winter and Spring. 603, four lectures and recitations and one two-hour laboratory period each week. 604, five lectures and recitations each week. Not open to students who are taking Accounting 624. Mr. Willcox.

The application of material, labor and burden costs to the product under the order and process plans. The use of standards and other methods of control in production and distribution accounting.

**607-608. Auditing.** Two credit hours. Two Quarters. 607, Autumn and Winter; 608, Winter and Spring. Prerequisite, Accounting 602 and 604. Mr. Wall, Mr. Taylor, Mr. Miller.

The various kinds of audits and their respective uses. Methods followed in verifying balance sheets and profit and loss accounts. Audit reports and certificates. Duties and responsibilities of an auditor.

**\*610. Cost Accounting System.** Three credit hours. Winter Quarter. Prerequisite, Accounting 604 or 624.

A study of cost accounting systems of various types, including practice in designing forms and procedure for representative industries. Attention is given to uniform cost systems adopted by various trades.

**611. Income Tax Accounting.** Two credit hours. One Quarter. Autumn and Spring. Two hours of lectures, problems, and recitations each week. Mr. Miller, Mr. Bolon, Mr. Frickey.

The accounting principles and procedure involved in the Federal taxes on income and profits. Practice in preparing income tax returns from the accounts of individuals, partnerships, and corporations.

**612. Constructive Accounting.** Four credit hours. One Quarter. Autumn and Spring. Four hours of lectures, problems, and recitations each week. Prerequisite, Accounting 603-604. Mr. Heckert.

Practice in designing accounting systems for typical business enterprises.

**613-614. Accounting Practice.** Four credit hours. Two Quarters. 613, Autumn and Winter; 614, Winter and Spring. Four hours of lectures, problems, and recitations each week. Prerequisite, Accounting 602 and 604. Mr. Taylor, Mr. Miller.

Practice in the solution of typical accounting problems. The class material is taken largely from the Certified Public Accountants' examinations of the various states.

**616. Business Statements.** Three credit hours. One Quarter. Autumn, Winter, Spring. Three hours of lectures and problems each week. Mr. Bolon.

A study of the different kinds of statements prepared by corporations for the guidance of executives, directors, stockholders, and creditors. The methods used in preparing the necessary statements together with the principles of statement interpretation. Use is made of current statements of well-known corporations. Lectures and problems.

**617. Managerial Accounting.** Five credit hours. Spring Quarter. Prerequisite, Accounting 602 and 604. Mr. Heckert.

The organization and function of the controller's department. The use of accounting and statistical data in the protection, control, planning, and coordination of business. Standards and budgetary procedure.

**\*621. Fiduciary Accounting.** Two credit hours. Winter Quarter. Prerequisite, Economics 631-632. It is strongly urged that Economics 633 be taken previously or concurrently. Mr. Frickey.

The principles underlying the accounting problems encountered in the administration of trust estates. Special attention is devoted to the accounting aspects of the Federal Income Tax Law, the Federal Estate Tax, and the Ohio Inheritance Tax.

**622. Advanced Accounting Theory.** Three credit hours. Spring Quarter. Prerequisite, Accounting 602. Mr. Wall.

An examination of some of the prevailing theories of accounting. Recent theories in connection with the valuation of assets; the determination of income and surplus. Each student is required to make a report covering the investigation of some particular subject.

**624. Factory Costs.** Five credit hours. Spring Quarter. Five hours of lectures and recitations each week. Not open to students taking Accounting 603-604. Mr. Willcox, Mr. Frickey.

The course is intended primarily for students whose major interest is in fields other than Accounting. Emphasis is placed upon the accumulation of material, labor, and expense, cost of production and distribution and to the relationship between cost accounting work and that of other business departments.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**804. Seminary in Accounting.** Two credit hours. Autumn Quarter.

**950. Research in Accounting.** Autumn, Winter, and Spring Quarters.

### ADULT EDUCATION

(See Education)

### AGRICULTURAL CHEMISTRY

Office, 211 Townshend Hall

PROFESSOR LYMAN, ASSISTANT PROFESSORS ALMY AND BURRELL

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

The general prerequisites for Course 601 include five hours of biological science; for 602, a course in pharmaceutical analysis; for 604, a course in qualitative analysis; for 607 and 608, acceptable courses in physiology.

**601. General Biological Chemistry.** Five credit hours. One Quarter. Autumn and Winter. Three lectures and two three-hour laboratory periods each week. Mr. Burrell.

A study of the chemistry of the fats, carbohydrates, proteins, and other compounds of biological importance, and the general chemistry of the metabolism of plants and animals. This course is intended for students majoring in biological subjects, and as a prerequisite to certain advanced courses in this department.

**602. Food Inspection and Analysis.** Five credit hours. Spring Quarter. One lecture and four three-hour laboratory periods each week. Mr. Almy.

Lectures and laboratory work on the composition, official methods of analysis, and methods of detection of adulteration of such foods as maple syrup, honey, cocoa, chocolate, spices, vinegar, flavoring extracts, and alcoholic foods.

**604. Dairy Chemistry.** Five credit hours. Autumn Quarter. Two lectures and three three-hour laboratory periods each week. Mr. Almy.

The constituents of milk are studied, using lectures, textbooks, and assigned readings. Laboratory work includes the separation and study of the constituents of milk.

**605. Dairy Chemistry.** Five credit hours. Winter Quarter. Three lectures and two three-hour laboratory periods each week. Prerequisite, Agricultural Chemistry 604. Mr. Almy.

A continuation of Agricultural Chemistry 604. A study is made of the application of some physico-chemical principles in the field of Dairy Technology.

**606. Advanced Dairy Chemistry.** Five credit hours. Spring Quarter. One lecture and four three-hour laboratory periods each week. Prerequisite, Agricultural Chemistry 605. Mr. Almy.

Laboratory and lectures on the analysis of dairy products, milk, condensed milk, dried milk, and butter. This course is designed to teach the methods of analysis used in the chemical control of manufacturing plants and the legal control of dairy products.

**607. Chemistry of Nutrition.** Five credit hours. Spring Quarter. Two lectures and three three-hour laboratory periods each week. Given in alternate years. Mr. Lyman.

Lectures on the chemistry of nutrition. Laboratory work includes experiments on digestion and utilization of food, determination of fuel value of food and the heat production of man under various conditions, the analysis of blood for waste products of metabolism, the effects on small animals of diets consisting of purified food constituents, and the effects of selected diets on the formation of waste products in the body.

**\*608. Animal Nutrition.** Five credit hours. Spring Quarter. Two lectures and three three-hour laboratory periods each week. Given in alternate years. Prerequisite, Agricultural Chemistry 601. Mr. Lyman.

Lectures on the chemical problems involved in growth, maintenance and fattening of animals, and in the production of milk and work. The composition of feeds and farm rations is discussed from the standpoint of the more recent conception of animal nutrition. Laboratory work includes the determination of coefficients of digestibility, the determination of protein and mineral storage during growth, a study of the energy requirement, and the effect of selected rations on animals.

**701. Special Problems.** Three to fifteen credit hours, taken in units of three or five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. Prerequisite, Agricultural Chemistry 601 and the consent of the instructor. All instructors.

Students electing this course must have had at least two five-hour courses in the department. Consent of the department must be secured.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**801. Plant Chemistry.** Five credit hours. Spring Quarter. Two lectures and three three-hour laboratory periods each week. Prerequisite, Agricultural Chemistry 601 and Botany 605. Mr. Burrell.

Lectures, laboratory, and collateral reading on special phases of the chemistry of plant metabolism.

**804. Seminary.** One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in agricultural chemistry. Prerequisite, Agricultural Chemistry 601. Mr. Lyman.

**950. Research in Agricultural Chemistry.** Autumn, Winter, and Spring Quarters. Laboratory, library, and conference work. Prerequisite, Agricultural Chemistry 701 and consent of the instructor. Mr. Lyman, Mr. Burrell, Mr. Almy.

Research may be done in nutrition, plant chemistry, food analysis, or dairy chemistry.

### AGRICULTURAL EDUCATION

Office, 323 Campbell Hall

PROFESSOR STEWART, ASSISTANT PROFESSORS KENESTRICK AND JACKSON

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**601. Special Methods of Teaching Vocational Agriculture in Secondary Schools.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five recitations each week. Mr. Stewart, Mr. Jackson.

An intensive application of the information and practices given in the preceding departmental courses to the preparation of material for specific agricultural courses. The organization of subject matter for effective presentation in the classroom, the planning of lessons, laboratory work, and field trips, the methods of teaching through project supervision, and the organization of part-time courses.

**701. Special Problems.** Three to fifteen credit hours, taken in units of three or five hours each Quarter. Autumn, Winter, Spring.

This course is intended for graduates who wish to work out problems in Agricultural Education including Agricultural Extension and Vocational Education in Agriculture.

\* Not given in 1938-1984.

**\*705. Project Records and Analysis.** Three credit hours. Winter Quarter. Three discussion periods each week. Prerequisite, teaching experience in vocational agriculture or permission of the instructor. Students expecting to enroll in this course should communicate with the instructor at least two weeks prior to the beginning of the Quarter in order to arrange for the collection of data on specific individual problems. Mr. Kenestrick.

A study based upon researches in project accounting and analysis promoted in Ohio in recent years. Conditions in the field are studied from the assembled material and the findings derived from it. A program of improvement is determined.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

Special problems are designed particularly for the training of supervisors of agricultural education and trainers of teachers of vocational agriculture.

**803. The Problem Method Applied to Secondary and College Teaching in Agriculture.** Five credit hours. Spring Quarter. Five discussion periods each week. Prerequisite, Agricultural Education 601. Other students may enroll by securing permission of the instructor. Mr. Stewart.

An inquiry into the conditions that promote effective teaching with a determination of procedures that contribute to this end. The possibilities of the problem method in agricultural education are fully explored.

**804. State Administration and Supervision of Vocational Agriculture.** Three credit hours. Spring Quarter. Three discussion periods each week. Mr. Stewart.

A course devoted to a consideration of the following: federal and state legislation relating to vocational agriculture; state plans; records and reports; standards and objectives; teacher training in service; supervisory procedures; state courses of study; placement and recommendations of teachers; promotion of state program; day, evening, and part-time school organizations; and other problems relating to the state administration and supervision of vocational agriculture.

**806. Organization and Administration of Teacher Training for Vocational Agriculture.** Three credit hours. Winter Quarter. Five lectures each week. Mr. Jackson.

A course devoted to a consideration of the following: state plans for resident teacher training; working relations between teacher training departments and state supervisory organization; teacher training courses offered; analysis of the content of teacher training courses; provisions for observation and practice teaching; research in agricultural education; teacher placement and follow-up program.

**808. Organization and Methods of Conducting Part-Time and Evening Schools in Vocational Agriculture.** Three credit hours. Winter Quarter. Three discussion periods each week. Prerequisite, teaching experience in vocational agriculture or permission of the instructor. Students expecting to enroll in this course should communicate with the instructor at least two weeks prior to the beginning of the Quarter in order to arrange for the collection of data on specific individual problems. Mr. Kenestrick.

A course devoted to an analysis of the problems related to part-time and evening schools in vocational agriculture and to the development of objectives and procedures in the organization and conduct of such instruction.

**†809. Research for Teachers of Vocational Agriculture.** Three credit hours. Mr. Stewart.

A course devoted to a study of research techniques and procedures appropriate to studies and researches in the field of agricultural education. The course will direct students to a study of procedures in the promotion of research with individual projects in planning, organizing, and projecting appropriate studies.

**810. Seminary in Agricultural Education.** One to three credit hours. Autumn, Winter, and Spring Quarters. All instructors.

A study of current problems in agricultural education. Provision for investigation, reports and discussion.

\* Not given in 1933-1934.

† Not given during the academic year, 1933-1934.

**AGRICULTURAL ENGINEERING**

Office, 105 Ives Hall

PROFESSORS McCUEN, REED, MILLER, AND OVERHOLT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

The general prerequisites include fundamental courses in agricultural engineering, agronomy, mathematics, and physics. For Course 602 they should also include courses in animal husbandry.

**\*602. Theory and Practice in Agricultural Engineering: Farm Structures.** Five credit hours. Winter Quarter. Given only in alternate years. Three recitations and two three-hour laboratory periods each week. Mr. Miller.

Advanced study of farm building programs, coordinating engineering, biological economics and social factors. Present design and construction of units, and layouts of entire farmsteads, as well as theoretical considerations of future needs and trends.

**\*603. Theory and Practice of Agricultural Engineering: Farm Power Equipment.** Five credit hours. Autumn Quarter. Given only in even numbered years. Three three-hour recitations and laboratory periods each week. Mr. McCuen.

Trends in design and application of modern farm power equipment. The farm tractor and its complement of power equipment, such as combines, threshers, feed mills, corn harvesters, will be used as a basis in a study leading toward power programs for economical production.

**\*604. Theory and Practice of Agricultural Engineering: Land Maintenance and Improvement.** Five credit hours. Spring Quarter. Given only in odd-numbered years. Three three-hour recitations and laboratory periods each week. Mr. Overholt.

Advanced study of conservation of soil by agricultural engineering structures to control erosion, and of soil water regulation through drainage and irrigation systems. A coordination of the biological, engineering, and economic factors involved in individual systems; also, cooperation problems in state and community programs for economic land utilization.

**\*605. Theory and Practice of Agricultural Engineering: Advanced Field Machinery.** Five credit hours. Spring Quarter. Given in alternate years. Three three-hour recitation and laboratory periods each week. Mr. Reed.

An advanced study of soil working and crop processing units, coordinating biological, engineering and economic factors. Trend problems starting with present agronomic, engineering, and management concepts regarding use, design, and needs, and progressing toward the solution of major machinery problems in advanced agricultural practices and systems.

**701. Special Problems.** Three to fifteen credit hours, taken in units of three or five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. All instructors.

Students selecting this course must have had at least two five-hour courses in the department, one of which must have been in line with the problem chosen. Consent of the department must be secured.

**FOR GRADUATES**

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**950. Research in Agricultural Engineering.** Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Permission of the department required. Mr. McCuen, Mr. Reed, Mr. Overholt, Mr. Miller.

**AGRICULTURAL EXTENSION**

Office, 115 Townshend Hall

MR. RAMSOWER, DIRECTOR; MR. SPOHN, DISTRICT SUPERVISOR

FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**\*600. Extension Education.** Five credit hours. Autumn Quarter. Five recitations each week. Mr. Spohn.

The application of psychology and principles of education to the program and methods used in Extension work.

\* Not given in 1933-1934.



**701. Special Problems.** Three to fifteen credit hours, taken in units of three or five hours each Quarter. Autumn, Winter, Spring.

This course is intended for graduates who wish to work out problems in Agricultural Education including Agricultural Extension and Vocational Education in Agriculture.

## AGRONOMY

Offices, 203 Townshend Hall and 101 Horticulture Building

PROFESSORS R. M. SALTER, PARK, BRADFIELD, AND WILLARD, ASSOCIATE PROFESSOR CONREY, ASSISTANT PROFESSORS McCLURE, BATCHELOR, F. J. SALTER, AND BORST

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

The general prerequisites should include also fundamental courses in agronomy, agricultural chemistry, and biological science. For Course 608, they should include also a course in physics.

**601. Theory and Practice of Soil Management.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. R. M. Salter.

A review of some of the more important investigational work with soils and plants as related to field practice.

Not open to students who have credit for Soils 601.

**\*602. Chemical Methods Used in Soils Investigations.** Five credit hours. Autumn Quarter. Two lectures and nine laboratory hours each week. Mr. McClure.

The fundamentals of inorganic quantitative analysis as applied to soils, fertilizers, and liming materials.

Not open to students who have credit for Soils 602.

**603. Origin and Classification of Soils.** Three credit hours. Spring Quarter. Two lectures and one three-hour laboratory period each week. Mr. Conrey.

The characteristics of soils as developed under various climatic conditions and their application in soil classification with special reference to Ohio conditions. Laboratory study of soil characteristics, field trips to several of the important soil areas in Ohio.

Not open to students who have credit for Soils 603.

**608. Soil Physics.** Five credit hours. Winter Quarter. Two lectures and three three-hour laboratory periods each week. Mr. Bradfield, Mr. McClure.

A study of the structure and physical properties of soils, including size distribution of particles, plasticity constants, soil-water, soil-air and temperature relationships. Special emphasis is placed on the behavior of soils under field conditions and upon the soil as a physical medium for plant growth.

Not open to students who have credit for Soils 604 or 608.

**609. Physical Chemistry of Soils.** Five credit hours. Spring Quarter. Two lectures and three three-hour laboratory periods each week. Prerequisite, Agronomy 608. Mr. Bradfield, Mr. McClure.

A study of the soil as a dynamic physico-chemical system with especial emphasis upon the properties of colloidal clay and organic matter and their role in natural soil development and improvement. The development and correction of soil acidity, base exchange phenomena, reactions of soils with fertilizers, factors affecting the composition of the soil solution and the growth of plants are among the subjects treated.

Not open to students who have credit for Soils 604 or 609.

**701. Special Problems.** Three to fifteen credit hours. May be taken in units of three or five credit hours for one or more Quarters. Autumn, Winter, Spring. Prerequisite, fifteen hours of biological science, fifteen hours of agronomy, and the consent of the instructor. All instructors.

Problems will be outlined by the instructor to meet the needs of the individual student.

\* Not given in 1933-1934.

**702. Seminary in Agronomy.** One credit hour. Autumn, Winter, and Spring Quarters. Prerequisite, at least one course in agronomy in the "600" group.

A weekly conference of graduate students and departmental members in which the research work of members of the seminary or related topics will be discussed.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**950. Research in Agronomy.** Autumn, Winter, and Spring Quarters.

Research work in plant breeding and crop production under the direction of Mr. Park, Mr. Willard, and Mr. Borst; research work along physical, chemical, or biological lines as related to soils under the direction of Mr. R. M. Salter, Mr. Bradfield, Mr. Batchelor, and Mr. McClure.

#### AMERICAN HISTORY

(See History)

#### ANATOMY

Office, 410 Hamilton Hall

PROFESSORS LANDACRE, KNOUFF, AND BAKER, ASSISTANT PROFESSORS EDWARDS AND SETTERFIELD, MR. YATES

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

Courses 621-628 inclusive are open only to students doubly registered in the College of Medicine and the Graduate School; courses 628, 638, 639, and 640 are open only to students doubly registered in the College of Dentistry and the Graduate School to the extent of 15 Quarter hours.

**601-602-603. Seminary.** One credit hour. Autumn, Winter, and Spring Quarters. One conference each week. Prerequisite, two Quarters of anatomy. Required of all graduate students taking a major in anatomy. The staff.

Lectures by members of the staff, conferences on investigations being carried on in the department, and reports on recent investigations in anatomy. Subjects for extended study will be changed from Quarter to Quarter.

**604-605-606. Advanced Anatomy; Minor Problems.** Three or five credit hours. Autumn, Winter, and Spring Quarters. One conference and four or eight laboratory hours each week. Prerequisite, two Quarters of anatomy including 613; 619 recommended. The staff.

Students will be assigned problems in gross or microscopical anatomy.

**611. Cytology.** Five credit hours. Winter Quarter. Two lecture and six laboratory hours each week. Prerequisite, three Quarters of biological science including Anatomy 613 or an equivalent. Mr. Landacre.

An introductory course in cytology.

**612. Cytology.** Five credit hours. Winter Quarter. Two lecture and six laboratory hours each week. Prerequisite, three Quarters of biological science which must include Anatomy 613 or an equivalent. Class limited to ten students. Mr. Knouff.

Cytoplasmic relations and differentiations by vital and supravitral methods.

**613. Comparative Anatomy of the Vertebrates.** Five credit hours. Autumn Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, elementary courses in zoology. A course in evolution is recommended. Mr. Setterfield.

The gross anatomy of the vertebrates.

Not open to students who have credit for Anatomy 401 or 406.

**614. Comparative Anatomy of the Vertebrates: Minor Problems.** Five credit hours. Winter Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, Anatomy 613. Mr. Setterfield.

The gross anatomy of the vertebrates.

Not open to students who have credit for Anatomy 402.

**615. Comparative Vertebrate Embryology.** Five credit hours. Spring Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, two Quarters in zoology and Anatomy 613 or equivalent. One additional Quarter of anatomy is recommended, preferably Anatomy 616. Class limited to ten students. Mr. Knouff.

An experimental and descriptive course on the development of one of the vertebrates.  
Not open to students who have credit for Anatomy 403.

**616. Comparative Vertebrate Embryology.** Five credit hours. Winter Quarter. Two lectures or recitations and three two-hour laboratory periods each week. Prerequisite, Anatomy 613. Mr. Yates.

The development of the chick with especial emphasis on the formation of foetal membranes and on the development of the organs.

Not open to students who have credit for Anatomy 404.

**617. Elementary Neurology.** Five credit hours. Autumn Quarter. Two lectures and six laboratory hours each week. Prerequisite, Anatomy 613 and 619. Mr. Landacre.

The gross structures of the brain and sense organs of the higher mammals with special reference to their functional significance.

Not open to students who have credit for Anatomy 408.

**618. Elementary Neurology.** Five credit hours. Winter Quarter. Two lectures and six laboratory hours each week. Prerequisite, Anatomy 617. Mr. Landacre.

The study of the microscopic structures of the sense organs and of the spinal cord and brain of the higher mammals with special reference to reaction systems.

Not open to students who have credit for Anatomy 409.

**619. Comparative Anatomy of the Vertebrates.** Five credit hours. Spring Quarter. Two lectures or recitations and six laboratory hours each week. Prerequisite, Anatomy 613. Anatomy 616 is recommended. Mr. Setterfield.

The anatomy of the mammals with special reference to the cat.

Not open to students who have credit for Anatomy 413.

NOTE: Courses 621 to 640: Open only to students registered in the College of Medicine or in the College of Dentistry.

**621. Human Anatomy.** Five credit hours. Autumn Quarter. Three lectures or recitations and nine laboratory hours each week. Mr. Baker.

The gross anatomy of the thorax and abdomen.

**622. Human Anatomy.** Five credit hours. Winter Quarter. Three lectures or recitations and nine laboratory hours each week. Mr. Baker.

The gross anatomy of the extremities and perineum.

**623. Human Anatomy.** Five credit hours. Spring Quarter. Three lectures or recitations and nine laboratory hours each week. Mr. Baker.

The gross anatomy of the head and neck, the central nervous system and sense organs.

**624. Microscopic Anatomy.** Five credit hours. Autumn Quarter. Two recitations, one lecture, and nine laboratory hours each week. Mr. Knouff.

The general histology of epithelium, connective tissues, blood and muscle and the special histology of the skeletal, muscular, vascular, integumentary, respiratory, digestive and endocrine systems.

**625. Developmental Anatomy.** Five credit hours. Winter Quarter. Two recitations, one lecture, and nine laboratory hours each week. The lecture hour may be replaced by a seminary hour. Mr. Knouff.

The histology of the urinary and reproductive organs and the general embryology of the mammal, with special reference to man.

**626. Neurology.** Five credit hours. Spring Quarter. Two recitations, one lecture, and nine laboratory hours each week. The lecture hour may be replaced by a seminary hour. Prerequisite or concurrent, Anatomy 623. Mr. Landacre.

The histology of the central nervous system and sense organs, and the study of the human brain and spinal cord, with special reference to the reaction systems.

**627. Topographical Anatomy.** Two credit hours. Autumn Quarter. One lecture or recitation and three laboratory hours. Prerequisite, Anatomy 621, 622, 623. Mr. Baker.

The topographical relations of gross anatomy based on surface and sectioned material.

**628. Special Advanced Anatomy.** Three credit hours. Winter Quarter. One conference or lecture and six laboratory hours each week. Prerequisite, Anatomy 627 or its equivalent, and permission of the instructor. Mr. Baker.

Students will select or have assigned to them special regions for dissection and study.

**638-639. Human Anatomy.** Seven credit hours. Autumn and Winter Quarters. Two recitations and fifteen laboratory hours each week. Mr. Edwards.

The gross anatomy of the body with special stress on the anatomy of the head and neck, including the osteology of these parts.

Not open to students who have credit for Anatomy 433 or 438-439.

**640. Histology and Embryology.** Five credit hours. Spring Quarter. Three recitations and six laboratory hours each week. Mr. Knouff.

The general histology of the tissues and the special histology of the skeletal, vascular, digestive, respiratory, urinary and nervous systems, including special embryological features of the teeth and histology of the reproductive system.

Not open to students who have credit for Anatomy 440.

**701-702-703. Minor Problems in Gross Anatomy, Microscopic Anatomy, Embryology, or Neurology.** Five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite for all courses except Neurology, three Quarters of anatomy; for Neurology, Anatomy 617-618. The staff.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**801-802-803. Advanced Anatomy.** Five credit hours. Autumn, Winter, and Spring Quarters. One conference and eight laboratory hours each week. Mr. Landacre.

A student will be assigned a problem in some phase of vertebrate embryology. The course will be devoted in part to the mastery of the literature on the subject assigned.

**950. Research in Anatomy.** Autumn, Winter, and Spring Quarters. Prerequisite, two years of biological science, of which one must be in subjects listed in the Department of Anatomy. Mr. Landacre, Mr. Knouff, Mr. Baker.

The student will be assigned a problem in some subject in anatomy other than embryology.

### ANIMAL HUSBANDRY

Office, Animal Husbandry Building

PROFESSORS GAY, PLUMB (EMERITUS), KAYS, COFFEY, AND SALISBURY,  
MR. HEIZER, MR. SUTTON, MR. ROTH

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

All work leading to a graduate degree in this department shall be done under the supervision of a graduate committee which shall consist of the chairman of the department, a member of the staff chosen by the chairman and the student's adviser. This committee shall pass on a candidate's fitness for the work, prescribe his course, and approve his thesis plans before he proceeds.

#### GENERAL LIVESTOCK PRODUCTION

**607. Advanced Meats.** Three credit hours. Spring Quarter. One lecture and two laboratory periods each week. Mr. Roth.

For senior students who plan to enter the commercial or research field. Studies of the composition, nutritive value and consumption of meat, wholesale and retail cutting methods, processing, storage, carcass shrinkage, price factors and merchandising.

**608. Livestock Marketing.** Five credit hours. Autumn Quarter. Five lectures each week. Mr. Henning.

The various agencies and organizations involved in the marketing of livestock will be studied. Methods of selling, basis of sale, choice of markets, grade price differentials will be reviewed. The problems of transportation and financing will be considered. Emphasis will be placed on recent developments, concentration, direct to packer marketing, costs of marketing, management, public relations and other problems in livestock marketing.

Not open to students who have credit for Rural Economics 625.

**611. Progeny Testing and Newer Trends in Livestock Breeding.** Three credit hours. Winter Quarter. One two-hour seminary and one conference hour each week. Two Quarters of mathematics are recommended. Mr. Heizer.

Offered for advanced students and graduate students wishing to become familiar with the newest methods in the scientific breeding of farm livestock. The function of the progeny test as a tool for measuring the genetic potentialities of sires and dams is emphasized.

Seminary periods utilized for discussion of recent contributions to the science of animal breeding.

#### DAIRY PRODUCTION

**614. Trends in Dairy Cattle Investigation.** Five credit hours. Winter Quarter. Three lectures and one four-hour laboratory period each week. Prerequisite, at least twenty hours in Dairy Production courses and permission of instructor in charge. Mr. Salisbury, Mr. Heizer.

A course designed to cover the experimental work being pursued at the leading experiment stations and studies in experimental methods. Problems in breeding, feeding and management will be assigned.

**616. Dairy Inspection Trip.** No credit hours. An inspection trip of approximately two weeks, without credit, will be required of all students specializing in Dairy Production, to be taken immediately following the Spring Quarter of the junior year. Mr. Salisbury.

The purpose of this inspection trip is to study at first hand the leading breeding herds, commercial dairies and research programs in operation in the Eastern part of the country.

**626. Marketing of Dairy Products.** Three credit hours. Winter Quarter. Two lectures each week. Prerequisite, Rural Economics 613. Mr. McBride.

A study of assembling, transportation and marketing of dairy products, with special reference to Ohio. Attention will be given to changing market areas, producers' cooperative movements and manufacturers' consolidation activities. One or two inspection trips of two or three days will be made.

Not open to students who have credit for Rural Economics 626.

#### SPECIAL PROBLEMS

##### GENERAL LIVESTOCK PRODUCTION AND DAIRY PRODUCTION

**701. Special Problems.** Three to fifteen credit hours. Given in units of three to five hours a Quarter for one or more Quarters. Autumn, Winter, Spring. Mr. Gay, Mr. Plumb, Mr. Kays, Mr. Coffey, Mr. Salisbury, Mr. Heizer, Mr. Sutton.

Special assignments in the advanced phases of any of the lines of animal and dairy production and meats. Students will elect work in desired subjects after conference with the instructor in charge.

NOTE: Students desiring work in animal nutrition, see Agricultural Chemistry 601, 607, 608.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

This will include at least two years' study of the types and breeding of live stock with collateral work in the principles of breeding, feeding and management.

**950. Research in Animal Husbandry.** Autumn, Winter, and Spring Quarters.

Research work in Animal Husbandry is conducted under the direction of Mr. Gay, Mr. Kays, Mr. Coffey; in Dairy Production under the direction of Mr. Salisbury; in Genetics under the direction of Mr. Heizer; in Nutrition under the direction of Mr. Sutton; and in Meats under the direction of Mr. Roth.

## ART

(See Fine Arts)

## ASTRONOMY

(See Physics and Astronomy)

## BACTERIOLOGY

Office, 210 Pharmacy and Bacteriology Building

PROFESSORS MORREY AND STARIN, ASSISTANT PROFESSORS SPEER AND  
MASTERS, MR. WEISER, MR. DEEM

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

The above prerequisites must include fundamental courses in chemistry and the biological sciences.

**607. General Bacteriology.** Five credit hours. One Quarter. Autumn, Winter, Spring. Two class periods and three three-hour laboratory periods each week. Mr. Morrey, Mrs. Masters, Mr. Weiser.

This course is a prerequisite to all elective courses in the department and is designed to prepare for special work. The lectures consider the botanical relationships of bacteria, their morphology, classification, effect of physical and chemical environment, action on food material, etc. The laboratory work includes preparation of the ordinary culture media and making of cultures on these media, staining methods, and some typical biochemical actions.

**608. Pathogenic Bacteria.** Three credit hours. Winter Quarter. Three class periods each week. Prerequisite, Bacteriology 607. Mr. Morrey.

A study of the more important bacteria producing disease in man. Ways of transmission and methods of protection against infectious diseases. Sanitation and the theories of immunity.

**609. Pathogenic Bacteria.** Three credit hours. Winter Quarter. Three three-hour laboratory periods each week. Prerequisite, Bacteriology 607. Mrs. Masters.

Laboratory work on the more important bacteria producing disease in man, including cultural and staining properties, methods of diagnosis, animal inoculation.

**610. Dairy Bacteriology.** Three credit hours. Winter Quarter. Three class periods each week. Prerequisite, Bacteriology 607. Mr. Weiser.

Sources of bacteria in milk. Methods of avoiding them. Kinds of bacteria in milk. Abnormalities of milk and their prevention. Disease bacteria and milk. Uses of bacteria in butter making. Abnormalities of butter and their prevention. Uses of bacteria and fungi in cheese making. Abnormalities of cheese and their prevention. Bacteria in oleomargarine and ice cream.

**611. Dairy Bacteriology.** Three credit hours. Winter Quarter. Three three-hour laboratory periods each week. Prerequisite, Bacteriology 607. Mr. Weiser.

Laboratory work on the organisms discussed in Bacteriology 610.

**614. Water Examination, Sewage Disposal, Water Filtration.** Three credit hours. Winter Quarter. Three class periods each week. Prerequisite, Bacteriology 607. Mr. Morrey.

A study of the organisms concerned in these processes. The modern water filtration and sewage disposal plants of the city of Columbus afford most excellent opportunities for practical demonstration and also for study of special problems.

**616. Bacteriological Chemistry.** Three credit hours. Spring Quarter. Three class periods each week. Prerequisite, Bacteriology 607. Mr. Morrey.

Enzymes and the theory of their action. Technical uses of bacteria and fungi in the fermentation and allied industries.

**617. Immunity and Serum Therapy.** Three credit hours. One Quarter. Autumn and Spring. Three class periods each week. Prerequisite, Bacteriology 607, 608, and 609, or equivalents. Mr. Starin, Mr. Speer.

A discussion of the general principles of immunity, including toxins and anti-toxins, bactericidal substances, agglutinins, precipitins, opsonins, etc.

**618. Immunity and Serum Therapy.** Three credit hours. One Quarter. Autumn and Spring. Three three-hour laboratory periods each week. Prerequisite, Bacteriology 607, 608, and 609, or equivalents. Mr. Starin, Mr. Speer.

Laboratory work in the preparation of toxins, anti-toxins, anti-bacterial substances, bacterial vaccines, and in the serological methods of diagnosis.

**\*619. Pathogenic Protozoa.** Three credit hours. Spring Quarter. Three class periods each week. Prerequisite, Bacteriology 607, 608, and 609, or equivalents. Mr. Starin.

The various protozoal diseases are considered, with special attention to trypanosomiasis, piroplasmoses, and spirochaetoses.

**621. Advanced Dairy Bacteriology.** Five credit hours. Autumn Quarter. Prerequisite, Bacteriology 607, 610, and 611. Mr. Weiser.

Research in any of the lines discussed in Bacteriology 610.

**625-626. Special Technique in Pathogenic Bacteriology.** Five credit hours. Autumn and Winter Quarters. Conferences, library, and laboratory work. Prerequisite, Bacteriology 607, 608, and 609, or equivalents. Mr. Starin.

A course in technique in which the student is thoroughly trained in working with such material and methods as are encountered in board of health and hospital laboratories.

**627. Special Problems in Pathogenic Bacteriology.** Five credit hours. Spring Quarter. Conferences, library, and laboratory work. Prerequisite, Bacteriology 607, 608, 609, or equivalents. Mr. Morrey, Mr. Deem.

**643-644-645. Applied Veterinary Bacteriology.** Two credit hours. Autumn, Winter, and Spring Quarters. Six three-hour laboratory periods each week. Prerequisite, courses in general and pathogenic bacteriology. Mr. Speer, Mr. Deem.

A course in technic in which the student is given thorough training in diagnostic, preventive, and curative methods on material actually brought into the Veterinary Clinic.

This included during 1931-1932, 2500 agglutination tests for contagious abortion, 7000 agglutination tests for white diarrhoea, preparation of autogenous vaccines in selected cases, bacteriological diagnosis of specimens sent in by veterinarians, bacteriological examination of water and milk samples.

**701. Minor Investigations.** Three or five credit hours each Quarter. Autumn, Winter, Spring. A student may enter at the beginning of any Quarter. Prerequisite, Bacteriology 607, 608, 609 and either 617, 618, or 625-626 or equivalents. All instructors.

This course is designed for such students as have completed the equivalent of two years' work in bacteriology and are still undergraduates. The work will be outlined by the instructor in charge to meet the individual student's needs.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

Students intending to specialize in bacteriology should take in addition to their major work, courses in botany, pathology, anatomy, physiology, zoology, dairying, or soils, depending upon the field of specialization. The general prerequisites also include an acceptable course in organic chemistry.

**807-808-809. Seminary in Bacteriology.** One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in bacteriology. Department staff.

**950. Research in Bacteriology.** Autumn, Winter, and Spring Quarters. Prerequisite, acceptable courses in the chosen field of research.

Research work in pathogenic bacteriology is conducted under the direction of Mr. Morrey, Mr. Starin, and Mr. Speer; in agricultural or technical bacteriology under the direction of Mr. Morrey and Mr. Weiser.

\* Not given in 1933-1934.

## BOTANY

Office, 102 Botany and Zoology Building

PROFESSORS TRANSEAU, SCHAFFNER (RESEARCH), STOVER, TIFFANY, AND SAMPSON, ASSOCIATE PROFESSOR WALLER, ASSISTANT PROFESSORS MEYER AND BLAYDES, MISS LAMPE, MR. HUMPHREY, MR. CAMP, MR. GORDON, MR. FREELAND

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

The general prerequisites for course 617 include a course in plant physiology; for 651, 655 and 657, a course in plant pathology; and for 635 a course in heredity.

**601. Plant Ecology.** Five credit hours. Autumn Quarter. Three lectures and one four-hour laboratory period each week. Mr. Transeau, Mr. Gordon.

Lectures on the vegetation of the Eastern United States with special reference to the plant associations and formations of Ohio. Field work on the associations of the vicinity of Columbus and their successions. Reading of important literature.

**602. Plant Ecology.** Five credit hours. Spring Quarter. Three lectures and one four-hour laboratory period each week. Prerequisite, Botany 601. Mr. Transeau, Mr. Gordon.

General principles of ecological plant geography. A discussion of associations and successions of the major divisions of the vegetation of North America. Assigned readings of the more important literature. Several Saturday field trips.

**605. Plant Physiology.** Five credit hours. One Quarter. Autumn and Winter. Three lectures and two two-hour laboratory periods each week. Mr. Transeau, Mr. Meyer, Mr. Freeland.

The physiology of absorption and movement of water, salts, and gases in plants. The properties of water, solutions, and colloids; permeability, diffusion, absorption, transpiration, and the movement of water in plants.

Not open to students who have credit for Botany 415.

**606. Plant Physiology.** Five credit hours. One Quarter. Winter and Spring. Three lectures and two two-hour laboratory periods each week. Prerequisite, Botany 605. Mr. Transeau, Mr. Meyer, Mr. Freeland.

The physiology of nutrition, growth and movement; photosynthesis, other syntheses, enzymes, digestion, translocation, accumulation, assimilation, respiration, fermentation, growth, and movement.

Not open to students who have credit for Botany 416.

**611. Evolution of Plants.** Five credit hours. Spring Quarter. Lectures and assigned readings. Prerequisite, four Quarters of Botany. Given in alternate years. Mr. Schaffner.

The progress of evolution in the plant kingdom with a general discussion of the problems and factors involved, including both the scientific and philosophical aspects of the subject.

**613. General Morphology of Thallophytes and Bryophytes.** Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Mr. Blaydes.

A study of the classification and life histories of the algae, fungi, liverworts, and mosses. The laboratory work will consist of a study of the vegetative and reproductive structures of the several groups.

Not open to students who have credit for Botany 409.

**614. General Morphology of the Pteridophytes and Spermatophytes.** Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. Miss Lampe.

A study of the comparative structures and life histories of the ferns, gymnosperms, and angiosperms, giving particular attention to the structure and development of seed plants.

Not open to students who have credit for Botany 410.

**615. Plant Microtechnic.** Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. Mr. Blaydes.

Principles and methods of killing, fixing, imbedding, sectioning, staining, and mounting plant materials for microscopic study.

Not open to students who have credit for Botany 421.



**617. Plant Microchemistry.** Five credit hours. Autumn Quarter. One lecture and three two-hour laboratory periods each week. Prerequisite, Botany 605-606. Desirable antecedents, general inorganic and organic chemistry. Mr. Sampson, Miss Lampe.

The identification *in situ* of organic and inorganic substances found in plant tissues by microchemical methods. These methods are of special value in determining plant substances within the cells and in the study of physical and chemical changes accompanying plant processes and plant responses. This applies particularly to the numerous local regions in plants too small to be attacked by the test-tube method of tissue analysis.

**619. Economic Botany.** Five credit hours. Autumn Quarter. Four lectures and one two-hour laboratory period each week. Desirable antecedents, commercial geography and plant ecology. Mr. Waller.

The world's food, fibre, and oil producing plants are studied in the light of their geographic distribution. The ecological and economic principles involved in plant production are discussed and centers of production are related to natural plant formations.

**632. Physiological Methods.** Three credit hours. Spring Quarter. Six laboratory hours each week. Prerequisite or concurrent, Botany 605-606, except by special permission of the instructor. Mr. Meyer.

Methods of measuring the physical factors of the environment that influence plant growth and development both under laboratory and field conditions. Methods of growing plants under controlled conditions for experimental work. Conferences, readings, and laboratory work.

**633. Physiological Methods.** Three credit hours. Winter Quarter. Six laboratory hours each week. Prerequisite or concurrent, Botany 605-606, except by special permission of the instructor. Mr. Meyer.

A laboratory course in the methods of plant physiology such as measurements of H-ion concentration, osmotic values, permeability, enzyme activity and the processes of transpiration, respiration, and photosynthesis. Conferences, readings and laboratory work.

**634. Plant Growth.** Three credit hours. Spring Quarter. Three lectures each week. Consult instructor before registering. Mr. Sampson.

A study of the physiology of growth. Special attention is given to the interrelated effects of internal and external factors upon growth, movement and reproduction in plants. Bibliographies and reviews of literature.

**\*635. Plant Genetics.** Five credit hours. Spring Quarter. Five recitations each week. Given in alternate years. Mr. Waller.

The study of heredity in plants. Theories of the transmission of heritable characteristics. Research methods in the study of inheritance.

**637. Plant Cytology.** Five credit hours. Spring Quarter. Two lectures and three two-hour laboratory periods each week. Prerequisite, four Quarters of Botany. Desirable antecedents, Botany 614 and 615. Given biennially, alternating with Botany 640. Miss Lampe.

The structure, ontogeny, divisions and fusions of plant cells.

**\*640. Plant Anatomy.** Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Given biennially, alternating with Botany 637. Mr. Camp.

The origin and development of the organs, and tissue systems of vascular plants, and comparative study of the structures of roots, stems, leaves, flowers, and fruits. This course is a desirable antecedent to advanced work in physiology and pathology.

**653. Mycology.** Five credit hours. Autumn Quarter. Three lectures and two two-hour laboratory periods each week. Mr. Stover.

The identification of the fungi of woods and fields, including a number of edible and poisonous mushrooms, wood-destroying fungi, and other important forms. The characteristic structures and life histories within each of the great groups are emphasized.

**656. Advanced Plant Pathology.** Three credit hours. Winter Quarter. Three two-hour laboratory periods each week. A laboratory and conference course for students in botany, entomology, horticulture, and agronomy. Mr. Stover.

\* Not given in 1933-1934.

\*665. Freshwater Algae. Five credit hours. Winter Quarter. Prerequisite, six Quarters of biological work and consent of the instructor. Given biennially. Mr. Tiffany.

Conference, laboratory, and library course on the classification, morphology, and ecological relations of the freshwater algae.

701. Special Problems. Two to five credit hours each Quarter. Autumn, Winter, Spring. Mr. Schaffner, Mr. Transeau, Mr. Stover, Mr. Tiffany, Miss Lampe, Mr. Blaydes, Mr. Camp.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Education, Course 683.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

Students majoring in plant pathology must have had acceptable courses in microchemistry, bacteriology and plant genetics, in addition to the undergraduate courses in pathology. Advanced work in plant physiology presupposes at least an elementary course in organic chemistry. With plant physiology, suitable courses may be elected in physical, organic and plant chemistry, and in soil investigations. With plant pathology, various courses in entomology and bacteriology are available.

807. Principles of Taxonomy: Pteridophytes and Gymnosperms. Five credit hours. Autumn Quarter. Two lectures and six laboratory hours each week. Mr. Schaffner.

A detailed study of phylogeny and evolutionary series based on floral structure and organography.

Not open to students who have credit for Botany 607.

808. Principles of Taxonomy: Monocotyls. Five credit hours. Winter Quarter. Two lectures and six laboratory hours each week. Prerequisite, Botany 607. Mr. Schaffner.

A study of the groups of monocotyls with special consideration of the taxonomy of the grasses and of the lack of correlation between taxonomic characters and environment.

Not open to students who have credit for Botany 608.

809. Principles of Taxonomy: Dicotyls. Five credit hours. Spring Quarter. Two lectures and six laboratory hours each week. Prerequisite, Botany 608. Mr. Schaffner.

A general consideration of all the groups of dicotyls, of the origin of angiosperms, and of the progressive or serial development of characters.

Not open to students who have credit for Botany 609.

810. Botanical Colloquium. One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in botany. All instructors.

812. Seminary in the History of Botany. One credit hour. Winter Quarter. Recommended for all graduate students majoring in botany. Mr. Waller.

950. Research in Botany. Autumn, Winter, and Spring Quarters.

Research work in taxonomy, morphology, anatomy, cytology, physiology, genetics, plant pathology, or economic botany is offered by various members of the staff. Mr. Transeau, Mr. Schaffner, Mr. Stover, Mr. Sampson, Mr. Tiffany, Mr. Waller, Mr. Meyer, Mr. Blaydes, Miss Lampe, Mr. Camp, Mr. Gordon.

#### BUREAU OF BUSINESS RESEARCH

Office, 206 Commerce Building

PROFESSORS BELL, WISSLER, AND GRINSTEAD, ASSOCIATE PROFESSOR BOOTHE,  
ASSISTANT PROFESSOR BRUNSMAN

The purposes of the Bureau of Business Research are to serve as a laboratory for the faculty and students of the College of Commerce and Administration and at the same time to make cooperative studies in business and industry, which will be useful in the commercial and industrial development of the state.

\* Not given in 1933-1934.

The studies made and services rendered by the Bureau should be of value to the business concerns cooperating in the studies. They should also be useful to the faculty in the development of illustrative and problem material for the courses offered in the College. In so far as it may be feasible, advanced undergraduate and graduate students will be used to assist staff members in studies which are undertaken. This service will have a value in acquainting students with research problems and methods.

It is expected that staff members of the Bureau will be subject to call in making the results of their studies available to students in the College. It is also a part of the plan of the College to assign from time to time members of the Bureau Staff to campus teaching or Extension service and likewise to transfer staff members of the Extension or campus teaching departments to research projects in the Bureau.

The files and data collected by the Bureau will also be subject to use by members of the Faculty in connection with their College work.

## BUREAU OF EDUCATIONAL RESEARCH

Office, 100, 101 Education Building

PROFESSORS CHARTERS, HOLY, AND TYLER, ASSOCIATE PROFESSOR ANDERSON,  
ASSISTANT PROFESSORS COWLEY AND DALE, MR. LUMLEY, MISS McLATCHY,  
MISS SEEGER

The purpose of the Bureau of Educational Research is to promote the scientific investigation of educational problems both at the University and in the public schools of the State. It constitutes an agency for cooperative effort among all the school people of Ohio. The facilities of the Bureau are available to all students, faculty members, and school people of Ohio.

**Library.** The research library contains large quantities of material in the form of manuscripts, pamphlets, bulletins, reports, modern textbooks for elementary and high-school grades, and educational periodicals. This library is in charge of a reference librarian, and her services together with the library material will be utilized in the preparation of bibliographies and reports on problems presented by those engaged in educational work. This applies to students and faculty members as well as those engaged in the work of the public schools. Unless the problem requires extensive investigation, this service will be rendered gratis.

**Courses.** In order to make the resources of the Bureau serve for research purposes, students desiring to work in the Bureau may register in certain courses listed in the departments of Education and Psychology. Courses must be approved by the Executive Committee or chairman of the department and by the Director of the Bureau. Such students will be under the direction and supervision of the Bureau staff members.

**Research Problems.** Students taking such courses will be given a practical problem upon which to work. There will be no regular recitation periods, but the student will be in a position to confer with the Bureau staff whenever advisable. According to the nature and exacting character of the problem and the scholastic status of the student, he may be registered in either of two groups of courses, as follows:

**MINOR PROBLEMS.** Two to four credit hours. Investigation of minor problems:  
Education 600  
Psychology 650

**INDIVIDUAL PROBLEMS.** Two to ten credit hours. Investigation of problems leading to preparation of theses for advanced degrees.  
Education 800  
Psychology 801

**NOTE:** Descriptions of these courses, prerequisites, and the divisions into which the two Department of Education courses are divided will be found under the department announcements.

## BUREAU OF SPECIAL EDUCATION

Office, 321 Education Building

PROFESSOR BERRY

The function of the Bureau of Special Education is to promote the education of all types of exceptional children (the handicapped and the gifted) through field service, teacher training, and research.

Students interested in the work of this Bureau should confer with the Director.

**Field Service.** The objectives of field service are as follows: to assist the smaller communities in organizing the work of special education; to serve in an advisory capacity the communities in which special education has already been organized; and to cooperate with state and local organizations in formulating a state program for the protection, treatment and training of all types of exceptional children and for the removal of the causes that handicap children.

**Teacher Training.** No person should prepare to teach exceptional children who has not had successful experience in teaching normal children.

For graduate students who wish to prepare to teach children who are behavior problems, mentally retarded, or defective in speech, the following courses are recommended.

For those preparing to teach the mentally retarded:

Psychology 609, 611, 613, 616, 622  
Education 764, 767, 897

For those preparing to teach behavior problem children:

Psychology 609, 616, 622, 634, 641  
Sociology 625  
Education 764, 766, 767, 897

For those preparing to teach the defective in speech:

Psychology 609, 616  
Phonetics 604, 606  
Education 764, 767, 897

**Research.** Students interested in research problems connected with the work of the Bureau of Special Education may register in any of the following courses:

Psychology 650 (One or more credit hours)  
Education 600-g (Two to four credit hours)  
Psychology 950 (Three or more credit hours)  
Education 800-j (Two to ten credit hours)  
Education 897 (Three to five credit hours)

NOTE: Descriptions of these courses will be found under the department announcements.

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## BUSINESS ORGANIZATION

Office, 107 Commerce Building

PROFESSORS MAYNARD, WEIDLER, HOAGLAND, DICE, HELD, WISSLER, DUFFUS, AND DECKMAN, ASSOCIATE PROFESSORS PIKE, REEDER, CORDELL, AND DAVIS, ASSISTANT PROFESSORS THOMPSON, POWER, DAMERON, AND RIDDLE, MR. DONALDSON, MR. BURLEY, MR. CHUTE, MR. HAROLD, MR. ODEBRECHT

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34. The general prerequisites must include a fundamental course in economics.

**614. Business Statistics.** Four credit hours. Winter Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, courses in economic statistics and college algebra. Mr. Dewey.

Price and production indexes. Analysis of time series. Linear correlation applied to economic and business problems.

**621. Business Law: Contracts.** Three credit hours. One Quarter. Autumn, Winter, Spring. Mr. Power, Mr. Bowers.

A course in the law of contracts for the student of business, including the study of the fundamentals of legally binding agreements between persons, and their enforcement.

**622. Business Law for Engineers and Architects: Contracts.** Three credit hours. One Quarter. Autumn, Winter, Spring. Mr. Power.

A course in the law of contracts with special reference to engineering and architectural problems and with incidental reference to certain other phases of the law that most closely affect the engineer and architect.

**623. Business Law: Agency and Sales.** Three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Business Organization 621. Mr. Pike, Mr. Bowers.

A course in the law of agency and sales for the student of business. The fundamentals of the law governing business transactions of persons through agents and the sale of personal property. A continuation of Business Organization 621.

**625. Business Law: Negotiable Instruments.** Three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Business Organization 621. Mr. Bowers.

A course in the laws governing bills of exchange, promissory notes and checks designed to guide the business man in his daily transactions with such instruments.

**627. Business Law: Partnerships and Corporations.** Three credit hours. One Quarter. Autumn and Winter. Prerequisite, Business Organization 621. Preferably preceded by Business Organization 623. Mr. Pike.

A course designed to give the student of business a practical working knowledge of important laws governing the formation and operation of partnerships and corporations.

**629. Business Law: Legal Aspects of Credits and Collections.** Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Business Organization 621. Mr. Pike.

The course includes in part a study of property as the source of collections and as security for debts; legal instruments of the security type such as mortgage and conditional sales, etc., types of legal procedure in the courts, and duties of the officers thereof with which the creditor is most concerned.

**\*631. Business Law: The Law of Banks and Banking.** Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Business Organization 621 and 625. Mr. Pike.

A study of legal principles governing the operation of banks and trust departments.

**640. Corporate Organization and Control.** Three credit hours. One Quarter. Autumn, Winter, Spring. Three recitations each week. Mr. Donaldson.

Types of business enterprises; the corporation; rights, duties, obligations, and liabilities of stockholders, directors, and officers.

**642-\*643. Real Estate Principles and Finance.** Three credit hours. Two Quarters. 642, Autumn and Spring, 643, Winter. Three hours lecture and quiz each week. Prerequisite to 642, ten hours in the principles of economics. Prerequisite to 643, Business Organization 642. Business Organization 642 may be taken separately. Mr. Hoagland.

The first Quarter's work constitutes a survey course covering the general field of the real estate business.

The second Quarter deals with problems of real estate appraisals and finance.

**644. Real Estate Problems.** One to three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, permission of instructor. Mr. Hoagland.

Individual research in the field of real estate, designed for students primarily interested in real estate investments and in possibilities of the real estate business.

**645. Trade Associations.** Three credit hours. Winter Quarter. Three recitations each week. Mr. Hoagland, Dr. Duffus.

The nature and function of trade associations, and their relation to business and to government.

\* Not given in 1938-1934.

**650. Corporation Finance.** Five credit hours. One Quarter. Autumn, Winter, Spring. Two lectures and three quiz periods each week. Mr. Hoagland, Mr. Duffus, Mr. Donaldson, Mr. Riddle, Mr. Harold.

Financial structure and problems of modern business corporations.

Not open to students who have credit for or are taking Economics 616.

**652. Industrial Finance.** Three credit hours. One Quarter. Autumn and Spring. Three recitations each week. Prerequisite, Business Organization 650. Mr. Hoagland.

A study of specific cases involving financial decisions and operations.

**653. Industrial Consolidations and Mergers.** Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Business Organization 640 or 650. Mr. Hoagland, Mr. Duffus.

Historical and analytical study of industrial consolidations and mergers.

**656. Railroad and Public Utility Finance.** Three credit hours. One Quarter. Autumn and Winter. Three recitations each week. Prerequisite, Business Organization 650. Mr. Duffus.

Financial problems peculiar to public service industries. American railroads and utilities as fields or for investment and speculation and their financial administration under state and federal regulation.

**657. Investment Analysis.** Three credit hours. Winter Quarter. Prerequisite, Business Organization 650. Mr. Riddle.

A course in which investment problems with specific corporations will be analyzed and compared.

**658. Principles of Investment.** Three credit hours. One Quarter. Autumn and Spring. Three hours of recitations and problem discussion each week. Prerequisite, Economics 616 or Business Organization 650. Mr. Hoagland, Mr. Donaldson, Mr. Riddle.

A consideration of the principles governing the selection of investment channels and investment securities from the point of view of the investor.

**659. Investment Banking.** Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Business Organization 650. Mr. Riddle.

A consideration of the functions and operations of investment bankers in the distribution of securities.

**660. The Stock Market.** Three credit hours. One Quarter. Autumn, Winter, Spring. Three recitations each week. Prerequisite, Business Organization 650 and a course in money and banking. Mr. Dice, Mr. Donaldson.

The New York Stock Exchange; brokerage houses, methods of trading; business cycles and movements of stock prices; regulation of stock issue and manipulation.

**662. The Money Market.** Three credit hours. Spring Quarter. Prerequisite, a course in money and banking. Mr. Dice.

New York as a money market; the acceptance and commercial paper; brokers' loans; business loans; interest and discount rates; control of the supply of money through the Federal Reserve System; present problems and trends.

**665. Foreign Exchange.** Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, a course in money and banking. Mr. Willit.

A study of the theory and practices of foreign exchange from the standpoint of both bankers and foreign traders. The relationship of foreign exchange to international trade and financial problems is included.

**666. Practice Work in Banking.** One to three credit hours. Autumn Quarter. Students are admitted on the suggestion of the instructor in charge in cooperation with the banks concerned. Mr. Dice.

Students do actual work in a bank. Each student will attend conferences in regard to his work and make reports based on the different bank operations.

**\*670-\*671. Bank Organization and Management.** Three credit hours. Winter and Spring Quarters. Each Quarter may be taken separately. Prerequisite, a course in money and banking, Business Organization 650, and Accounting 616 (for 671). Mr. Dice.

This course deals with the organization and practical operation of banks; their relations to the Federal Reserve System; government control; trends and required reforms.

**674. Savings and Trust Institutions.** Three credit hours. Autumn Quarter. Three lecture and discussion periods each week. Prerequisite, a course in money and banking. Mr. Willit.

The practical operations and economic significance of the building and loan associations, savings banks, trust companies, and various other institutions are studied.

**680. Industrial Organization and Management.** Five credit hours. One Quarter. Autumn, Winter, Spring. Three lectures and two conferences each week. Mr. Davis, Mr. Thompson, Mr. Chute.

The history, literature, organization, and management of industry and the theory of industrial management. The business applications of management fundamentals are developed and emphasized in the several fields of industrial management, viz., production, material, and personnel.

**684. Industrial Management Field Work.** Three to six credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Business Organization 680. Mr. Thompson, Mr. Chute.

**685. Purchasing, Stores, and Inventory Control.** Three credit hours. One Quarter. Autumn and Winter. Two lectures and one laboratory hour each week. Prerequisite, Business Organization 680. Mr. Wissler.

The organization, management and control of materials in industries. Treats particularly of the organization and functions of the purchasing, stores, and material-handling and controlling departments and those parts of the planning, accounting, production, and other departments directly affecting the control of materials.

**686. Personnel Organization and Management.** Three credit hours. One Quarter. Autumn and Spring. Two lectures and one laboratory hour each week. Prerequisite, Business Organization 680. Mr. Wissler, Mr. Thompson.

The organization, management and control of the personnel in industry. Treats particularly the functions and practice which come within the scope of hiring, force maintenance, industrial education and welfare.

**687. Production Organization and Management.** Three credit hours. One Quarter. Winter and Spring. Three lectures and one laboratory hour each week. Prerequisite, Business Organization 680. Mr. Wissler, Mr. Davis.

The organization, management and control of production in industry. Treats these largely from the point of view of shop management.

**691. Office Organization and Management.** Three credit hours. Spring Quarter. Two lectures and one laboratory hour each week. Prerequisite, Business Organization 680. Mr. Wissler.

Mechanics of administration. Office management. Standards, tools, forms, equipment, office machinery, and standard methods. Special office problems of different departments, and of multi-plant organization.

**700. Marketing.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five hours lecture and quiz each week. Mr. Beckman, Mr. Reeder, Mr. Cordell, Mr. Maynard, Mr. Burley.

A general but critical survey of the field of marketing. Consumer demand in relation to the marketing machinery. Functions, methods, policies, marketing costs, and problems of the farmer, manufacturer, wholesaler, commission merchant, broker, retailer and other middlemen. Emphasis on principles, trends, and policies in relation to marketing efficiency.

**702. Marketing Problems and Market Analysis.** Four credit hours. One Quarter. Autumn, Winter, Spring. Four hours lecture and quiz each week. Prerequisite, Business Organization 700. Mr. Cordell.

The technique of market research; problems on selected topics in retailing, wholesaling of consumer goods, industrial marketing, sales promotion, and price policies.

**705. Retail Merchandising.** Four credit hours. One Quarter. Autumn, Winter, Spring. Four lecture and discussion periods each week. Prerequisite, Business Organization 700. Mr. Maynard.

A consideration of the organization and management of retail establishments: store location; store organization; buying; receiving; storekeeping; inventories; sales systems; store policies; services; expenses and profits; deliveries; personnel problems, etc.

**706. Wholesaling.** Four credit hours. Spring Quarter. Four lecture and discussion periods each week. Prerequisite, Business Organization 700. Mr. Beckman.

The field of wholesaling; types and classes of wholesale organizations; tendencies in wholesaling; wholesale centers. Organization and management of wholesale establishments including location, purchasing, receiving, stock control, advertising, selling, order filling, traffic management, credit granting, expenses, profits, etc.

**709. Credits and Collections.** Four credit hours. One Quarter. Autumn, Winter, Spring. Four hours lecture and quiz each week. Prerequisite, Business Organization 700. Mr. Beckman, Mr. Cordell.

Credit—nature, functions, instruments, classes, risk, organization and management. Sources of credit information. Collection methods and policies. Extensions, compositions, adjustments, receiverships, bankruptcy, credit insurance, credit limits, credit and collection control.

**712. Salesmanship and Sales Management.** Four credit hours. One Quarter. Autumn, Winter, Spring. Four hours lecture and quiz each week. Prerequisite, Business Organization 700. Mr. Maynard, Mr. Odebrecht.

Salesmanship topics: knowledge of goods and markets; buying motives; sales planning; study of customers and their wants; meeting objections; closing.

Sales management problems: sales organization; planning; territories; quotas; sales research; selecting and training salesmen; compensation; expenses, stimulation and supervision of salesmen.

**716. Principles of Advertising.** Three credit hours. One Quarter. Autumn, Winter, Spring. Three lecture and discussion periods each week. Prerequisite, Business Organization 700. Mr. Maynard, Mr. Dameron.

Advertising in relation to marketing and general business. Advertising organization. Science of advertising. Copy layout, typography, engraving. Advertising strategy. Advertising media. Economics of advertising. The viewpoint of the enterpriser emphasized.

**717. Advertising Practice.** Three credit hours. Winter Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, Business Organization 716. It is recommended that this course be preceded by Psychology 635. Mr. Dameron.

The technique of advertising with emphasis on copy and layout. Consideration of marketing factors. Preparation of advertising or campaign. Layout in relation to media. Appeals, space, position, typography, art, illustration. Borders, backgrounds, pointing devices, perspective. Emphasis on consumer advertising in general markets.

**719. Retail Advertising.** Four credit hours. Spring Quarter. Two recitations, one two-hour laboratory period, and one conference each week. Prerequisite, Business Organization 717 or the permission of the instructor. Mr. Dameron.

Nature and purpose of retail advertising and sales promotion. Retail advertising organization. Appeals, copy, art, engraving, typography, media. Retail advertising plans. Coordination of selling efforts.

**720-721. Exporting and Importing.** Three credit hours. Autumn and Winter Quarters. 720 is given in the Autumn Quarter, and 721 in the Winter Quarter. Three hours lecture and quiz each week. Preferably preceded or accompanied by Business Organization 700, and a course in money and banking. Mr. Held.

Methods of conducting export and import business; foreign trade correspondence and advertising; market analysis; export commission houses and other sales agencies; handling shipments; credits and collections.

**725. Field Work in Marketing.** Three to six credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Business Organization 700. Open to students in the Marketing group only. Mr. Maynard, Mr. Beckman.

This course is open to students temporarily not in residence. The student is required to submit a report covering certain of the market problems of the company by which he had been engaged.



**740. Public Utility Organization and Administration.** Three credit hours. Spring Quarter. Three lecture and discussion periods each week. Prerequisite, Economics 618 or 648. Mr. Power.

The public utility as a business enterprise. The study of its organization and administration. Consideration of the problems of management confronting the utility as a business.

**748. Valuation of Railroads and Public Utilities.** Three credit hours. Winter Quarter. Three lecture and discussion periods each week. Prerequisite, Economics 618 or 648. Mr. Power.

A study of the various methods of the valuation of public utilities and the problems arising therefrom. Study is made of typical valuation and rate cases before state public utilities commissions and before the Interstate Commerce Commission.

**752. Traffic Management.** Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, Economics 618. Mr. Duffus.

Investigations of the business relationships existing between shippers and carriers in the transportation of goods in domestic and foreign commerce by rail, highway, water, and air.

**760. Personal Insurance.** Three credit hours. Winter Quarter. Three lecture and discussion periods each week. Mr. E. L. Bowers.

Life insurance; accident and health insurance; annuities. Premiums; reserves; investments; surrender values; dividends, etc. Types of policies and companies. Adaptation of insurance to individual cases. Agency organization; state supervision.

**764. Property Insurance.** Three credit hours. Spring Quarter. Three lecture and discussion periods each week. Mr. Odebrecht.

A study of the following lines of insurance: fire and marine; automobile; burglary and robbery; windstorm; plate glass; business interruption. Credit and title insurance, corporate bonding. Types of companies; loss prevention and adjustments; supervision. Insurance as a business opportunity.

**799. Special Problems in Business Organization.** One to three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, senior or graduate standing, preliminary courses in the field of specialization, and permission of the instructor.

Individual investigations of specific problems in the following fields of Business Organization:

- (a) Corporation Organization and Finance. Mr. Hoagland and others.
- (b) Real Estate Problems. Mr. Hoagland.
- (c) Insurance. Mr. E. L. Bowers and others.
- (d) Marketing. Mr. Maynard and others.
- (e) Banking. Mr. Dice and others.
- (f) Industrial Management. Mr. Wissler and others.
- (g) Transportation and Public Utilities. Mr. Duffus and others.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**804. Corporation Finance for Graduate Students.** Three credit hours. One Quarter. Winter and Spring. Prerequisite, thirty hours in business organization, economics, or accounting, with adequate undergraduate courses in this field as determined by the instructor in charge. Mr. Hoagland, Mr. Duffus.

A conference course for graduate students. The content for any particular Quarter will be adapted to the needs of the students enrolled for that Quarter and will be announced in advance.

Not open to students who have credit for Business Organization 840.

**816. Marketing for Graduate Students.** Three credit hours. One Quarter. Autumn and Winter. Prerequisite, thirty hours in business organization, economics, or accounting with adequate undergraduate courses in this field as determined by the instructor in charge. Mr. Weidler, Mr. Maynard, Mr. Beckman, Mr. Dameron.

A conference course for graduate students. The content for any particular Quarter will be adapted to the needs of the students enrolled for that Quarter and will be announced in advance.

**820. Problems of Banking and of Stock Prices.** One to three credit hours. Spring Quarter. Prerequisite, thirty hours in business organization, economics,

or accounting with adequate undergraduate courses in this field as determined by the instructor in charge. Mr. Dice.

A seminary in the leading problems relating to banking and to stock prices. The desires of the group will determine whether the major part of the course shall be devoted to problems of banking or to problems involved in determining the movements of stock prices.

**827. Stock Market for Graduate Students.** Three credit hours. Winter Quarter. Prerequisite, thirty hours in business organization, economics, or accounting with adequate undergraduate courses in this field as determined by the instructor in charge. Mr. Dice.

A study of the problems involved in judging stock values.

**831. Graduate Seminary in Business Organization for Beginning Graduate Students.** Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Hoagland.

**832. Graduate Seminary in Business Organization for Advanced Students.** Two credit hours. Autumn, Winter, and Spring Quarter. All instructors.

**833. Graduate Course in Industrial Management.** Three credit hours. Autumn Quarter. Prerequisite, thirty hours in business organization, economics, or accounting with adequate undergraduate courses in the field as determined by the instructor in charge. Mr. Davis.

A conference course for graduate students. The content for any particular Quarter will be adapted to the needs of students enrolled for that Quarter and will be announced in advance.

**834. Applications of Economic Theory in Industrial Organization and Management.** Three credit hours. Spring Quarter. Prerequisite, thirty hours in business organization, economics, or accounting, with adequate undergraduate courses in this field as determined by the instructor in charge. Mr. Wissler.

The examination of selected principles in economic theory as to their bearing upon optimum plant size and location, wage determination and scientific management, production costs, depreciation and obsolescence, and similar industrial management problems.

**845. Transportation and Public Utilities for Graduate Students.** Three credit hours. One Quarter. Autumn and Winter. Prerequisite, thirty hours in business organization, economics, or accounting with adequate undergraduate courses in this field as determined by the instructor in charge. Mr. Duffus, Mr. Power, Mr. Dewey.

A conference course for graduate students. The content for any particular Quarter will be adapted to the needs of the students enrolled for that Quarter and will be announced in advance.

**950. Research in Business Organization.** Autumn, Winter, and Spring Quarters.

Individual investigations, group discussions participated in by those investigating related subjects. The following fields are suggested:

(a) Research in Corporation Organization and Finance. Mr. Hoagland, Mr. Duffus, Mr. Riddle, Mr. Donaldson.

(b) Research in Real Estate Problems. Mr. Hoagland.

(c) Research in Insurance. Mr. E. L. Bowers, Mr. Odebrecht.

(d) Research in Marketing. Mr. Weidler, Mr. Maynard, Mr. Beckman, Mr. Reeder, Mr. Cordell, Mr. Dameron.

(e) Research in Banking. Mr. Dice, Mr. Willit.

(f) Research in Industrial Management. Mr. Wissler, Mr. Davis, Mr. Thompson.

(g) Research in Transportation and Public Utilities. Mr. Duffus, Mr. Power.

## CERAMIC ENGINEERING

Office, 131 Lord Hall

PROFESSORS WATTS AND BOLE (RESEARCH), ASSOCIATE PROFESSOR CARRUTHERS, ASSISTANT PROFESSOR KING, MR. McSWINEY

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**600. Theory of Drying.** Three credit hours. Autumn Quarter. Three lectures and six hours of preparation each week. Prerequisite, two Quarters of college physics. Mr. Carruthers.

A study of the fundamental physical laws and ceramic technology involved in drying ceramic wares and their application to commercial practice.

**603. Elements of Ceramic Plant Engineering.** Five credit hours. Winter Quarter. Five lectures and ten hours of preparation each week. Prerequisite, Ceramic Engineering 600. Mr. Carruthers.

A study of the basic processes and equipment used in ceramic manufacturing, including grinding, sizing, filtration, draft, heat transfer, and extrusion.

**605. Bodies, Glazes, and Colors.** Four credit hours. Spring Quarter. Four lectures each week. Prerequisite, Ceramic Engineering 615. Mr. Watts. Ceramic bodies, glazes, and colors.

**610. Refractories and their Uses.** Five credit hours. Spring Quarter. Five lectures each week. Mr. King.

Lectures on refractories, their physical and chemical compositions and properties, their utilization and testing.

**615. Ceramic Calculations.** Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, courses in metallurgical and ceramic analysis. Mr. King.

Solution of chemical and physical problems involved in compounding ceramic mixtures, including wet blending. Also instruction in development of series, containing one, two, and three variables.

**620. Physical and Chemical Measurements of Clays and Other Ceramic Materials.** Five credit hours. Winter Quarter. Two recitations and eight laboratory hours each week. Prerequisite, Ceramic Engineering 615, Chemistry 681, and a course in ceramic laboratory. Mr. King.

Application of physical chemical laws to ceramic materials and compounds. Laboratory practice in determination of the essential physical and chemical properties of ceramic mixtures and compounds in the plastic, dry, vitrified, and fused states.

**701. Ceramic Investigations.** Five credit hours. Autumn Quarter. Conference, library, and laboratory work. Prerequisite, Ceramic Engineering 605, 615, 620. Mr. Watts, Mr. King.

Detailed studies and definite problems having practical application in one or more of the following fields of ceramic technology: (a) stoneware; (b) terra cotta; (c) saggars; (d) metal enamels.

**702. Ceramic Investigations.** Five credit hours. Winter Quarter. Conference, library, and laboratory work. Prerequisite, senior standing in Ceramic Engineering. Mr. Watts, Mr. Bole.

Detailed studies and definite problems having application in either of the following fields of ceramic technology: (a) earthenware, china, and porcelains; (b) structural clay products.

**703. Ceramic Investigations.** Five credit hours. Spring Quarter. Conference, library, and laboratory work. Prerequisite, senior standing in Ceramic Engineering. Mr. Watts, Mr. King.

Detailed studies and definite problems in practical applications in either of the following fields of ceramic technology: (a) glazes and colors; (b) refractories.

**705. Ceramic Designing.** Five credit hours. Autumn Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 601 and Mechanics 602. Mr. Carruthers.

Designing of clay plant structures and equipment such as bins and retaining walls. Practical problems in structural design and storage of clays.

**706. Ceramic Designing.** Five credit hours. Winter Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 705. Mr. Carruthers.

A continuation of Ceramic Engineering 705. Study of drying and fan problems and the design of driers.

**707. Ceramic Designing.** Five credit hours. Spring Quarter. One lecture, one quiz, and eight laboratory hours each week. Prerequisite, Ceramic Engineering 706. Mr. Carruthers.

A continuation of Ceramic Engineering 706. Study of firing and factory equipment problems and design of kilns and complete clay plants.

**708. Technology of Glass.** Three credit hours. Autumn Quarter. Two lectures and three laboratory hours each week. Prerequisite, Ceramic Engineering 615. Mr. McSwiney.

Practice in melting typical glass batches. Studying physical behavior during the melting process and in the molten state. Measurement of some of the physical properties of the glass produced experimentally and of commercial glasses.

**750. Special Problems.** Two to seven credit hours. Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. Prerequisite, fundamental ceramic engineering courses and consent of department. This course may be repeated for different problems or continuation of original problem, with total credit not to exceed fifteen hours. All instructors.

This course is designed to permit any properly qualified student to avail himself of the library and laboratory facilities of the department for carrying on a special investigation or for adding to his knowledge and technique in some ceramic subject.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

These prerequisites must include satisfactory training in qualitative and quantitative analysis, a knowledge of the general principles of ceramic technology, a knowledge of mathematics through calculus and analytical mechanics, at least a one year's course in physics, with laboratory and problem work, and engineering drawing.

**810-811-812. Porcelain for Electrical and Other Special Purposes.** Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Watts.

**815. Seminary in Ceramic Engineering.** One to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Watts, Mr. Bole, Mr. Carruthers, Mr. King.

The course consists of conference and reports on problems in ceramic technology and engineering. Topics are chosen to cover the development of the ceramic industry.

**950. Research in Ceramic Engineering.** Autumn, Winter, and Spring Quarters. Prerequisite, permission of the instructor in charge.

Research in ceramic technology and engineering, in analytical and physical chemistry of ceramic materials and mixtures, in mineralogy and geology of ceramic deposits, in physical and chemical testing of ceramic materials and products, under Mr. Watts, Mr. Bole, and Mr. King; in the engineering, designing and testing of ceramic apparatus and structures, under Mr. Carruthers; in ceramic whitewares, under Mr. Watts; in refractories and metal enamels, under Mr. King. The student may spend a part or all of his time on research work.

## CHEMICAL ENGINEERING

Offices, 179, 180 Chemistry Building

PROFESSOR WITHROW, ASSISTANT PROFESSORS DUNCOMBE AND KOFFOLT,  
MR. VILBRANDT

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**700. Elements of Chemical Engineering.** Two credit hours. Winter Quarter. Mr. Duncombe, Mr. Withrow.

A thorough discussion of the fundamental principles underlying the engineering operations which constitute the body of chemical engineering as a branch of engineering. An introduction

is given to the mechanical equipment which is used to carry out these engineering operations in the chemical industries. The relationship between chemical processes and the selection of engineering equipment to carry out the engineering operations demanded by these chemical processes is emphasized. The market demand, economics, and chemistry fundamental to, or utilized by, an industry is referred to as the basis which determines the engineering operations necessary in utilizing the chemistry for productive manufacture. The main detailed engineering operations taken up are transportation; storage; crushing and grinding; calcination; solution; mixing and agitation; classifying; the separation of solids from liquids by sedimentation, filtration, crystallization, refrigeration, precipitation, evaporation, distillation, and electrolysis; the separation of liquids from liquids; drying; absorption; and the special engineering manipulation required in highly standardized or individualized chemical processes such as gasification, hydrogenation, sulphonation, nitration, chlorination, reduction, cracking, hydroxylation, autoclaving, and impregnation.

**701-702. Industrial Chemistry.** Three credit hours. Autumn and Winter Quarters. Three lectures each week. Prerequisite or concurrent, physical chemistry, except with special permission of the instructor. Mr. Withrow.

The fundamental lecture course in industrial chemistry, dealing with the problems of the chemical industries, and placing stress upon the economic questions involved in chemical manufacturing, materials of plant construction, as well as the engineering operations involved in chemical engineering, and the principles underlying the applications of chemistry and engineering to a selected number of chemical industries. The work of the Autumn Quarter deals especially with the inorganic industries, while that of the Winter Quarter is related to the organic industries.

**\*703. Inspection Trip to the East.** No credit hours. Week of May 1, 1935, and odd-numbered years thereafter. Prerequisite, permission of the instructor. Mr. Withrow, Mr. Koffolt.

The trip includes Akron, Ohio; Albany, New York City, Long Island, and West Sayville, New York; Jersey City, Grasselli, and Deep Water Point, New Jersey; Wilmington, Baltimore, and Curtis Bay, Maryland; and Washington, D. C. The entire expense need not exceed \$80.00. A satisfactory written report upon the work of the trip and an examination are required.

**704. Inspection Trip to the West.** No credit hours. Week of May 1, 1934, and even-numbered years thereafter. Prerequisite, permission of the instructor. Mr. Withrow, Mr. Koffolt.

The trip includes Dayton, West Carrollton, Hamilton, Cincinnati, and Ivorydale, Ohio; Kensington, Illinois; Grasselli and Whiting, Indiana; Chicago and Argo, Illinois; Detroit, Wyandotte, and Midland, Michigan. The entire expense need not exceed \$55.00. A satisfactory written report upon the work of the trip and an examination are required.

**705. Written Reports.** No credit hours. Spring Quarter. Week of May 1. Prerequisite, Chemical Engineering 701-702. Mr. Withrow.

A substitute course for Chemical Engineering 703 or 704, allowed only upon presentation of reasons satisfactory to the instructor in charge. The course consists of assigned reading designed to familiarize the student with all that can be found in the literature or plants regarding chemical engineering, and specified chemical processes, together with a full written report.

**706. Chemical Engineering and Industrial Chemistry Laboratory.** Two to five credit hours. Autumn Quarter. One hour conference and fourteen laboratory hours each week. Prerequisite or concurrent, Chemical Engineering 701, and an acceptable course in analytical chemistry. Mr. Withrow, Mr. Vilbrandt, Mr. Duncombe, Mr. Koffolt.

An introduction to industrial chemical research through assigned manufacturing problems, beginning with the general chemical industries. The specific problems are so chosen as to disclose the fundamental principles underlying the assigned industry, and practice is afforded in the preparation of written reports. Opportunity is given for study of operating efficiency of certain engineering equipment utilized in the fundamental engineering operations of chemical engineering. Weekly inspection trips are taken to plants in and around Columbus for study and report upon equipment and operation. Great emphasis is laid upon methods of attacking problems and upon organization of reports. Certain types of problems with engineering equipment, in factory research and in applied electrochemistry, are required of all students, after which opportunity is given the student to select special problems in various portions of the fields of industrial chemistry and chemical engineering such as absorption systems, filtration, petroleum and sugar technology, intermediates, wood distillation, insecticides, starch, lime, chlorine, and plant fume questions.

**707. Engineering Chemistry, Chemical Engineering Laboratory.** Three credit hours. Winter Quarter. One conference and eight laboratory hours each

\* Not given in 1933-1934.

week. Prerequisite, Chemical Engineering 706; concurrent, Chemical Engineering 702. Mr. Withrow, Mr. Vilbrandt, Mr. Duncombe, Mr. Koffolt.

A continuation of Chemical Engineering 706, with special emphasis laid upon technical methods of control as applied to industrial processes.

**708. Practical Experience in Chemical Engineering Work.** Six credit hours. Prerequisite, Chemical Engineering 700. Mr. Withrow.

Academic credit for this course is based on the reports of a student who has had practical experience of a chemical engineering character in a semi-responsible position covering a more advanced grade of work than that required in Chemical Engineering 501.

The student shall present a satisfactory report, the outline and basis of which, it is preferred, shall be arranged in conference prior to beginning the work. In general the report shall cover in very considerable detail, the particular industry with which the student is connected, in respect to market demand and economics, chemistry involved, engineering operations, plant layout, special equipment and design, operation methods, costs and efficiencies (in so far as this information is obtainable), labor problems, and safety and health hazards, together with other pertinent matter. Flow sheets, production schedules, sketches and photographs to illustrate the report, are especially to be desired.

The student also who has had twelve months' or more experience in industry may present a report which, if satisfactory, will be accepted in lieu of the above requirements.

**710. Applied Electrochemistry.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Chemistry 681-682-683 or special permission. Mr. Vilbrandt, Mr. Withrow.

A survey of the electrochemical industries, and a discussion of the principles underlying the application of the electric current in chemical industries.

**712-713-714. Advanced Chemical Engineering Machinery Laboratory.** Two to six credit hours. Autumn, Winter, and Spring Quarters. One conference and five to seventeen laboratory hours each week. Prerequisite, Chemical Engineering 706-707 or special permission of the chairman of the department. Mr. Withrow, Mr. Koffolt.

An advanced course of minor problems dealing with various chemical engineering equipment with the view of acquainting students with all types of equipment, their design, and operation. The application of thermodynamics and graphics to chemical engineering problems.

The conferences cover topics chosen from the field of chemical engineering. Specific topics are given each Quarter.

Students may repeat these courses with credit, with the approval of the chairman of the department, inasmuch as the topics vary from year to year. The following is a list of topics from which work in this course is chosen: Graphical Chemical Engineering Computations, Drying, Humidification, Dehumidification, Adsorption, Absorption, Fume and Smoke, Crystallization, Filtration, Crushing and Grinding, Furnace and Pyrometry, Evaporation, Refrigeration, Distillation, Cracking, Heat Transfer, and Flow of Fluids.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites must include courses in qualitative and quantitative analysis, and an introductory course in organic chemistry and physics. Preparation in mathematics through calculus with some engineering drawing and mineralogy, although not required, is desirable.

**801. Introductory Problems in Chemical Engineering.** Two to five credit hours. Autumn, Winter, and Spring Quarters. Conference, library and laboratory work. Prerequisite, satisfactory course in the field of the problem undertaken. The course may be repeated on other problems as desired. Mr. Withrow, Mr. Vilbrandt, Mr. Duncombe, Mr. Koffolt.

The work of the course is carried on by individual conference, library, and laboratory work and consists of problems involving an introduction to the application of physics, mathematics, drawing, mechanics, and chemistry in the field of chemical engineering.

**900-901-902. Advanced Industrial Chemistry and Chemical Engineering.** Two to five credit hours. Autumn, Winter, and Spring Quarters. One hour conference and five to fourteen laboratory hours each week. Prerequisite, acceptable course in industrial chemistry, or permission of instructor. Mr. Withrow.

An advanced course dealing with the solution of minor problems in industrial chemistry and chemical engineering. Special work will be planned along lines in industrial chemistry or chemical engineering as may be desired by the individual student.

905-906-907. Seminary in Industrial Chemistry and Chemical Engineering. Two credit hours. Autumn, Winter, and Spring Quarters. Two conference hours each week. Prerequisite, satisfactory courses in industrial chemistry. Mr. Withrow.

The course consists of conferences and reports upon methods of attacking special problems in industrial chemistry and chemical engineering. The topics vary from Quarter to Quarter, keeping in touch with the constant development of chemical industry.

950. Research in Industrial Chemistry and Chemical Engineering. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Prerequisite, satisfactory courses in the chosen field of research. Mr. Withrow, Mr. Duncombe, Mr. Koffolt.

Advanced research problems and dissertation in industrial chemistry, applied electrochemistry, and in chemical engineering.

## CHEMISTRY

Office, 115 Chemistry Building

General Chemistry Office, 112 Chemistry Building

PROFESSORS EVANS, McPHERSON, HENDERSON, FOULK, BOORD, MACK, DAY, AND FRANCE, ASSOCIATE PROFESSOR BRODE, ASSISTANT PROFESSORS HOLLINGSWORTH, JOHNSTON, MOYER, WOLFROM, AND FERNELIUS, MR. BACHMAN, MR. HARRIS.

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

621. Advanced Quantitative Analysis. Four or five credit hours. Autumn Quarter. One conference and nine or twelve laboratory hours each week. Prerequisite, acceptable courses in quantitative analysis. Mr. Foulk.

An extension of the first year's work in quantitative analysis, including electrometric titrations, colorimetric and turbidimetric analysis, and hydrogen ion determinations.

622. General Quantitative Analysis. Three credit hours. Winter Quarter. Three lectures or recitations each week. Prerequisite, acceptable courses in quantitative analysis. Mr. Foulk.

General principles of chemical analysis.

624. Advanced Qualitative Analysis. Five credit hours. Spring Quarter. Two recitations and nine laboratory hours each week. Prerequisite, acceptable courses in qualitative and quantitative analysis, or the permission of the instructor in charge. Mr. Hollingsworth, Mr. Foulk.

This course emphasizes the application of physico-chemical principles to the problems of qualitative analysis. The rarer elements are included in the laboratory exercises.

625. Water Analysis. Five credit hours. Spring Quarter. Three lectures and six laboratory hours each week. Prerequisite, acceptable course in quantitative analysis. Mr. Foulk.

Methods of sanitary and industrial water analysis, and interpretation of the analytical results.

\*627. Industrial Water Problems. Three credit hours. Winter Quarter. Three lectures or recitations each week. Given in alternate years. Prerequisite, acceptable courses in quantitative analysis. Mr. Foulk.

Chemistry of scale formation, foaming and priming in steam boilers, corrosion in hot and cold water systems, and the purification of water for industrial use.

641. Qualitative Organic Analysis. Three credit hours. Spring Quarter. One lecture and six laboratory hours each week. Prerequisite, acceptable courses in laboratory work in organic chemistry. Mr. Boord.

A study of the systematic methods of separation, purification, and identification of organic compounds.

\* Not given in 1933-1934.

**642. Quantitative Organic Analysis.** Three credit hours. Spring Quarter. One lecture and six laboratory hours each week. Prerequisite, acceptable courses in laboratory work in organic chemistry. Mr. Boord.

Practice in the standard methods for the quantitative analysis of organic compounds, including combustion, and the quantitative estimation of organic radicals present in various compounds.

**647-648. Organic Chemistry.** Three credit hours. Autumn and Winter Quarters. Three lectures or recitations each week. Prerequisite, acceptable courses in general and analytical chemistry. Mr. Boord.

The fundamental course in organic chemistry. Chemistry 647 is devoted to a discussion of the aliphatic hydrocarbons and their derivatives and Chemistry 648 to a discussion of the coal tar compounds.

Not open to students who have credit for Chemistry 451-452. Not available for graduate credit for students majoring in chemistry.

**649-650. Organic Chemistry: Laboratory.** Three credit hours. Autumn and Winter Quarters. Nine laboratory hours each week. Prerequisite or concurrent, Chemistry 647-648. Mr. Wolfrom.

The laboratory work naturally belonging to Chemistry 647-648. The preparation of a series of typical organic compounds, their purification, and a study of their properties.

Chemistry 649 is not open to students who have credit for Chemistry 451-452. Not available for graduate credit for students majoring in chemistry.

**654. X-rays and Crystal Structure.** Three credit hours. Winter Quarter. Three lectures and recitations each week. Prerequisite, calculus and one year of college physics. Given in alternate years. Mr. Mack, Mr. Harris, Mr. Blake, Mr. McCaughey.

This course is designed for those students of physics, chemistry, and mineralogy who intend to do research work in crystal structures and X-ray analysis.

This course is the same as Mineralogy 654 and Physics 654.

Not open to students who have credit for Physics 814.

**661. Advanced Inorganic Chemistry.** Three credit hours. Autumn Quarter. Three lectures or recitations each week. Prerequisite, two years of courses in chemistry. Mr. Henderson.

An advanced course in inorganic chemistry with emphasis upon the fundamental topics of inorganic compounds, their preparation, classifications and reactions.

**662. Advanced Inorganic Chemistry.** Three credit hours. Winter Quarter. Three lectures or recitations each week. Prerequisite, two years of courses in chemistry. Mr. Henderson.

An advanced course in inorganic chemistry, stressing the more difficult points in chemical theory in the elementary courses.

**663. The Rare Elements.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Chemistry 661 or equivalent. Mr. Henderson.

Lectures on the chemistry of the less familiar elements, emphasizing their relations to the well-known elements, as well as their technical applications.

**668. Non-aqueous Solvents.** Three credit hours. Spring Quarter. Three lectures or recitations each week. Prerequisite, acceptable courses in physical chemistry. Mr. Fernelius.

A consideration of the solvent properties of various solvents, electrical conductance of non-aqueous solutions, the nature of acidity, systems of compounds and evidence obtained from studies of liquid ammonia solutions of metals and inter-metallic compounds, which contributes to an understanding of the nature of the metallic state.

**672. Inorganic Preparations.** Three credit hours. Spring Quarter. Nine laboratory hours each week. Prerequisite, acceptable courses in general chemistry and quantitative analysis. Mr. Henderson, Mr. Fernelius.

Methods employed in the preparation of pure inorganic compounds. The chief classes of such compounds. The laboratory preparation of a number of examples sufficient to develop reasonable technique in applying the methods and to illustrate the classes.



**675. The Phase Rule.** Two credit hours. Winter Quarter. Two meetings each week. Given in alternate years. Prerequisite, acceptable courses in physical chemistry. Mr. Henderson.

A study of the phase rule and its applications in chemical research.

**681-682-683. Physical Chemistry.** Three credit hours. Autumn, Winter, and Spring Quarters. Three lectures each week. Prerequisite or concurrent, acceptable courses in organic chemistry, physics, and calculus (two Quarters). Mr. Mack, Mr. Johnston.

The fundamental course in physical chemistry, arranged for students specializing in chemistry.

**691-692-693. Physical Chemistry: Laboratory.** Two credit hours. Autumn, Winter, and Spring Quarters. Six laboratory hours each week. Prerequisite or concurrent, an acceptable course in physical chemistry. Mr. Mack, Mr. Johnston, and assistants.

Introduction to physico-chemical measurements. Any one of these courses may be taken in any Quarter.

**695. Colloid Chemistry.** Three credit hours. Winter Quarter. Three lectures or recitations each week. Prerequisite, acceptable courses in chemistry and physics. Mr. France.

A fundamental course in colloid chemistry.

**696. Theoretical Electrochemistry.** Three credit hours. Autumn Quarter. Three lectures or recitations each week. Prerequisite, acceptable courses in physical chemistry. Mr. France.

A fundamental course in theoretical electrochemistry.

**699. Minor Problems in Chemistry.** Three to fifteen credit hours. Any Quarter. Conference, library, and laboratory work. Prerequisite, satisfactory courses in the field of the problem undertaken. A student may repeat this course and may spend all or any part of his time on it during a Quarter.

This course is designed to permit any properly qualified person to avail himself of the library and laboratory facilities of the department for carrying out a minor investigation or for adding to his knowledge and technique in some chemical subject.

A student may exercise entire freedom in his choice of instructor to conduct his work in this course, but as a rule, topics in organic chemistry will be under the direction of Mr. McPherson, Mr. Evans, Mr. Boord, Mr. Brode, Mr. Wolfrom, and Mr. Bachman; in inorganic chemistry, under Mr. Henderson, Mr. Day, and Mr. Fernelius; in physical chemistry, under Mr. Mack, Mr. France, Mr. Day, Mr. Johnston, Mr. Fernelius, Mr. Harris; in analytical chemistry, under Mr. Foulk, Mr. Hollingsworth, and Mr. Moyer; and in colloid chemistry and electrochemistry, under Mr. France.

**782. Chemical Bibliography.** One credit hour. Winter Quarter. One conference each week. Prerequisite, acceptable courses in analytical and organic chemistry. Mr. Henderson.

Designed to train the advanced student in the use of the chemical library, and to instruct him in the character of various chemical journals, dictionaries, reference books, and other sources of information pertaining to chemical subjects.

**783. Chemical Biography.** One credit hour. Spring Quarter. One lecture each week. Prerequisite, acceptable courses in analytical and organic chemistry. Mr. Henderson.

Designed to familiarize the advanced student with the leading personages in chemistry, particularly those of recent and contemporary times, as well as with the available sources of information relating to such personages.

**NOTE: TEACHING COURSES.** For the Teaching Course in this department see the Department of Education, Course 684.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84. These prerequisites include a thorough preparation in general inorganic chemistry, qualitative and quantitative analysis and introductory courses in organic chemistry and in physical

chemistry (including laboratory courses in both subjects), acceptable courses in physics and mathematics, including calculus.

**Preliminary Examination for the Master's Degree.** At least one Quarter prior to the Convocation at which he expects to receive the Master's degree, the candidate must pass a written preliminary examination in each of the chemical courses specified for admission to graduate work. An examination covering these topics will be held each Quarter in the week preceding the regular undergraduate examination schedule. He must also give evidence of his ability to read a typical article in a chemical magazine in the French or German language, preferably the latter.

**General Examination for the Doctor's Degree.** This examination will presuppose that the candidate has materially extended his knowledge of chemistry along all the lines required for admission to graduate work; that he has acquired such broad familiarity with his especial field of concentration in chemistry as may be reasonably expected from courses and seminaries available, from laboratory experience, and from habitual use of the chemical library, (especially the current literature); that he is reasonably familiar with the use of a chemical library, with eminent chemical personages, and with the outline of the historical development of chemical science; and that he possesses a reading knowledge (in chemical literature) of both French and German.

The written examination will be conducted at the end of the second week of the Quarter in which it is taken and the oral examination will be conducted later during the same Quarter in accordance with a schedule arranged by the Dean of the Graduate School.

**822. Seminary in Analytical Chemistry.** Three credit hours. Autumn Quarter. Three conferences each week. Prerequisite, acceptable courses in analytical, organic, and physical chemistry. Mr. Foulk.

Topic for 1933-1934: Precision Measurements.

**823. Seminary in Analytical Chemistry.** Two credit hours. Winter Quarter. Two conferences each week. Prerequisite, acceptable courses in quantitative analysis and organic chemistry. Mr. Moyer.

Topic for 1933-1934: Organic Reagents in Chemical Analysis.

**830. Historical Chemistry.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, acceptable courses in organic chemistry. Mr. Henderson.

A general course in the history of chemistry with special reference to the development of the theories of the science.

**841. Advanced Organic Chemistry.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, acceptable courses in organic chemistry including laboratory work. Mr. Brode.

An advanced course in the fundamental principles of organic chemistry, covering the chain hydrocarbons and their derivatives.

**842. Advanced Organic Chemistry.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, acceptable courses in organic chemistry including laboratory work. Mr. Brode.

A continuation of Chemistry 841, covering the carbocyclic and heterocyclic compounds, and including under the former, aromatic, hydroaromatic, and terpene derivatives.

**844. Advanced Organic Preparations: Laboratory.** Three credit hours. Autumn Quarter. Nine hours of library, conference, and laboratory work each week. Prerequisite or concurrent, Chemistry 841. Mr. Boord, Mr. Brode.

An advanced course in the synthesis of aliphatic organic compounds that involve difficulties, special stress being placed upon yield and purity of products.

**845. Advanced Organic Preparations: Laboratory.** Three credit hours. Winter Quarter. Nine hours of library, conference, and laboratory work each week. Prerequisite or concurrent, Chemistry 842. Mr. Boord, Mr. Brode.

A continuation of Chemistry 844. The work consists in the synthesis of aromatic compounds. Chemistry 844 and 845 lead directly to minor research problems in organic chemistry.

**850. Seminary in Organic Chemistry.** Three credit hours. Autumn Quarter. Three conference hours each week. Prerequisite, Chemistry 841-842. Mr. Boord.

Conferences and reports upon some chosen topic in organic chemistry. Topic for 1933-1934: The Nature of Organic Reactions.

**851. Seminary in Organic Chemistry.** Three credit hours. Winter Quarter. Three conference hours each week. Prerequisite, Chemistry 841-842. Mr. Evans.

Conferences and reports upon some chosen topic in organic chemistry. Topic for 1933-1934: The Chemistry of the Saccharides.

**852. Seminary in Organic Chemistry.** Three credit hours. Spring Quarter. Three conference hours each week. Prerequisite, Chemistry 841-842. Mr. Wolfrom.

Conferences and reports upon some chosen topic in organic chemistry. Topic for 1933-1934: Recent Advances in the Structural Organic Chemistry of Natural Products.

†854. **Seminary in Organic and Inorganic Chemistry.** Three credit hours. Offered in Summer Quarter only. Prerequisite, graduate standing in chemistry.

Topic for the Summer Quarter, 1933: Recent Advances in the Structural Organic Chemistry of Naturally Occurring Substances.

Open to auditors and advanced students not working for credit.

**859. Colloid Chemistry: Laboratory.** Two credit hours. Winter Quarter. Six laboratory hours each week. Prerequisite or concurrent, Chemistry 695. Mr. France.

A general laboratory course in colloid chemistry.

Not open to students who have credit for Chemistry 698.

**860. Electrochemistry: Laboratory.** Two credit hours. Autumn Quarter. Six laboratory hours each week. Prerequisite or concurrent, Chemistry 696. Mr. France.

A general laboratory course in theoretical electrochemistry.

Not open to students who have credit for Chemistry 697.

**861-862-863. Physical Chemistry: Laboratory.** Two or three credit hours. Autumn, Winter, and Spring Quarters. Nine laboratory hours each week. Prerequisite, acceptable courses in physical chemistry including elementary laboratory work. Mr. Johnston and assistants.

Advanced courses in physico-chemical experimental work designed to illustrate the more important principles of physical chemistry, to develop skill in this type of laboratory work and to form a basis for research. Any one of these courses may be taken in any Quarter.

**865. Atomic Structure.** Three credit hours. Autumn Quarter. Three lectures or conferences each week. Prerequisite, acceptable courses in physical chemistry. Mr. Johnston.

A survey of the modern theories of the structure of the atom.

**866. Seminary in Inorganic Chemistry.** Two credit hours. Autumn Quarter. Two conferences each week. Prerequisite, acceptable courses in physical chemistry. Mr. Day.

Topic for 1933-1934: Solutions of Electrolytes.

**867. Seminary in Inorganic Chemistry.** Two credit hours. Autumn Quarter. Two conferences each week. Prerequisite, acceptable courses in physical chemistry. Mr. Henderson, Mr. Fernelius.

Topic for 1933-1934: Valence.

†881-882-883. **Lectures in Advanced Physical Chemistry.** Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Chemistry 681-682-683. Given in alternate years in lieu of Chemistry 887-888-889. Mr. Mack, Mr. Johnston.

A number of topics of special interest to physical chemists at the present time will be treated, such as special topics from the field of kinetics of chemical reactions, kinetics of adsorption and of evaporation from liquid and solid surfaces, dielectric constants, wave-mechanical theory of chemical bonds, photochemistry, etc.

**887-888-889. Lectures in Advanced Physical Chemistry.** Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Chemistry 681-

\* Not given in 1933-1934.

† Not given during the academic year, 1933-1934.

682-683. Given in alternate years in lieu of Chemistry 881-882-883. Mr. Johnston.

Training in the use of thermodynamics as a tool for solving chemical problems. Topics to be discussed include: vapor pressure; solutions and solubility; molecular spectra; free energy; modern theories of electrolytic dissociation; galvanic cells; and the various factors associated with the measurement and control of chemical equilibria.

891. Seminary in Colloid Chemistry and Electrochemistry. Three credit hours. Winter Quarter. Three conferences each week. Prerequisite, acceptable courses in chemistry and physics. Mr. France.

Topic for 1933-1934: Overvoltage.

†892. Seminary in Physical Chemistry. Three credit hours. Autumn Quarter. Three conferences each week. Prerequisite, acceptable course in physical chemistry and thermodynamics. Mr. Johnston.

Topic for the Summer Quarter, 1933: The Application of X-rays to Chemical Problems.

950. Chemical Research. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Prerequisite, acceptable course in the chosen field of research. The student may spend a part or all of his time on research work.

Research work in organic chemistry is conducted under the supervision of Mr. McPherson, Mr. Evans, Mr. Boord, Mr. Brode, Mr. Wolfrom, Mr. Bachman; in organic chemistry under Mr. Henderson, Mr. France, Mr. Day, and Mr. Fernelius; in physical chemistry under Mr. Mack, Mr. France, Mr. Day, Mr. Johnston, Mr. Fernelius, and Mr. Harris; in analytical chemistry under Mr. Foulk, Mr. Hollingsworth, and Mr. Moyer; in colloid chemistry and electrochemistry under Mr. France.

NOTE: Attention is called to the fact that courses in physiological chemistry are listed elsewhere in this Bulletin under the Department of Physiological Chemistry and Pharmacology.

NOTE: For Industrial Chemistry, Applied Electrochemistry, and Chemical Engineering Courses see the Department of Chemical Engineering.

## CIVIL ENGINEERING

Office, 108 Brown Hall

PROFESSORS SHERMAN, ENO (RESEARCH), MORRIS, CODDINGTON, SLOANE, SHANK, AND PRIOR, ASSOCIATE PROFESSOR MONTZ, ASSISTANT PROFESSORS LARGE, MARSHALL, AND WYATT

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

608. Precise Surveying. Three credit hours. Autumn Quarter. One recitation and two laboratory periods each week. Prerequisite, calculus, railroad surveying, and summer surveying camp. Mr. Coddington, Mr. Marshall. Primary traverse, base line measurements, field triangulation, precise leveling.

609. Adjustment of Observations. Three credit hours. Winter Quarter. Three two-hour laboratory periods each week. Prerequisite, Civil Engineering 608. Mr. Coddington, Mr. Marshall.

Theory of adjustment of observations, using work of preceding term; precise maps.

701. Concrete Design. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, course in Cement and Concrete. Mr. Shank, Mr. Large.

Theory and design of reinforced concrete structures.

702. Bridge Design. Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, course in Stresses in Structures. Mr. Morris. A course in design of steel roofs and bridges.

† Not given during the academic year, 1933-1934.

**703. Water Supply Engineering.** Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Mechanics 603 or 605 and 607. Mr. Prior.

Construction and operation of public water supplies.

**704. Masonry Construction.** Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Civil Engineering 701 or 702. Mr. Sherman. Stone and ceramic products in masonry construction; foundations.

**705. Masonry Structures.** Five credit hours. Spring Quarter. Five recitations each week. Prerequisite, Civil Engineering 704. Mr. Prior.

Application of principles of Engineering 704 to various masonry structures.

**712. Trusses.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five recitations each week. Prerequisite, Mechanics 602. Mr. Wyatt, Mr. Shank. Stresses in and design of steel-frame mill buildings.

**713. Concrete Design.** Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, Mechanics 602. Mr. Large.

A course for architectural engineers, similar to Civil Engineering 701.

**714. Steel-Frame Buildings.** Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Civil Engineering 712 or 702. Mr. Morris. Stresses in and design of steel-frame office buildings.

**732. Contracts and Specifications.** Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Civil Engineering 704 and a course in Roads and Pavements. Mr. Sherman.

A discussion of the principles underlying engineering contracts and specifications.

**733. Tall Buildings.** Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Civil Engineering 712. Mr. Morris.

Stresses in and design of steel-frame office buildings.

**737. Advanced Bridges.** Three to five credit hours. Winter Quarter. Prerequisite, Civil Engineering 702. Mr. Morris.

Design of arches and of movable and long-span bridges.

Not open to students who have credit for Civil Engineering 734 and 735.

**738. Highway Plans and Surveys.** Three credit hours. Autumn Quarter. One recitation and two three-hour laboratory periods each week. Prerequisite, courses in Topographic Surveying and Roads and Pavements. Mr. Sloane.

Reconnaissance and location surveys, alignment and grades, curve widening and super-elevation, bridge and culvert surveys, preparation of plans and estimates, study of highway standards.

**739. Bituminous Roads and Surfaces.** Three credit hours. Winter Quarter. One recitation and two three-hour laboratory periods each week. Prerequisite, course in Roads and Pavements. Mr. Sloane.

Study of various types of bituminous roads now in use, plant layout and construction details, analysis of specifications and study of current literature on maintenance, renewals and surface treatments, laboratory tests of asphalts, tars, and oils.

**749. Advanced Civil Engineering.** Three credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, Mechanics 605 and 607, Civil Engineering 602. Mr. Prior, Mr. Shank, and instructors.

Municipal engineering, advanced concrete, advanced problems in civil engineering.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**950. Research in Civil Engineering.** Credit hours to be arranged. Autumn, Winter, and Spring Quarters. All instructors.

CLASSICAL LANGUAGES AND LITERATURE

Office, 217 Derby Hall

PROFESSORS OGLE†, HODGMAN, ELDEN, AND BOLLING, ASSISTANT  
PROFESSOR TITCHENER, MR. HOUGH

GREEK

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

The general prerequisites for courses 601 and 610 include a course in elementary Greek.

**601. Reading and Lectures.** Three to five credit hours. One Quarter. Winter and Spring. Three to five meetings each week. Mr. Bolling, Mr. Titchener.

Study of the language, style, and works of some author or group of authors, chosen to meet the particular needs of the class. The course may consequently be repeated.

**610. Private Reading and Minor Problems.** Two to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Bolling, Mr. Titchener.

Passages for private reading and topics for investigation will be suggested to meet the needs of individual students.

**\*611. Athenian Public Life.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. Titchener.

A brief study of the development of Athenian governmental institutions.

**701. Principles of the Historical Study of Language.** Three credit hours. Spring Quarter. Three lectures each week. Mr. Bolling.

The elements of linguistic science together with an outline of the Indo-European family of languages.

**720-721-722. Historical Greek and Latin Grammar.** Three credit hours each Quarter. Autumn, Winter, and Spring Quarters. Prerequisite, ten credit hours of advanced work in the classics. Mr. Bolling.

NOTE: This course is the same as Latin 720-721-722.

LATIN

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**602. Latin Satire.** Three credit hours. Autumn Quarter. Three recitations each week. Mr. Elden.

Selections from the Satires of Horace or Juvenal.

**\*609. Historical Latin Grammar: Inflections.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, six Quarters of college Latin. Mr. Hodgman.

Sounds and inflections, and other topics essential to the understanding of the principles which govern the development of the Latin language. Latin 609 is deemed essential for those graduate students who specialize in Latin and is recommended for advanced undergraduate study.

**\*610. Roman Religion.** Three credit hours. Winter Quarter. Three lectures each week. Mr. Hodgman.

Lectures on the development of Roman religion, with readings from the *Fasti* of Ovid. This course is valuable as supplementing the courses on the life and literature of the Romans.

**\*611. Roman Public Life.** Three credit hours. Winter Quarter. Three meetings each week. Prerequisite, four Quarters of college Latin. Mr. Titchener.

Lectures and readings in Latin authors illustrating the development of Roman governmental institutions, with special attention to their functions and character during the late republic and early empire.

† Absent on leave, 1933-1934.

\* Not given in 1933-1934.

612. Latin Prose Composition: First Course. Three credit hours. Winter Quarter. Three recitations each week. Mr. Hodgman.

Exercises and lectures on Latin idiom and style.

613. Latin Prose Composition: Second Course. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Latin 612. Mr. Titchener.

A continuation of Latin 612.

\*614. Latin Prose Composition: Advanced Course. Three credit hours. One Quarter. Three recitations each week. Prerequisite, Latin 613. Mr. Hodgman.

A study of the more difficult points of Latin idiom and style.

615. Proseminary I. Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, six Quarters of college Latin. Mr. Elden.

Lectures on topics suggested by the study of Caesar and Cicero. Roman writing and Roman writing materials; readings from the Letters of Cicero. Latin 615 is designed especially for students preparing to teach Latin.

616. Proseminary II. Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, six Quarters of college Latin. Mr. Elden.

Lectures on the life and works of Vergil, and his influence on modern literature; readings from the Eclogues and the Georgics. Latin 616 is designed especially for students preparing to teach Latin.

\*620. Roman Elegy. Three credit hours. Autumn Quarter. Mr. Hough.

621. Roman Tragedy. Three credit hours. Autumn Quarter. Mr. Hough.

622. Plautus. Three credit hours. Winter Quarter. Mr. Hough.

\*623. Advanced Reading Course in the Post-Augustan Epic. Three credit hours. Spring Quarter. Mr. Ogle.

624. Advanced Reading Course in Tacitus. Three credit hours. Spring Quarter. Mr. Elden.

\*625. Advanced Prose Composition. Three credit hours. Autumn Quarter. Prerequisite, Latin 612 and 613, or their equivalent. Mr. Ogle.

626. Paleography. Three credit hours. Winter Quarter. Prerequisite, three Quarters of college Latin. Mr. Elden.

Study of the different styles of writing. Textual criticism based largely on Latin manuscripts.

627. Vulgar Latin. Three credit hours. Winter Quarter. Prerequisite, six Quarters of college Latin, or French 801, or the consent of the instructor. Mr. Hodgman.

Lectures and the study of texts and inscriptions illustrating the development of the popular speech.

†628. Terence. Three credit hours. Mr. Bolling.

\*629. History of Literary Tradition. Three credit hours. One Quarter. Mr. Ogle.

Lectures and discussions dealing with the genesis and development of literary forms and motifs and their tradition down to the rise of modern literatures. The course will be so conducted that students of literature generally will be welcome.

630. Cicero's Political Philosophy. Three credit hours. Spring Quarter. Three lectures each week. Mr. Hough.

Lectures and readings in Cicero's *de re publica* and *de legibus* illustrating his theory of the state, with attention paid to his sources and to his influence.

631. Private Reading and Minor Problems. Two to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Titchener, Mr. Hough.

Passages for private reading and topics for investigation will be suggested to meet the needs of individual students.

\* Not given in 1933-1934.

† Not given during the academic year, 1933-1934.

650-651-652. **History of Roman Literature.** Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, three reading courses more advanced than Latin comedy. The content of the readings within this course is so extensive that graduate students may repeat this course for credit. Mr. Titchener.

Lectures and assigned reading in literary histories on the development of Roman literature; required and suggested passages for translation in each author studied; brief weekly reports.

720-721-722. **Historical Greek and Latin Grammar.** Three credit hours each Quarter. Autumn, Winter, and Spring Quarters. Prerequisite, ten credit hours of advanced work in the classics. Mr. Bolling.

NOTE: This course is the same as Greek 720-721-722.

NOTE: **TEACHING COURSE.** For the Teaching Course in this department see the Department of Education, Course 694.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

Candidates for advanced degrees will be required to have:

(a) Some knowledge of language as such and of the place held in the history of linguistic development by the Classical Languages. To attain this end, all candidates must have at least one course in General Linguistics (Greek 701).

(b) A knowledge of Classical Literature in its broad outlines.

(c) An understanding, in a general way, of the principles of textual criticism, and as a means to this end, some knowledge of Paleography.

Candidates for the Doctorate will be required to attain such mastery of their major language as will enable them to express themselves in it and to interpret any document in that language set before them. Similar but less difficult tests will be applied to candidates for the Master's degree; the passages set before them for interpretation will be selected from some particular field in which they have already worked.

Candidates for the Doctorate who make one of the Classical Languages their major, must take in the other language one course, at least, from the intermediate group (600) except that Greek 650, 651, 652 cannot be used to satisfy this requirement.

\*801. **Seminary in the Latin Epic.** Three credit hours. Autumn Quarter. Mr. Ogle.

Research problems based upon the fragments of the early Epic. Lectures on the Greek background of the Latin Epic. The Latin Epyllion.

\*802. **Seminary in the Latin Epic (Continued).** Three credit hours. Winter Quarter. Mr. Ogle.

The Aeneid of Vergil will form the center of study and discussion.

803. **Seminary in the Post-Augustan Epic.** Three credit hours. Spring Quarter. Mr. Titchener.

Study and discussion of the Pharsalia of Lucan and the Argonautae of Valerius Flaccus. Lectures on the later traditions of the Epic.

\*804. **Seminary in the Latin Lyric.** Three credit hours. Autumn Quarter. Mr. Ogle.

Research problems based upon the Greek background of the Latin lyric and upon the poetry of Catullus and Horace.

\*805. **Seminary in the Latin Lyric (Continued).** Three credit hours. Winter Quarter. Mr. Ogle.

Lyric poetry in the later Empire and Medieval period.

\*806. **Seminary in the Latin Satire.** Three credit hours. One Quarter. Autumn and Winter. Mr. Titchener.

The works of Horace and Juvenal will form the center of study and discussion.

807. **Seminary in Latin Historiography.** Three credit hours. One Quarter. Autumn and Winter. Mr. Titchener.

Study and discussion will be based upon the work of Livy and Tacitus.

\* Not given in 1933-1934.



\*808. Seminary in the Latin Drama. Three credit hours. One Quarter. Autumn and Winter. Mr. Ogle.

The plays of Plautus and Terence will form the center of study and discussion, but part of the course will deal with the tragedies of Seneca and with their importance in the history of dramatic literature.

\*809. Seminary in the Latin Philosophical Writers. Three credit hours. Spring Quarter. Mr. Titchener.

The works of Lucretius, Cicero, and Seneca will form the center of study and discussion.

\*810. Seminary in Classical Archaeology. Three credit hours. Spring Quarter. Mr. Elden.

The work of the course will center around the study of the archaeological remains of classical antiquity.

## COMPARATIVE LITERATURE AND LANGUAGE

Courses formerly offered under the above heading will be found under the Departments of Classical Languages and Literature, and German.

## DAIRY TECHNOLOGY

Office, 111 Townshend Hall

PROFESSOR STOLTZ, ASSOCIATE PROFESSOR BURGWARD, MR. ERB

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These general prerequisites for courses 608, 609 and 610 include a course in Bacteriology.

605. Management of Dairy Plants. Three credit hours. Winter Quarter. Three discussion periods each week. Prerequisite, Dairy Technology 607, 608, and 610. Mr. Stoltz.

Lectures will be given on the organization, construction, and operation of milk plants, creameries, cheese factories, condenseries, and ice cream plants. The purchasing of milk and milk products by various methods, the importance of sanitation, employing of help, and the purchasing of supplies will be discussed. A trip to visit small and large plants is required.

607. Market Milk. Five credit hours. Autumn Quarter. Three discussion periods and one two-hour and one four-hour laboratory periods each week. Prerequisite, Bacteriology 607, 610, 611. It is also desirable that students taking this course should have credit for dairy chemistry. Mr. Burgward.

Lectures and assigned readings will be given on the handling and distribution of milk for city trade including cooling, clarifying, standardizing, pasteurizing, and bottling milk and cream and methods of determining the bacterial and leucocyte count in milk in order to comply with the regulations laid down by the various city ordinances. Laboratory will consist of practical work in handling and processing milk and the operation of the milk plant. Training and practice will be given in milk inspection from the standpoint of the Board of Health and the city milk plant.

Not open to students who have credit for Dairying 404.

608. Hard Cheese Manufacturing. Five credit hours. Winter Quarter. Two discussion periods and two four-hour laboratory periods each week. Given in alternate years. Mr. Stoltz.

Lectures will take up the methods of manufacturing cheddar, Swiss, brick, and Limburger cheese, the method of paying for milk at cooperative cheese factories and the scoring of American cheese. Laboratory work will consist of the making of cheddar cheese from both raw and pasteurized milk, Swiss cheese by the use of the eye-forming culture, brick, Limburger, and farm cheese.

Not open to students who have credit for Dairying 408.

609. Condensed Milk and Milk Powders. Three credit hours. Autumn Quarter. Two discussion periods and one three-hour laboratory period each week. Mr. Erb.

Lectures will be given on the theory and practice of milk condensation and milk drying. Special emphasis will be given to the questions of heat stability of milk, the salt balance, and lactose crystallization. Laboratory work will consist of practical work with the operation of vacuum pans, sterilization of milk, and visits to milk condenseries and powder plants in the vicinity of Columbus.

Not open to students who have credit for Dairying 409.

\* Not given in 1933-1934.

**610. Ice Cream Manufacturing.** Five credit hours. Autumn Quarter. Three discussion periods and two three-hour laboratory periods each week. Concurrent, Dairy Technology 609. Mr. Erb.

The course deals with the modern ice cream industry and has to do with manufacturing operations, distribution methods and sales activities. Considerable attention is given to the physico-chemical aspects of ice cream and how these enter into modern processing procedure.

Laboratory work consists of processing ice cream and visiting manufacturing plants.

**615. Dairy Products Scoring.** Three credit hours. Spring Quarter. One lecture and two two-hour laboratory periods each week. Mr. Stoltz, Mr. Burgwald, Mr. Erb.

An advanced class for Juniors who are majoring in dairy technology and who desire to take up judging of milk, butter, ice cream, and cheese in the commercial field.

**701. Special Problems.** Three to fifteen credit hours, taken in units of three to five hours each Quarter, for one or more Quarters. Autumn, Winter, Spring. Mr. Stoltz, Mr. Burgwald, Mr. Erb.

This course is designed for students majoring in Dairy Technology and consists in working out special problems along the lines in which they are specializing.

**702. Dairy Seminary.** One credit hour. Autumn, Winter, and Spring Quarters. One hour conference each week. Open to Seniors and graduate students who are specializing in dairy technology. During this seminary seniors will report on problems or special references. Graduate students will make a report of their problems. Instructors in allied departments of the University will be requested to take part in this seminary.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**950. Research in Dairy Technology.** Autumn, Winter, and Spring Quarters. One hour conference each week. Prerequisite, at least twenty hours of work in the department and the consent of the instructor. Mr. Stoltz, Mr. Burgwald, Mr. Erb.

Research work in Dairy Technology is conducted under the supervision of Mr. Stoltz, Mr. Burgwald, and Mr. Erb. Any apparatus or equipment on hand will be furnished and room will be arranged for those desirous of studying problems pertaining to market milk, ice cream, butter, cheese, evaporated milk, milk powder, buttermilk, or other dairy products. Students desiring to work on some problems, such as plant management, dairy bacteriology, dairy chemistry, nutrition, cost accounting, can arrange to carry on the work as though it were in one department and college.

#### DRAWING

(See Engineering Drawing)

#### ECONOMICS

Office, 116 Commerce Building

PROFESSORS WOLFE, HAMMOND, HAYES, WALRADT, HOAGLAND, DICE, AND HELD.  
ASSOCIATE PROFESSORS ZORBAUGH, SMART, AND BOWERS, ASSISTANT PROFESSORS DEWEY, JAMES, PATTON, AND WILLIT, MISS STITT, MISS HERBST, MR. ROWNTREE, MR. WHITSETT

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**616. Corporation Economics.** Five credit hours. Autumn Quarter. Five meetings each week. Mr. Hoagland, Mr. Donaldson.

A course in corporation organization and finance designed primarily for students outside of the College of Commerce and Administration.

Not open to students who have credit for or who are taking Business Organization 650.

**618. Transportation Economics.** Five credit hours. One Quarter, Autumn, Winter, Spring. Five class meetings each week. Mr. Dewey, Mr. Rowntree, Mr. Whitsett.

A general survey of the history and regulation of inland transportation agencies, and a discussion of current problems of transportation and regulation, for students with a general interest in the field of economics as well as for those with a special interest in transportation.

**624. Principles of Insurance.** Three credit hours. Autumn Quarter. Three class meetings each week. Mr. E. L. Bowers.

A study of the theory and practice of the principal types of insurance in the life, fire, and casualty fields. The economic theory of risk; loss prevention; state supervision, etc.

Not open to students who have credit for Business Organization 760.

**625-626. Business Cycles and Economic Planning.** Two credit hours. Autumn and Winter Quarters. Mr. Dewey.

A general survey of changes in price levels and past and current theories of business cycles. Economic and social results of economic instability. The development of economic planning.

**631-632-633. Public Finance.** Three credit hours. Autumn, Winter, and Spring Quarters. Three class meetings each week. Mr. Walradt.

A study of the problems connected with the debts, expenditures, revenues, and fiscal administration of national, state, and municipal governments.

**634-635. International Economic Problems.** Three credit hours. Autumn and Winter Quarters. Three class meetings each week. Mr. James.

Theories of international trade and finance. Balance of international payments for important countries: war debts, export of capital, gold movements, etc. Broader aspects of international economic relations emphasized.

**637. Labor Relations.** Five credit hours. Autumn Quarter. Five class meetings each week. Miss Herbst.

A study of the methods used by wage-earners, employers and the government to meet present-day labor conditions.

**638. Labor Legislation.** Three credit hours. Winter Quarter. Three class meetings each week. Miss Stitt.

A study of society's efforts through legislation to improve the conditions of labor and to increase its bargaining power. Legislation and court decisions affecting the labor of men, women, and children, hours, wages, working conditions, immigration, convict labor, trade union activities and industrial disputes.

**639. Social Insurance.** Three credit hours. Spring Quarter. Three class meetings each week. Mr. Bowers.

Efforts to guarantee to the worker security. Accident insurance; employers' and workmen's compensation; health hazards and health insurance. Old age insurance and pensions; unemployment and its prevention; unemployment insurance. Compulsory automobile insurance.

**\*643. Woman in the Modern Economic World.** Four credit hours. Autumn Quarter. Four class meetings each week. Miss Stitt.

A study of the relation of women to the present economic order, and of the social, economic, industrial and legal problems associated therewith.

**645. Principles of Economic Consumption.** Three credit hours. Winter Quarter. Three class meetings each week. Miss Zorbaugh.

Critique of consumption facts and problems, and of consumers' welfare. Theories of consumers' economic role. Means of controlling consumption.

**648. Public Utility Economics.** Five credit hours. Autumn Quarter. Five class meetings each week. Mr. Dewey.

A course complementary to Economics 618, with special emphasis on local public utilities, including water, gas, electric light and power, telephone and telegraph, etc. The history and present status of regulation and the leading problems arising therefrom, including supervision of holding companies, valuation, reasonableness of rates, adequacy and economy of service, etc. Public ownership versus public regulation.

**651. International Commercial Policies.** Three credit hours. Spring Quarter. Three class meetings each week. Mr. Held.

The theory of international trade; historic policies; mercantilism; free trade and protection. A study of the tariff policy of the United States with a comparative study of the policies of other countries. International trade as affected by the World War.

\* Not given in 1933-1934.

**656. The Distribution of Wealth and Income.** Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Hayes.

Analyses of the process by which wages, interest, rent, and profit are determined; proposals for altering same.

**657. Socialism.** Three credit hours. Spring Quarter. Three class meetings each week. Mr. Hayes.

A critique of the present economic system and of the schemes proposed to modify or replace it.

**658-659-660. Population.** Two credit hours. Autumn, Winter, and Spring Quarters. Two class meetings each week. Mr. Wolfe.

The growth and distribution of population. The relation of numbers to resources, productive capacity, standard of living, prosperity, and international economic problems. The dynamic aspects of population in relation to material and moral progress. Critical consideration of population theories and policies.

**700-701-702. Reading Course.** One to five credit hours. Autumn, Winter, and Spring Quarters. Open by permission of the chairman of the department. All instructors.

(a) A program of reading arranged for the undergraduate student, with individual conferences and reports. Prerequisite: (1) Senior standing; (2) the record of "A" in at least half of his Economics courses and an average of "B" in the remainder; (3) permission of the professor under whose supervision the work is given. Candidates for a degree with distinction in Economics must enroll for this course for at least two Quarters. Mr. Hayes, with the cooperation of other members of the department.

(b) A program of reading open to graduate students in lieu of scheduled courses, or supplementary to study provided in regular courses.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites must include good foundation courses of collegiate grade in the principles of economics, political science, psychology, European and American history.

**MASTER'S DEGREE:** The candidate for the Master's degree in economics must meet certain minimum requirements: (1) in the general principles of economics; (2) in the history of economic thought and processes, for which Economics 801-802-803 or its equivalent is necessary; (3) in elementary statistics, which, if it has not been taken as an undergraduate course, may be obtained by taking Economics 807.

**DOCTOR'S DEGREE:** The candidate for the Doctor's degree in economics should have a broad and liberal training, such as will enable him to approach his work in a scientific, critical, and constructive spirit; and from a broad social point of view rather than from that of a narrow special interest. In order to attain this point of view, he should have gained familiarity with the progress which has been made not only in economics but in the other social sciences, as well as in philosophy and psychology. A reasonable acquaintance with European and American history is presupposed.

The more specific requirements for the Doctor's degree in economics include the following:

- (1) The minimum requirements for the Master's degree as given above;
- (2) Modern economic theory at least equivalent to Economics 816-817-818;
- (3) Concentration in one of the following fields, and extensive preparation in at least five of the others;
  - (a) Economic theory;
  - (b) Economic history, European and American;
  - (c) Statistics;
  - (d) Labor problems and legislation;
  - (e) Socialism and economic reform;
  - (f) Money and banking;
  - (g) Business cycles and economic planning;
  - (h) Public finance;
  - (i) International economic relations;
  - (j) Corporations and public control, transportation and public utilities;
  - (k) Population and standard of living;
- (4) One or more subjects taken in other departments of the university, selected with the approval of the professor in charge of the candidate's dissertation.

**801-802-803. History of Economic Thought.** Three credit hours. Autumn, Winter, and Spring Quarters. Three class meetings each week. Mr. Hammond.

**804-805-806. Economic History of the United States.** Three credit hours. Autumn, Winter, and Spring Quarters. Three class meetings each week. Mr. Hammond.

Not open to students who have credit for Economics 661-662-663.

**807-808-809. Statistical Analysis.** Two credit hours. Autumn, Winter, and Spring Quarters. One two-hour class meeting each week. Prerequisite, the basic course in mathematics and permission of the instructor. Mr. Smart.

A general course in statistical methods designed primarily to give the graduate student in economics, who intends to enter into the statistical field, a clear conception of the value of statistics to economics and business. The course will include a treatment of the methods of collection, tabulation and graphic representation of data, of analysis of statistical series of various kinds together with an interpretation of the final results.

**812-813-814. The Economic History of Western Europe.** Two credit hours. Autumn, Winter, and Spring Quarters. Two class meetings each week. Preferably preceded or accompanied by Economics 801-802-803. Mr. Smart.

A general survey from the fall of the Roman Empire to the Great War. Especial attention is given to the interrelations between the economic institutions, the general culture, and the economic thought of the various periods. The development of modern capitalism. Economic background and social consequences of the Industrial Revolution. The economic causes and implications of modern European nationalism.

**815. Costs and Returns.** Three credit hours. Spring Quarter. Three class meetings each week. Mr. Wolfe.

Critical and constructive analysis of the conditions which determine costs of production. Types of cost. Differences and changes in costs. The intricacies of the relation of cost to value. Critical consideration of the history of the theory of costs and returns.

**816-817-818. Modern Economic Theories.** Three credit hours. Autumn, Winter, and Spring Quarters. Three class meetings each week. Mr. Wolfe.

Critical consideration of the leading contributions to economic thought in Europe and America during the past forty years. Much attention is given to post-war theory, with special emphasis on the trend to dynamic economics and on the newer problems of theory which have appeared with the changing character of economic institutions and the rise of new issues.

**825. Current Taxation Problems.** Two credit hours. Winter Quarter. Mr. Walradt.

A critical analysis of the taxation problems now before the federal, state, and local governments.

**863. Advanced Money.** Three credit hours. Spring Quarter. Preferably preceded by a course in Money and Banking. Mr. Dice.

A study of the gold standard; the gold exchange standard; the role of money in the economic organization; the leading types of monetary theory; and the methods of stabilizing the price level.

Not open to students who have credit for Economics 611.

**864. Advanced Banking.** Three credit hours. Winter Quarter. Three discussion periods each week. Prerequisite, a course in Money and Banking. Mr. Dice.

The integration of the financial institutions; the theories of bank deposits; the theories of the elasticity of bank currency; the discount policy and the interest rate of central banks; the effectiveness of the different methods of regulating credit and business activities.

Not open to students who have credit for Economics 612.

**865-866-867. Public Control of Industry.** Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Dewey.

A study of the underlying conceptions and conditions of control, the general instruments of control, and the safeguarding of consumers against exploitation. Attention is directed to the legal and constitutional background of control. Examination of various proposals for economic planning.

**868. Problems of Capital Accumulation and Utilization.** Three credit hours. Winter Quarter. Three class meetings each week. Mr. Hayes.

An analysis of the doctrines of economists and other writers concerning the problems of capital accumulation and utilization with especial attention to economic "progress," oversaving, thrift, industrial depressions, inequality of wealth, and the export of capital.

**869. Capitalism and Socialism in Europe and America.** Three credit hours. Spring Quarter. Three class meetings each week.

An analytical comparison of the economic and social system of capitalism with that of socialism in contemporary Europe and America.

**870. European Banking Systems.** Two credit hours. Spring Quarter. Mr. Dice.

A survey of the central banking and commercial banking systems of the leading European countries, together with a study of the current international banking and credit problems.

**950. Research in Economics.** Autumn, Winter, and Spring Quarters. Open by permission of the Chairman of the Department.

Qualified graduate students who wish to do research with the advice of members of the staff of the Department of Economics may register for this course.

## EDUCATION

Office, 116 Education Building

EXECUTIVE COMMITTEE: PROFESSORS EIKENBERRY, KLEIN, AND ALBERTY

PROFESSORS ALBERTY, BODE, BRIM, CLIFTON, EIKENBERRY, GOOD, \*HULLFISH, KLEIN, LEWIS, \*PAHLOW, SEELY, STONE, TWISS, AND ZIRBES, ASSOCIATE PROFESSORS DAVIS, HECK, LANDSITTEL, REEDER, SMITH, AND WARNER, ASSISTANT PROFESSORS BRONSKY, ECKELBERRY, AND THARP, MR. EBERHART, MR. MARPLE, MR. SHOEMAKER, MR. TOLL

**Prerequisites for Entrance Upon Graduate Work in Education**

1. A student seeking to enter upon graduate work in the field of education shall hold a Bachelor's degree from an accredited institution of higher learning and shall show familiarity with certain fields of education to the extent of what is ordinarily covered in undergraduate courses in approximately twenty-four Quarter hours. The fields in which familiarity should be exhibited include the following: (a) Philosophy of Education, (b) Educational Psychology, (c) Principles of Teaching, (d) History of Education, and (e) School Organization and Management. In demonstrating competency in such fields the student may either present official records or take a comprehensive examination.

In addition to the above requirement the student will present course credits for student teaching or provide evidence of one or more years of successful teaching experience.

2. Specific requirements to supplement the foregoing general prerequisites may be set up in the various areas of specialization. An illustration follows:

A student preparing to secure a Master's degree in the teaching of high school English, before admission to graduate work, shall meet the foregoing professional prerequisites and in addition shall show competency, either by course credits or comprehensive examination, in English equivalent to the requirement of the College of Education for graduation.

**Prerequisites for 600 and 800 Courses**

1. 600 courses for undergraduate and graduate credit. Junior standing and twenty Quarter-credit hours in education and allied subjects of which ten approved by the instructor must be in education.

2. 600 courses for graduate credit only. Graduate standing in the field of education.

3. 800 courses. Graduate standing in the field of education and ten Quarter-credit hours in graduate courses in education approved by the instructor.

**NOTE:** Courses in the Department of Education are arranged under the following headings:

General and Basic, Philosophy of Education, History of Education, Elementary Education, Secondary Education, Higher Education and Teacher Training, Practical Arts and Vocational Education, Superintendency, Guidance, Special Education.

All of these except the first represent areas of specialization within the Department of Education.

Courses listed in the Department of Education include those previously offered by the Departments of Adult Education, History of Education, Practical Arts and Vocational Education, Principles and Practice of Education, and School Administration.

### KEY TO COURSE NUMBERS

General and Basic	600-609	800-806
Philosophy of Education	610-629	807-811
History of Education	630-649	812-820
Elementary Education	650-669	821-828
Secondary Education	670-710	829-844
Higher Education and Teacher Training	711	845-855
Practical Arts and Vocational Education	712-726	856-866
Superintendency	727-744	867-883
Guidance	745-763	884-896
Special Education	764-770	897-899

\* Absent on leave, 1933-1934.

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34. See also page 77.

## GENERAL AND BASIC

**600. Minor Problems.** Two to four credit hours. Autumn, Winter, and Spring Quarters. Students may, with the approval of their advisers, register for more than one section of Education 600 or for the same section two or more times.

By permission of the Executive Committee of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under members of the Bureau staff.

- (a) Commercial Education. Mr. Stone.
- (b) Elementary Education. Mr. Brim, Miss Zirbes, Mr. Lindquist, Mr. Warner, Mr. Heck, Miss Bronsky.
- (c) Guidance. Mr. Stone, Mr. Clifton.
- (d) History of Education. Mr. Good, Mr. Eckelberry.
- (e) Industrial Arts Education. Mr. Warner, Mr. Smith.
- (f) Secondary Education. Mr. Alberty, Mr. Eikenberry, Mr. Lindquist, Mr. Davis.
- (g) Special Education. Mr. Berry, Mr. Heck, Mrs. Charters.
- (h) Vocational Industrial Education. Mr. Stone, Mr. Warner, Mr. Smith.

**603. Foundations of Education.** Five credit hours. Autumn Quarter. This course or equivalent preparation required of all candidates for advanced degrees in the field of education. Prerequisite, graduate standing in the field of education. Mr. Bode, Mr. Stone.

To provide a comprehensive understanding of the individual, as a living and learning organism, of the present status and major problems of our social order, the complexity of the challenge, and a keen sense of the opportunity and responsibility of educational leadership today. To provide also a clearer understanding of fundamental principles conditioning individual and social living, in the light of which each student may establish and constructively reorganize his own philosophy of life toward the common end of individual satisfaction and social welfare.

**604. The Historical Development of Educational Problems.** Five credit hours. Winter Quarter. This course or equivalent preparation required of all candidates for advanced degrees in the field of education. Prerequisite, graduate standing in the field of education. Mr. Good.

A study of some of the more important educational problems of the present, in the light of their historical development and of contemporary social, political, economic, and intellectual conditions.

**605. The Organization of Educational Agencies.** Five credit hours. Spring Quarter. This course or equivalent preparation required of all candidates for advanced degrees in the field of education. Prerequisite, graduate standing in the field of education. Mr. Lewis, Mr. Stone.

This course will provide a basis for integrating all of the agencies for education in the United States to the end that our educational system on all levels and in all aspects becomes a dynamic instrument for social improvement.

## PHILOSOPHY OF EDUCATION

**610. Conceptions of Mind in Educational Theory.** Three credit hours. Spring Quarter. Mr. Bode.

A study of the doctrines of mind that have exercised a determining influence upon educational theory and practice.

Not open to students who have credit for Principles of Education 354 or 620.

**\*611. The Thinking Process in Its Educational Bearings.** Three credit hours. Winter Quarter. Mr. Hullfish.

A study of the thinking process for the purpose of tracing its implications for educational theory and classroom practice.

Not open to students with credit for Principles of Education 683.

\* Not given in 1933-1934.

\*617. **Modern Tendencies in Education.** Three credit hours. Spring Quarter. Mr. Bode.

A discussion of current educational doctrines and controversies, in the light of their historic background and their philosophical implications.

Not open to students who have credit for Principles of Education 356 or 640.

\*620. **Moral Ideals in Education.** Three credit hours. Autumn Quarter. Mr. Hullfish.

A consideration of types of moral ideals, of the relation of moral values to school subjects, and of the question of direct and systematic moral instruction in the schools.

Not open to students who have credit for Principles of Education 350 or 601.

624. **Social Education.** Three credit hours. Spring Quarter. Lectures and discussions. Mr. Lumley.

An examination of educational agencies and processes other than those of the school, which contribute to the enlightenment and socialization of the individual. An analysis of childhood's isolation, the methods of communication and control, the influence of the family, the playgrounds, the industrial organization, the church and the state.

Not open to students who have credit for Principles of Education 645.

#### HISTORY OF EDUCATION

631. **The History of Modern Education since 1750.** Three credit hours. One Quarter. Autumn and Spring. Prerequisite, History of Education 625, except for students specializing in music. Students who have credit for History of Education 625 should elect Education 631 during 1933-1934. Not to be offered after 1933-1934. Mr. Eckelberry, Mr. Shoemaker.

Not open to students who have credit for History of Education 401, 405, 626, 627, or Education 507 or 632.

632. **The History of Modern Education.** Five credit hours. One Quarter. Autumn, Winter, Spring. Required in the College of Education except for students preparing for service in elementary schools. Students who have credit for History of Education 625 should elect Education 631 during 1933-1934. Mr. Good, Mr. Eckelberry, Mr. Shoemaker.

Not open to students who have credit for History of Education 401, 404, 405, 625, 626, 627, or Education 507 or 631.

\*635. **The Evolution of Educational Thought.** Five credit hours. Autumn Quarter. Mr. Good.

A study from the sources of the great philosophies of education in relation to their times; and an evaluation of their influence on present educational thought and practice. The thought of the Greek, Roman, Renaissance, and the modern democratic and industrial thinkers will be studied.

Not open to students who have credit for History of Education 350, 351, 352, 353, 601, or 602.

637. **Historical and Comparative Study of Secondary Education.** Five credit hours. Autumn Quarter. Mr. Eckelberry.

A survey of the development of secondary education with intensive treatment of the American academy and high school in relation to social and political conditions and philosophies, and in comparison with present secondary schools in Europe.

639. **Great Teachers.** Two credit hours. Spring Quarter. One two-hour lecture each week. Mr. Good.

Study of the times, personalities, and work of several eminent teachers: Socrates, Plato, Jesus, Quintilian, Agassiz, Arnold and others.

Not open to students who have credit for History of Education 617.

641. **The History of Vocational Education.** Three credit hours. Autumn Quarter. One two-hour meeting each week. Miss Donnelly, Mr. Eckelberry, Mr. Stewart, Mr. Stone.

The history of activities related to agriculture, commerce, industry, and home making as a part of education, and their relation to the general theory and practice of education.

Not open to students who have credit for Agricultural Education 602 or History of Education 607.

\* Not given in 1933-1934.



**642. History of Physical and Health Education.** Three credit hours. Spring Quarter. Given in alternate years. Mr. Hindman, Mr. Shoemaker.

An historical survey of physical and health education beginning with the physical education of ancient Greece, with special emphasis on recent and contemporary developments in Europe and America.

Not open to students who have credit for Physical Education 681 or 683.

**644. History of Education in the United States.** Five credit hours. Spring Quarter. Lectures and research. Given in alternate years. Prerequisite, graduate standing in the field of education and five hours in the history of education. Mr. Good.

The development of American education in relation to social history. The emphasis will be placed upon the period from 1830 to the present.

Not open to students who have credit for History of Education 605 or 606.

#### ELEMENTARY EDUCATION

**\*650. Fundamentals in Early Childhood and Elementary Education.** Five credit hours. Prerequisite, graduate standing in the field of education.

A service course for graduate students whose fields of specialization are in educational divisions other than elementary education. A general survey of major problems and issues in elementary education.

**658. Problems in the Direction and Supervision of Elementary Teacher Training.** Five credit hours. Winter Quarter. Prerequisite, graduate standing in the field of education or maturity and experience satisfactory to the instructor. Mr. Brim.

An intensive study of the problems confronting the director of training, the supervisors of student teachers and critic teachers. Special attention is given to the development of the teacher as a person, enriched content courses, reorganization of methods courses, more intimate relation of theory and practice, widening the scope of practice teaching, and creative supervision of student teaching.

Not open to students who have credit for Principles of Education 616.

**661. Problems of Elementary Teachers in Service.** Two credit hours. Autumn Quarter. Two conferences each week. Participation in special projects and investigations with reports. Open by permission of the instructor to principals and teachers in service. Miss Zirbes.

The work will center about ways and means of improving instruction through actual attack on selected classroom problems.

#### SECONDARY EDUCATION

**670. Teaching Literature in the High School.** Five credit hours. One Quarter. Autumn and Spring. Five lectures each week: observations. Mr. Seely.

Emphasis will fall upon the selection of suitable poetry, drama, prose-fiction, etc., for junior and senior high school pupils; developing methods for their presentation and study; and suggesting means for correlating the work in literature with the other high school studies.

Not open to students who have credit for Principles of Education 340, 341, or 662.

**671. Teaching Composition in High School.** Five credit hours. One Quarter. Autumn and Spring. Five lectures each week: observations. Mr. Seely.

This course will be devoted to the discussion of the methods of teaching grammar and composition, and to means of developing originality, imagination, and individuality in the oral and written expression of high school pupils.

Not open to students who have credit for Principles of Education 343 or 714.

**673. The Teaching of Dramatics.** Five credit hours. Autumn Quarter. Five lectures each week: observations. Prerequisite, English 680. Mr. Miller.

Lectures and readings on the organization of dramatics courses and the production of plays in high schools.

Not open to students who have credit for Principles of Education 717.

\* Not given in 1933-1934.

**677. Organizing History for the Classroom.** Five credit hours. One Quarter. Autumn and Spring. Five lectures each week; observations. Mr. Toll.

A professionalized subject-matter course surveying the field of high school history as a whole and organizing it into smaller units for teaching purposes.

Not open to students who have credit for Principles of Education 384, 385, or 663.

**678. The Teaching of the Social Studies.** Five credit hours. One Quarter. Autumn and Spring. Five lectures each week; observations. Mr. Landsittel.

This course deals with the history of the teaching of history and the other social studies; aims and methods; classroom and library equipment; evaluation of textbooks; testing.

Not open to students who have credit for Principles of Education 665 or 700.

**683. The Teaching of Biology.** Three credit hours. Spring Quarter. Three recitations each week; observations. Mr. Tiffany, Mr. David Miller.

The work will include lectures and demonstrations with discussion of the best methods of presenting botany, zoology, and biology to high school students.

Not open to students who have credit for Principles of Education 705.

**684. The Teaching of Chemistry and Physics.** Three credit hours. Spring Quarter. Three lectures each week; observations. Mr. Twiss.

A study of the problems of instruction that confront the teachers of chemistry and physics in modern high schools, such as objectives, educational values and methods of chemistry and physics teaching, selection and organization of subject matter, choice and use of textbooks, apparatus, recitations, lectures, excursions, class and laboratory experiments, problems and projects, reviews, tests, etc. Students enrolling in this course are advised to bring with them chemistry and physics textbooks and apparatus catalogs of recent publication.

Not open to students who have credit for Principles of Education 710, 755, or 756.

**687. The Teaching of Mathematics.** Three credit hours. Autumn Quarter. Three recitations each week; observations. Mr. Twiss.

The educational values of the study of mathematics; objectives; principles of selecting and organizing the content matter of the various courses in the junior and senior high schools; modes and methods of teaching and testing; recent and contemporary studies of the teaching of mathematics.

Not open to students who have credit for Mathematics 681 or Principles of Education 735.

**690. The Teaching of German.** Three credit hours. Winter Quarter. Three recitations each week; observations. Mr. Röseler.

Values. Critical study of objectives and methods. Textbook selection. Classroom procedures. Readings, discussions, and reports.

Not open to students who have credit for German 665 or Principles of Education 725.

**692. Methods and Techniques of Teaching Romance Languages.** Five credit hours. Autumn Quarter. Five meetings each week, combined and sectional; observations. Mr. Tharp.

Lectures, readings, discussions and conferences.

Values. Objectives. Demonstrations and lectures on methods of teaching reading, grammar and pronunciation. Textbook analysis. Professional advancement. Examinations and marking. Eight observations of high school classes required.

Sections. Techniques of instruction. During the fourth to ninth weeks inclusive the class will meet four days a week in sections according to subject. The work of each section carries two hours of credit, and students may enroll in as many sections as they possess the prerequisites enumerated above in phonetics and advanced composition and syntax.

Section A. French. Mr. Tharp.

Section B. Spanish. Mr. Tharp.

Lesson plans. Problems of presentation in the reading lesson, grammar, pronunciation. Construction of teaching materials. Choice of course content. Evaluation of classroom procedures.

Not open to students who have credit for Principles of Education 740 or 745.

**694. The Teaching of Latin.** Three credit hours. Spring Quarter. Three recitations each week: observations. Mr. Diederich.

Values. Teachers' equipment, objectives and methods. Classroom procedures. Lectures and assigned readings.

Not open to students who have credit for Latin 617 or Principles of Education 707 and 731.

**696. The Teaching of Mechanical Drawing I.** Three credit hours. Autumn Quarter. One lecture and two three-hour laboratory periods each week: observations. Mr. French.

Not open to students who have credit for Principles of Education 750.

**697. The Teaching of Mechanical Drawing II.** Three credit hours. Winter Quarter. One lecture and two three-hour laboratory periods each week: observations. Prerequisite, Principles of Education 750 or Education 696. Mr. French.

**699. Extra-curricular Activities of Secondary School.** Three credit hours. Winter Quarter. Mr. Eikenberry.

The principles, organization, administration and supervision of extra-curricular activities. Consideration will be given to home-room activities, pupil participation in school government, assemblies, clubs, publications, debating and dramatics, athletics, honor societies, social activities, control of participation in activities, and financial administration of activities.

Not open to students who have credit for School Administration 609.

**700. Survey of Secondary Education.** Five credit hours. Autumn Quarter. Prerequisite, graduate standing in the field of Education. Mr. Eikenberry.

A service course for graduate students whose fields of specialization are educational divisions other than secondary education. A general survey of the major problems and issues in modern secondary education.

**701. Major Course in Secondary Education I.** Five credit hours. Autumn Quarter. Prerequisite, graduate standing in the field of Education. Mr. Eikenberry.

A comprehensive survey of secondary education. This course is required of all graduate students whose field of specialization is secondary education.

**702. Major Course in Secondary Education II.** Five credit hours. Winter Quarter. This course is required of all students whose field of specialization is secondary education. Prerequisite, graduate standing in the field of education. Mr. Albery.

A continuation of Education 701.

#### HIGHER EDUCATION AND TEACHER TRAINING

**711. Survey of Higher Education.** Five credit hours. Spring Quarter. Prerequisite, graduate standing in the field of education. Graduate students in fields other than education may register for this course upon the recommendation of the department in which the student is specializing. Not open to students specializing in higher education. Mr. Klein.

This is a service course which will cover the same areas presented in 845 and 846. It will, however, be adapted to the needs of students not specializing in higher education.

#### PRACTICAL ARTS AND VOCATIONAL EDUCATION

##### A. Industrial Education

**714. Analysis and Organization of Subject Matter in Industrial Education.** Three credit hours. Winter Quarter. Three recitation periods each week. Mr. Smith.

Principles and practice in defining specific course objectives. Technique of analysis applied to various vocational lines for the selection of facts and activities conducive to desirable knowledge, skills, and behavior; and the organization of such materials into integrated courses of study and formulation of teaching plans.

Not open to students who have credit for Practical Arts and Vocational Education 680.

## B. Commercial Education

**718. Subject Matter and Method in Commercial Education.** Three credit hours. Autumn Quarter. Three recitations each week: observations. Mr. Stone.

Field studies, survey and analysis of commercial occupations and determination of the educational needs of persons in such occupations. Study of types of commercial curricula and course of study. Principles of teaching as they apply to both the social-business and technical business subjects. Criteria for selecting and practice in developing different types of activities and projects.

Not open to students who have credit for Practical Arts and Vocational Education 663.

**719. Subject Matter and Method in the Laboratory of Commerce.** Three credit hours. Spring Quarter. Three recitations each week: observations. Mr. Stone.

A professional course for teachers of commercial arts (sometimes designated also General Business Science or Junior Business Training) typically in junior high, part-time and general continuation schools, for major purposes of commercial culture, exploration and guidance. A basic course involving the fundamentals of a consumer's business education. Observation of classroom teaching.

Not open to students who have credit for Practical Arts and Vocational Education 667.

## SUPERINTENDENCY

**727. Introduction to School Administration.** Three credit hours. Autumn Quarter. Prerequisite, graduate standing in the field of education. Required of graduate students preparing for school executive positions. Mr. Reeder.

Designed to give an overview of the organization and administration of education in the United States, and especially designed for persons who expect to become school executives. The following topics, among others, are discussed: federal, state, and local administrative organization for education; the function of school administration; finance and business management; the plant; the teaching corps; the pupils; the curriculum; textbooks and libraries; and records, reports, and public relations.

Not open to students who have credit for School Administration 651.

**729. Administration of Rural and Village Schools.** Three credit hours. Winter Quarter. Three lectures each week. Assigned readings, investigations and reports. Prerequisite or concurrent, Education 727. Mr. Clifton.

An analysis of the administrative duties of the chief school administrator of consolidated and village schools. This course places particular emphasis on problems of transportation, methods of adjustment for small enrollment and other problems peculiar to rural and village schools.

Not open to students who have credit for School Administration 610 and 650.

**\*731. Administration of Physical and Health Education.** Three credit hours. Spring Quarter. Three lectures and discussions each week. Assigned readings and reports. Prerequisite or concurrent, Education 727. Mr. Ober-tuffer.

The study of the responsibility of administrators for the direction and supervision of health and physical education; organization, management and financing of programs; methods of securing and advising health and physical education staff; duties and services of these special officers; relations to public health; medical inspection; preventive programs; promotional programs; relations to mental health and hygiene; management and financing of athletics.

Not open to students who have credit for School Administration 626.

**733. Administration of School Financial Accounting in Ohio.** Two credit hours. Winter Quarter. Assigned readings, problems and reports. Prerequisite or concurrent, Education 727. Mr. Davis.

A study of the financial accounting systems in use in Ohio school districts including a consideration of underlying principles and legal regulations as well as actual practice in preparing budgets, financial statements and contracts, auditing payrolls, and the supervision of such clerical details as the keeping of books, minutes, and other records.

Not open to students who have credit for School Administration 658.

\* Not given in 1983-1984.

**734. School Finance.** Three credit hours. Autumn Quarter. Three lectures each week. Assigned readings, investigations and reports. Prerequisite or concurrent, Education 727. Mr. Reeder.

The literature and sources of data; trends of school costs; outlook for future costs; possible school economics; school expenditures vs. ability to expend; sources of school revenues; meeting a financial stringency; the equalization of educational opportunity; the control of school funds; school indebtedness.

Not open to students who have credit for School Administration 607 or 851.

**735. Business Administration of Schools.** Three credit hours. Winter Quarter. Three lectures each week. Assigned readings, investigations and reports. Prerequisite or concurrent, Education 727. Mr. Reeder.

Function of business administration in the schools; administrative relationships; personnel of the business department; making the budget; procuring revenue; financial accounting; planning and constructing a building; architectural service; selecting and purchasing building sites; financial capital outlays; use of buildings; maintenance of the plant; the janitor; insurance of property; taking the inventory; school supplies; payroll procedure; school transportation.

Not open to students who have credit for School Administration 608 or 850.

**738. Administration of Pupil Personnel.** Three credit hours. One Quarter. Winter and Spring. Three lectures each week. Assigned readings, investigations and reports. Prerequisite or concurrent, Education 727. Mr. Clifton.

Compulsory education laws and working certificates of Ohio; main requirements in other states. Census information it should secure, its use, legal requirements in different states. Attendance—organization of departments, amount and causes of non-attendance, devices to improve attendance. School record systems—forms used, items recorded, and uses. Reporting systems—need of uniformity in recording and reporting systems. Age-grade-progress studies. Elimination, grading and promotion. Classification. Definition of terminology. Visiting teacher. Marking systems.

Not open to students who have credit for School Administration 601.

**740. Public School Relations.** Two credit hours. Winter Quarter. Prerequisite or concurrent, Education 727. Mr. Reeder.

Emphasizes the function of public relations in school administration and the means for securing desirable public relations. The following topics, among others, are discussed; the aims and criteria for desirable public relations; the superintendent and the board of education in the school-relations program; school news in the newspaper; student publications; school reports; school house-organs and teachers' handbooks; the parent-teacher association; other home contacts; the janitor in the school-relations program; the school plant in the school-relations program; American Education Week; commencement as a school-relations agency; and organizing and conducting a publicity campaign.

**742. Legal Aspects of School Administration.** Three credit hours. Spring Quarter. Three lectures each week. Assigned readings, investigations and reports. Prerequisite or concurrent, Education 727. Mr. Clifton.

A study of the laws and judicial decisions of various states, relating to education, in order to discover the legal principles involved. Major topics; authority and responsibility of teachers; rights, privileges, and responsibilities of students; teachers' contracts and pensions; legal and illegal use of school property; contractual capacity and liability of public school officials; school boundaries and districts; taxation; legal aspects of the curriculum; expenditures of school money. Primarily for supervisory and administrative officials.

Not open to students who have credit for School Administration 813.

#### GUIDANCE

**750. Fundamentals of Guidance.** Five credit hours. Autumn Quarter. Mr. Stone.

A basic but advanced course for all students desiring a comprehensive knowledge of the history, theory, and practices of guidance. Especially for graduate students desiring to major in personnel. The course will consider the aims of guidance, materials, techniques, counseling, and research instruments of all major divisions of student personnel service.

Not open to students who have credit for Practical Arts and Vocational Education 470.

**752. Vocational Studies.** Five credit hours. Spring Quarter. Mr. Stone.

A consideration of the organic nature and importance of the economic principle in individual and institutional life, especially in the school. The course is organized with particular

reference to the needs of school advisers and teachers of vocational studies in high and continuation schools and classes.

Not open to students who have credit for Practical Arts and Vocational Education 610.

**754. The Administration of Guidance Programs.** Three credit hours. Spring Quarter. Prerequisite, graduate standing in the field of education and Education 750. Mr. Clifton.

Designed for school superintendents and high school principals and other executive officers in junior and senior high schools and junior colleges. Critical examination of the organization and administration of guidance programs in large and small school systems; the development of guidance programs for the school systems represented by the class membership.

Not open to students who have credit for School Administration 826.

#### SPECIAL EDUCATION

**764. Supervised Teaching in Special Classes.** Five credit hours. Spring Quarter. Mr. Berry.

Practice teaching for qualified students in classes for the mentally retarded, for behavior problem children, for the defective in speech, or for the deaf and the hard of hearing.

Students will be expected to devote one-third of their time, under the supervision of the University instructor in charge, to this course.

Not open to students who have credit for Principles of Education 656.

**766. Principles and Methods of Teaching Behavior Problem Children.** Three credit hours. Winter Quarter. Mr. Berry.

A critical study of principles and methods used in the adjustment of behavior problem children.

Not open to students who have credit for Principles of Education 655.

**767. Administration of Special Education.** Three credit hours. Spring Quarter. Three lectures each week. Assigned readings, reports, and field trips. Prerequisite, Education 727, or permission of instructor in charge. Mr. Heck.

History and development of special schools and classes; types defined; place in education; state encouragement and regulations; types of control; internal government; buildings and rooms; equipment; costs, teacher-training, experience, salaries; selection of other employees; characteristics of children; principles governing admittance, retention, and withdrawal; curriculum—academic, industrial, extra-curricular; methods of follow-up, etc.

Not open to students who have credit for School Administration 637 or 836.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34, also on page 77.

#### GENERAL AND BASIC

**800. Individual Problems.** Two to ten credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, graduate standing in the field of education and ten hours of graduate work in education approved by the instructor. Students may, with the approval of their advisers, register for more than one section of 800 or for the same section two or more times.

By permission of the Executive Committee of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under members of the Bureau staff.

- (a) Commercial Education. Mr. Stone.
- (b) Elementary Education. Mr. Brim, Miss Zirbes, Mr. Lindquist, Mr. Warner, Miss Bronsky, Mr. Heck.
- (c) Curriculum Techniques. Mr. Charters.
- (d) Guidance. Mr. Stone, Mr. Clifton, Mr. Warner, Mr. Smith.
- (e) Higher Education. Mr. Klein, Mr. Tyler.
- (f) History of Education. Mr. Good, Mr. Eckelberry.
- (g) Industrial Arts Education. Mr. Warner, Mr. Smith.
- (h) Philosophy of Education. Mr. Bode.
- (i) Secondary Education. Mr. Alberty, Mr. Eikenberry, Mr. Lindquist, Mr. Davis.
- (j) Special Education. Mr. Berry, Mr. Heck, Mrs. Charters.
- (k) Superintendency. Mr. Lewis, Mr. Reeder, Mr. Davis, Mr. Clifton, Mr. Heck, Mr. Holy.
- (l) Teaching of English. Mr. Seely.

- (m) Teaching of Social Studies. Mr. Landsittel.
- (n) Teaching of Foreign Languages. Mr. Tharp.
- (o) Teaching of Mathematics. Mr. Twiss.
- (p) Teaching of Science. Mr. Twiss.
- (q) Vocational Industrial Education. Mr. Stone, Mr. Warner, Mr. Smith.

**802. The Preparation of Theses and Other Scientific Reports.** Three credit hours. Winter Quarter. Open with permission of the instructor. Prerequisite, graduate standing in the field of education and credit for ten hours of graduate work in education. Mr. Reeder.

Emphasizes methods of research with special emphasis upon the preparation of theses. The following topics, among others, are treated: types of research; criteria for selecting and planning the problem; preparing the working and the final bibliographies; the securing of data; the organization, presentation, and interpretation of material; the form of citations; and the preparation of statistical tables and illustrations.

Not open to students who have credit for School Administration 800.

**804. Educational Experimentation.** Five credit hours. Spring Quarter. Prerequisite, graduate standing in the field of education and ten hours of graduate work in education approved by the instructor. Miss Zirbes, Mr. Tyler.

A consideration of significant aspects of the changing educational situation with particular reference to their implications for research. Methods of investigation and techniques of experimentation applicable to the evaluation of current trends in elementary, secondary and higher education.

#### PHILOSOPHY OF EDUCATION

**811. Seminary: Special Problems in Educational Theory.** Three credit hours. Autumn and Spring Quarters. Prerequisite, graduate standing in the field of education and fifteen hours of graduate work in education approved by the instructor. Mr. Bode.

#### HISTORY OF EDUCATION

**814. Comparative Education.** Five credit hours. Winter Quarter. Lectures and research. Prerequisite, graduate standing in the field of education and ten hours in the history of education. Mr. Eckelberry.

A survey of the present school systems of selected countries such as England, France, Germany, Russia, Canada, Argentine Republic, Australia, Denmark in comparison with the United States; and the study of topics such as the relation of national and local government to education; the sources of school support; the preparation of teachers; the methods and agencies of adult education.

Not open to students who have credit for History of Education 613 or 614, or School Administration 612 or 812.

**816. Seminary in the History of Education.** Two to five credit hours. Autumn, Winter, and Spring Quarters. Required of all candidates for advanced degrees specializing in the history of education. Prerequisite, graduate standing in education and fifteen hours in the history of education. Mr. Good, Mr. Eckelberry.

#### ELEMENTARY EDUCATION

**821-822. Major Course in Early Childhood and Elementary Education.** Five credit hours each Quarter. Autumn Quarter, Miss Zirbes; Winter Quarter, Mr. Lindquist. Prerequisite, graduate standing in the field of education and ten hours of graduate work in education approved by the instructor.

A comprehensive survey of elementary education. Required of all graduate students whose field of specialization is elementary education.

**824. Early Childhood and Elementary Curriculum.** Five credit hours. Spring Quarter. Prerequisite, Education 821 and 822. Mr. Brim.

A critical study of the reorganization, construction, and administration of the elementary school curriculum in the light of modern educational principles and objectives, the data contributed by research and the best current practices found throughout the country. Special attention will be given to organization of staff for curriculum study, to the basic issues in realizing a sound curriculum and to the installation, adaptation and administration of the revised curriculum.

Not open to students who have credit for Principles of Education 614 and School Administration 640.

**825. Elementary School Administration and Supervision.** Five credit hours. Winter Quarter. Prerequisite, Education 821 and 822. Mr. Brim.

A critical analysis of current practice in the organization, administration, and supervision of the elementary school. Formulation of guiding principles and effective program, practical implications of creative democratic leadership in efficient management, in the diagnosis of teaching, in the professional development of personnel, in the creative use of school and community activities, and in the broader public and professional relations of the school.

Not open to students who have credit for Principles of Education 613 or School Administration 628.

**\*826. Practice in Supervision.** Three credit hours. Spring Quarter. Alternative with Education 827. Prerequisite, Education 825. Miss Zirbes.

Typical school problems will be used to provide practice in the techniques of supervisory service. Emphasis will be placed on the application of principles of supervision to actual classroom situations.

**827. Laboratory Problems in Child Development.** Three credit hours. Spring Quarter. Alternative with Education 826. Prerequisite, Education 821 and 822. Miss Zirbes.

Students will make special studies of individuals and cooperative studies of groups at various levels of development under the direction of the instructor and with the cooperation of members of the staff of the University School.

**828. Seminary in Elementary Education.** Three to five credit hours. Spring Quarter. Prerequisite, fifteen hours of graduate work in education, approved by the instructor. Mr. Brim.

#### SECONDARY EDUCATION

**829. High School Administration and Supervision I.** Five credit hours. Spring Quarter. This course is required of all students whose field of specialization is secondary education. Prerequisite, Education 701 or 702. Mr. Davis.

A comprehensive survey of the major problems and issues in administration and supervision of the secondary school.

Not open to students who have credit for Principles of Education 610.

**830. High School Administration and Supervision II.** Five credit hours. Winter Quarter. This course is required of all graduate students whose field of specialization is secondary education and who are preparing for secondary school principalships. Prerequisite, Education 701, 702. Mr. Eikenberry.

An advanced course in the specialized techniques of high school administration.

Not open to students who have credit for School Administration 632, 633, 831, or 832.

**831. The Secondary School Curriculum.** Five credit hours. Spring Quarter. Prerequisite, Education 700 or 701. Required of all graduate students whose field of specialization is secondary education. Mr. Alberty.

A critical study of the construction, reorganization and administration of secondary school curricula and programs of study.

Not open to students who have credit for Principles of Education 625.

**832. The Junior College.** Three credit hours. Spring Quarter. Prerequisite, graduate standing in the field of education and Education 701 and 702. Mr. Klein.

The origin and development of junior colleges, including a critical survey of the several types: private, state and municipal. The place of the junior college in secondary education and readjustments in secondary and higher education that result from the junior college movement.

Not open to students who have credit for School Administration 840.

**837. Seminary in Secondary Education.** Three to five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Education 701, 702. Mr. Alberty, Mr. Eikenberry.

A seminary for advanced graduate students whose field of specialization is secondary education.

**842. Seminary in the Teaching of Mathematics and Physical Science.** Two or more credit hours. Autumn and Spring Quarters. One two-hour period

\* Not given in 1933-1934.



each week. Problems of minor or major research in the teaching of the physical sciences and mathematics in secondary schools. Required of all students who are working toward an advanced degree in this field. Prerequisite, graduate standing in the field of education and a minimum of twenty Quarter-credit hours in mathematics or physical science approved by the instructor. Mr. Twiss.

Not open to students who have credit for Principles of Education 821 or 822.

**843. Seminary in the Teaching and Supervision of Foreign Languages.** Three credit hours. Spring Quarter. Prerequisite, graduate standing in the field of education and thirty Quarter-credit hours, or the equivalent by course credit approved by the instructor or by comprehensive examination, in a foreign language taught in secondary schools. Mr. Tharp.

Not open to students who have credit for Principles of Education 846.

#### HIGHER EDUCATION AND TEACHER TRAINING

**845-846. Higher Education I; Higher Education II: Basic Courses.** Five credit hours. Autumn and Spring Quarters. The work of each Quarter is so arranged that either course may precede the other. Prerequisite, graduate standing in education; satisfaction of basic course requirements for all graduate students in education; and ten Quarter hours in secondary education. Open only to graduate students majoring in higher education, including teacher training. Mr. Klein.

A basic survey of problems in higher education, particularly as these relate to theory, history, organization and administration, curriculum and method, and student personnel, including measurement.

**\*847. Theory and Administration of Higher Education.** Five credit hours. Prerequisite, graduate standing in the field of education, satisfaction of basic course requirements for all graduate students in education and five hours in education approved by the instructor.

This course will study the theoretical and practical problems involved in the administration of institutions of higher education under modern social conditions.

Not open to students who have credit for Principles of Education 823 or School Administration 801.

**\*848. Curriculum and Method of Higher Education.** Five credit hours. Prerequisite, graduate standing in the field of education, satisfaction of basic course requirements for all graduate students in education and five hours in higher education.

A study of the development, principles, and administration of the curriculum and of teaching method in higher education.

Not open to students who have credit for Principles of Education 819 or School Administration 860.

**849. Source Materials in Higher Education.** Five credit hours. Autumn Quarter. Prerequisite, graduate standing in the field of education, satisfaction of basic course requirements for all graduate students in education and five hours in education approved by the instructor. Given in alternate years. Mr. Klein.

An intensive study of original documents that represent outstanding contributions to educational thought, historical development, and higher research investigation with special emphasis upon methods of research in this field.

**\*850. Teacher Training.** Five credit hours. Prerequisite, graduate standing in the field of education, satisfaction of basic course requirements for all graduate students in education and five hours in higher education.

A study of the problems of history, organization, administration, curriculum and method, student personnel (including measurement) peculiar to teacher training institutions.

\* Not given in 1988-1984.

**852. Achievement Tests in Higher Education.** Three credit hours. Winter Quarter. One two-hour period each week. Prerequisite, graduate standing in the field of education and permission of the instructor. Mr. Tyler.

A course for college instructors and research workers, to acquaint them with the techniques used in measuring attainment in the several fields of college instruction. Each student will carry on an examination project in his field.

Not open to students who have credit for School Administration 872.

## PRACTICAL ARTS AND VOCATIONAL EDUCATION

### A. Industrial Education

**856. Practicum in Industrial Education.** Three to five credit hours. Winter Quarter. Prerequisite, graduate standing in the field of education and thirty Quarter-credit hours in education and allied subjects of which fifteen, approved by the instructor, must be in education. Mr. Warner.

Investigations, reports and discussions concerning: nomenclature, historical development; analysis of professional objectives for their concepts; emphasis by grade levels; criterion basis of content selection and appraisal; teaching methods and devices; physical planning; organization; laboratory operation; testing; the teacher and his profession, concluding with a study of the various types of laboratory plans.

Not open to students who have credit for Practical Arts and Vocational Education 608.

**857. Administration of Industrial Education in Secondary Schools.** Three credit hours. Autumn Quarter. Prerequisite, graduate standing in the field of education and thirty Quarter-credit hours in education and allied subjects of which fifteen, approved by the instructor, must be in education. Mr. Stone.

Relation of Industrial Arts and Vocational Education to the general curriculum and the administrative responsibilities entailed. Courses of study; laboratory and shop provisions in building plans; equipment; relative costs; coordination problems; class and shop organization, and the development of an effective program of supervision. Selection of teachers and their improvement in service.

Not open to students who have credit for Practical Arts and Vocational Education 625.

### B. Industrial and Commercial Education

**860. Scientific Studies in the Practical Arts and Vocational Education.** Two credit hours. Autumn Quarter. Prerequisite or concurrent, Education 856. Mr. Warner.

An extensive view of research techniques applicable to the practical arts and vocational education; critical review and evaluation of published research examples in these fields; recognition and refinement of problems; study of research treatment; methods of writing and presenting research reports.

By permission of the Chairman of the Department of Education and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

Not open to students who have credit for Practical Arts and Vocational Education 801, 802, 803.

**862. Seminary in Practical Arts and Vocational Education.** Two credit hours. Winter and Spring Quarters. Prerequisite, Education 860. Mr. Stone, Mr. Warner, Mr. Smith.

Development of research problems. Topical reports and discussions. Preparation of theses or dissertations.

By permission of the major professor and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

## SUPERINTENDENCY

**873. Staff Personnel Administration.** Three credit hours. Autumn Quarter. Prerequisite, graduate standing in the field of education and thirty credit hours of education and allied subjects of which fifteen, including Education 727, approved by the instructor, must be in education. Mr. Lewis.

Definitions; rise of industry, government and education; philosophy of; man analysis and job analysis; selection; interviewing; in-service training; appraisal; supervision; absenteeism; marital condition; promotion; contracts certification dismissal, health and recreation;

ethics, morale; public and professional relations; pensions; tenure; salary schedules and other factors of economic and professional welfare.

Not open to students who have credit for School Administration 605 or 827.

**878. Federal and State School Administration.** Three credit hours. Winter Quarter. Three lectures each week. Assigned readings, investigations and reports. Prerequisite, graduate standing in the field of education and thirty credit hours in education and allied subjects of which fifteen, including Education 727, approved by the instructor, must be in education. Mr. Clifton.

Present conditions and the program of the federal department of education and of the departments of education of the several progressive states. The adjustment between national and state programs and the relationship of both of these to local administrative agencies. The state administration of the schools of Ohio.

Not open to students who have credit for School Administration 611 or 811.

**880. Planning, Constructing, and Equipping School Buildings.** Five credit hours. Spring Quarter. Assigned readings, observation trips, reports. Prerequisite, graduate standing in the field of education and thirty credit hours in education and allied subjects of which fifteen, including Education 727, approved by the instructor, must be in education. Mr. Davis.

A study of the major problems involved in determining the school building needs of a community, techniques for determining room requirements, types of buildings, their construction and adaptation to educational needs, school sites and present day equipment for school buildings, including types and arrangement of equipment for special and regular rooms, auditoriums, gymnasiums, libraries, cafeterias, offices, service systems, methods of selecting and purchasing equipment.

Not open to students who have credit for School Administration 606, 647, 648, 855, 856.

**882. Seminary in School Administration.** Two to five credit hours. Autumn, Winter, and Spring Quarters. At least one Quarter required of majors in the Superintendency. Prerequisite, graduate standing in the field of education and thirty credit hours in education and allied subjects of which fifteen, including Education 727, approved by the instructor, must be in education. Mr. Lewis, Mr. Reeder, Mr. Davis, Mr. Heck.

Specifically designed to aid students preparing masters' and doctors' theses. Students required to meet once a week as a group for discussions and direction.

#### SPECIAL EDUCATION

**897. Seminary in Special Education.** Three to five credit hours. Spring Quarter. Prerequisite, graduate standing in the Department of Education or Psychology, and permission of the instructor. Mr. Berry.

NOTE: For additional courses in special education, see Bureau of Special Education, page 51.

#### ELECTRICAL ENGINEERING

Office, 171 Robinson Laboratory

PROFESSORS DREESE AND CALDWELL, ASSOCIATE PROFESSORS BIBBER, EVERITT, AND KIMBERLY, ASSISTANT PROFESSORS SHEPARDSON, TANG, AND BYRNE

##### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 51.

**601. Direct Current Apparatus.** Five credit hours. One Quarter. Summer and Spring. Three class hours and three laboratory hours each week. Prerequisite, Mechanics 601.

Generators and motors; a study of their theory, construction, and operation.

**603. Alternating Current Circuits.** Five credit hours. One Quarter. Summer and Autumn. Five class hours. Prerequisite, Mechanics 601. Mr. Tang. Resistance, inductance, capacitance, reactance, impedance, series and parallel circuits, complex circuits, power, power factor, polyphase systems. Complex notation, non-sinusoidal waves, wave analysis, symmetrical components and transients in simple circuits.

**604. Alternating Current Laboratory.** Two credit hours. One Quarter. Summer and Autumn. Three laboratory hours. Prerequisite, Mechanics 601. Concurrent, Electrical Engineering 603. Mr. Tang.

Laboratory study of series and parallel circuits, polyphase circuits, phase differences, and wave forms.

**607. Applied Electronics.** Four credit hours. One Quarter. Autumn and Winter. Three class hours and two laboratory hours each week. Prerequisite, Electrical Engineering 605. Mr. Byrne.

An elementary study of electronic phenomena, electronic devices, and their application to electrical engineering.

**611. Medium and High Frequency Currents.** Five credit hours. One Quarter. Winter and Spring. Three class hours and one three-hour laboratory period each week. Prerequisite, Electrical Engineering 607. Mr. Everitt.

General analysis of alternating current circuits under wide ranges of frequency and impedance conditions. Network theorems, resonance phenomena, vacuum tube amplifiers, and a study of the conversion between mechanical or acoustical energy and electrical energy over wide frequency ranges. Alternating current measurements at medium and high frequencies.

**640. Electrical Engineering.** Two credit hours. Winter Quarter. Two class hours each week. Mr. Shepardson.

The elementary theory of direct and alternating current circuits, generators, motors, and other equipment.

**641. Electrical Engineering.** Five credit hours. Spring Quarter. Two class hours and two three-hour laboratory periods each week. Prerequisite, Electrical Engineering 640. Mr. Shepardson.

Theory, operating characteristics, and applications of direct and alternating current generators, motors, and other equipment.

**642. Electrical Engineering.** Four credit hours. One Quarter. Autumn, Winter, Spring. Three class hours, three laboratory hours, and six hours of preparation each week. Mr. Kimberly, Mr. Shepardson.

The electric current and its effects. Electrical circuits. Electrical measurements. Magnets and their application. Generators. Transformers.

**643. Electrical Engineering.** Four credit hours. One Quarter. Autumn, Winter, Spring. Three class hours, three laboratory hours, and six hours of preparation each week. Mr. Kimberly, Mr. Shepardson.

A continuation of electrical engineering fundamentals. Transmission and distribution. Motor characteristics, applications and control. Economic aspects, costs, and rates.

**661. Electrical Engineering Survey.** One-half credit hour. Autumn Quarter. One class hour each week. Mr. Dreese.

A course of lectures designed to give electrical engineering students some insight into other fields of thought.

**701. Alternating Current Apparatus.** Three credit hours. One Quarter. Autumn and Winter. Three class hours each week. Prerequisite, Electrical Engineering 601 and 603; concurrent, Electrical Engineering 705. Mr. Dreese.

Theory of transformers, induction motors, and related apparatus.

**702. Alternating Current Apparatus.** Three credit hours. One Quarter. Winter and Spring. Three class hours each week. Prerequisite, Electrical Engineering 701; concurrent, Electrical Engineering 706. Mr. Caldwell.

Theory of alternators, synchronous motors, converters, and other apparatus.

**705. Alternating Current Laboratory.** Four credit hours. One Quarter. Autumn and Winter. Five laboratory hours each week. Concurrent, Electrical Engineering 701.

Laboratory study of transformers and induction motors.

**706. Alternating Current Laboratory.** Four credit hours. One Quarter. Winter and Spring. Five laboratory hours each week. Concurrent, Electrical Engineering 702.

Laboratory study of alternators, synchronous motors, and converters.

**710. Electrical Transportation.** Four credit hours. Autumn Quarter. Three class hours and three problem hours each week. Prerequisite, Electrical Engineering 601 or equivalent. Mr. Bibber.

A synthesis of the students' previous work in mechanics, electrical engineering, and mathematics with reference to the application of electricity as a motive power to all forms of transportation, including railways, busses, elevators, and ships. Only the fundamental physical aspects are considered, no attempt is made to study the practical details.

**716. Communication Engineering.** Four credit hours. Autumn Quarter. Three class hours and three laboratory hours each week. Prerequisite, Electrical Engineering 611. Mr. Everitt.

Study of circuits with reference to their action at medium and high frequencies, electric filters, loading, theory of propagation of waves over long circuits, inductive interference and bridge circuits.

**717. Communication Engineering.** Four credit hours. Winter Quarter. Three class hours and three laboratory hours each week. Prerequisite, Electrical Engineering 716. Mr. Everitt, Mr. Byrne.

Coupled circuits, impedance matching networks, and the use of vacuum tubes as oscillators, amplifiers and detectors at medium and high frequencies.

**720. Electrical Illumination.** Four credit hours. Autumn Quarter. Three class hours and three laboratory hours each week. Mr. Caldwell, Mr. Tang.

Illumination, its development and present methods. Modern light-sources, and modification of light by reflectors, globes and other accessories. Light phenomena associated with illumination, such as reflection, transmission and absorption, direction and diffusion, refraction and color. Infra-red and ultra-violet radiation. Applications of illumination of industrial work, buildings, street-lighting, aviation, light-projection, etc.

**722. Electrical Illumination.** Three credit hours. Winter Quarter. Three class hours each week. Mr. Caldwell.

Modern lighting, both electric and daylight, especially as applied to buildings, such as industrial plants, stores, schools, residences, etc. A brief study of lamps and accessories and the phenomena of reflection, transmission, glare, diffusion, color, etc., as they affect illumination design. Circuits for electric lighting and their control.

**726. Advanced Electrical Communication.** Four credit hours. Spring Quarter. Three class hours and three laboratory hours each week. Prerequisite, Electrical Engineering 717. Mr. Everitt, Mr. Byrne.

An advanced study of medium and high frequency alternating current circuits. Radiation fields and their measurement.

**730. Electrical Design.** Four credit hours. Winter Quarter. Six hours in calculation periods each week. Given in alternate years. Prerequisite, Electrical Engineering 701. Mr. Dreese.

Design procedure and design theory of resistors, inductors, magnets, starters, regulators, direct-current generators and motors, alternating current transformers, etc., including mechanical and thermal problems; armature windings.

**741. Electric Utilities Engineering.** Three credit hours. Spring Quarter. Three class hours each week. Prerequisite, Electrical Engineering 601 and 603 or 642 and 643. Mr. Bibber.

Elementary principles of corporate finance, study of economic decay and tests for obsolescence, as applied to an electric power plant and distributing system; economic load division between units and plants, economic conductor section and distribution systems.

**742. Electrical Transmission and Distribution.** Three credit hours. Winter Quarter. Three class hours each week. Prerequisite, Electrical Engineering 701. Mr. Bibber.

The theory and operation of transmission and distribution systems and apparatus.

Not open to students who have credit for Electrical Engineering 740.

**746. Advanced Alternating Current Machinery.** Five credit hours. Spring Quarter. Three class hours and five laboratory hours each week. Given in alternate years. Prerequisite, Electrical Engineering 701, 705. Mr. Bibber, Mr. Kimberly.

Advanced theory and laboratory study of alternating current machinery.

Not open to students who have credit for Electrical Engineering 745.

**760-761-762. Advanced Theoretical Study of Electrical Engineering Practice and Equipment.** Credit hours to be arranged. Autumn, Winter, and Spring Quarters. All instructors.

**765-766-767. Special Advanced Laboratory.** Credit hours to be arranged. Autumn, Winter, and Spring Quarters. All instructors.

**770. The Application of Mathematics to Electrical Engineering Problems.** Three credit hours. Spring Quarter. Three class hours each week. Prerequisite, Electrical Engineering 603. Mr. Tang.

The content will be selected from the following fields: complex and hyperbolic quantities, calculus, differential equations, Fourier series, Heaviside operators. The applications will be illustrated by examples from electrical engineering and related fields.

**780. Engineering Field Problems.** Two credit hours. Spring Quarter. Two class periods each week. Prerequisite, Electrical Engineering 701 or 702 or 642 and 643. Mr. Kimberly.

A study of technical and economic problems found in electrical engineering practice.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include foundation courses in mathematics, physics and electrical measurements.

The general prerequisites include for 821 and 824, Electrical Engineering 701 and 702, or equivalent; for 825, Electrical Engineering 824; for 826, Electrical Engineering 824; for 832, Electrical Engineering 717, or equivalent.

Graduate work will be given to individual students and groups under the course numbers given below. The following are the fields of special interest of the instructors listed. Other lines of study are, however, taken up under their supervision. Mr. Dreese, Electrical Machinery. Mr. Caldwell, Alternating Current Apparatus and Illumination. Mr. Bibber, Transmission and Distribution, Alternating Current Apparatus. Mr. Everitt, Electrical Communication. Mr. Kimberly, Electrical Instruments, Alternating Current Apparatus. Mr. Shepardson, Electric Traction. Mr. Tang, Illumination, Electrical Mathematics. Mr. Byrne, Electronics, Electric Radiation.

**801-802-803. Advanced Theoretical Study of Electrical Engineering Practice and Equipment.** Credit hours to be arranged. Autumn, Winter, and Spring Quarters.

**805-806-807. Advanced Laboratory Study of Electrical Engineering Equipment.** Credit hours to be arranged. Autumn, Winter, and Spring Quarters.

**821. Revolving Fields and Permeances in Electrical Machinery.** Three credit hours. Autumn Quarter. Three class hours each week. Mr. Dreese.

An analysis of the various revolving and stationary fields found in electrical machinery. The origin and effects of both useful and parasitic fluxes are considered. Discontinuities and cusps in speed-torque curves of induction machines, synchronous-motor effects in induction machines, sub-synchronous speeds in induction and synchronous machines, and design for sub-synchronous operation are topics studied in this course.

**822. Revolving Fields and Permeances in Electrical Machinery.** Three credit hours. Winter Quarter. Three class hours each week. Mr. Dreese.

Continuation of Electrical Engineering 821.

**824-825-826. Advanced Synchronous Machine Theory.** Three credit hours. Autumn, Winter, and Spring Quarters. Three class hours and six hours of preparation each week. Mr. Bibber.

Review of fundamental considerations, general development of theory of symmetrical components, application to unbalanced loads on generators and systems, transient characteristics of synchronous machines, and system stability.

**831. Transmission Networks.** Three credit hours. Winter Quarter. Three class hours each week. Prerequisite, Electrical Engineering 716. Mr. Everitt.

Generalized treatment of transmission networks. Reflection and interaction factors. Advanced design and computation of filter systems and equalizing networks. Inductive interference.

832. **Electromagnetic Radiation and Radiating Systems.** Three credit hours. Spring Quarter. Three class hours each week. Mr. Everitt.

Scalar and vector fields. Maxwell's equations, electromagnetic radiation and propagation, antenna systems.

950. **Research in Electrical Engineering.** Autumn, Winter, and Spring Quarters.

NOTE: Detailed schedules of graduate studies available under the above course number may be obtained on application to the Department of Electrical Engineering.

## ENGINEERING DRAWING

Office, 218 Brown Hall

PROFESSOR FRENCH, ASSOCIATE PROFESSOR PAFFENBARGER

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

701. **Chemical Machine Drawing.** Two credit hours. Winter Quarter. Six laboratory hours each week. Mr. Paffenbarger.

The drawing and design of machinery and apparatus as related to industrial chemistry.

704. **Chemical Plant Layout and Design.** Four credit hours. Spring Quarter. Twelve laboratory hours each week. Prerequisite, Engineering Drawing 701. Mr. Paffenbarger.

Sketching and preliminary layout of industrial chemical plants. Design and drawing of a complete plant for the manufacture of a chemical or related product.

NOTE: **TEACHING COURSES.** For the Teaching Courses in this department see the Department of Education, Courses 696 and 697.

## ENGINEERING EXPERIMENT STATION

The Engineering Experiment Station is a division of the College of Engineering and was established by law to conduct technical research. The Station is authorized to cooperate with divisions of the State and National governments and with private individuals and corporations.

In many cases the Station investigations are such as may properly be conducted by graduate fellows working under direction of members of the faculty or Station staff. It follows, therefore, that not infrequently candidates for a graduate degree work out their theses or dissertations utilizing the equipment of the Station.

## ENGLISH

Office, 121 Derby Hall

PROFESSORS BECK, DENNEY, McKNIGHT, GRAVES, KETCHAM, PERCIVAL, WILEY, AND HATCHER, ASSISTANT PROFESSORS WALLEY, FRIERSON, MILLER, WILSON, CRAIG, SNOW, AND NEWDICK, MISS DENTON, MR. EMSLEY

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

608. **American Literature.** Five credit hours. Spring Quarter. Mr. Craig.

An historical survey by lecture and prescribed reading in the chief writers. One minor research will be required of each student.

**627. History of the English Language.** Three credit hours. Autumn Quarter. Lectures, quiz, and reports. Mr. McKnight.

A brief study of the English language prior to Chaucer, followed by a more detailed study of the later development of the language and the way it became standardized in grammar and vocabulary.

Especial attention is paid to the modern period, to the history of pronunciation and spelling, and the development of the rules which govern modern English usage.

Not open to students who have credit for English 427.

**636. Eighteenth Century Poetry and Prose.** Five credit hours. One Quarter. Autumn and Spring. Lectures, quiz, readings. Mr. Percival, Mr. Hatcher.

A study of the classical, romantic, realistic and sentimental literature of the eighteenth century. Representative prose, poetry, and drama. Especial attention will be given to a study of the life and times of Dr. Samuel Johnson.

**639. The Essay.** Five credit hours. Winter Quarter. Lectures, critical study, quiz. Mr. Beck.

The origin and development of the English essay as a literary type.

**641. Nineteenth Century Poetry: Romantic.** Five credit hours. One Quarter. Autumn, Winter, Spring. Lectures, quiz, readings. Mr. Percival, Mr. Beck, Mr. Snow.

Wordsworth, Shelley, Keats, and their contemporaries.

Not open to students who have credit for English 441.

**644. Nineteenth Century Prose.** Five credit hours. One Quarter. Autumn and Spring. Lectures, readings, discussions. Mr. Denney, Mr. Newdick.

Reading in Hunt, Hazlitt, Lamb, DeQuincey, Landor, Macauley, Carlyle, Newman, Ruskin, Arnold, Huxley, Pater, Stevenson, and in recent and contemporary essayists.

Not open to students who have credit for English 446.

**646. Middle English.** Three credit hours. Winter Quarter. Given in alternate years. Prerequisite, English 651. Mr. Emsley.

Grammar and reading of selected texts.

**651. Prose and Poetry.** Five credit hours. Autumn Quarter. Lectures, quiz, readings. Mr. McKnight.

Grammar and reading of selected texts.

**653. Chaucer and His Principal Contemporaries and Successors.** Five credit hours. Winter Quarter. Lectures, quiz, readings. Class enrollment limited to thirty. Mr. McKnight.

Chaucer's principal works are read. Consideration is also given to Gower, Wycliffe, Langland, the author of Sir Gawayne and the Grene Knight, Oocleve, Lydgate, Barbour, James I of Scotland, Dunbar, etc.

**654. English Medieval Literature to Chaucer.** Five credit hours. Autumn Quarter. Lectures, quiz, readings. Mr. McKnight.

A study of epic poetry in early English, followed by a study of legends, romances, tales, and metrical histories, all done by means of modern English renderings.

**\*655. The Novel: Richardson to Scott.** Five credit hours. Autumn Quarter. Lectures, quiz, readings.

The history and development of the novel in this period is given by lecture. Reading and criticism of Richardson, Fielding, Sterne, Jane Austen, and Scott.

**656. The Novel: Dickens to Meredith.** Five credit hours. Winter Quarter. Lectures, quiz, readings. Mr. Newdick.

The history and development of the novel in this period is given by lecture. Reading and criticism of Dickens, Thackeray, Trollope, George Eliot, Meredith, Hardy, James, and Conrad.

**657. Versification.** Five credit hours. Spring Quarter. Lectures, reading, practice. Special permission necessary. Class enrollment limited to thirty. Mr. Graves.

The theory of verse structure with a history of the principal English rhythms, and practice in verse composition.

\* Not given in 1933-1934.



658. **The Short Story.** Five credit hours. Winter Quarter. Lectures, quiz, readings. Special permission necessary. Class enrollment limited to thirty. Mr. Graves.

Lectures on structure and form in the short story, with class reports on assigned readings, and practice in story writing.

659. **Seventeenth Century Literature.** Five credit hours. One Quarter. Autumn and Spring. Four meetings each week and a fifth at the option of the instructor. Mr. Walley.

Non-dramatic literature of the seventeenth century with special reference to Milton. The poetry of Milton, Jonson, Donne, Herrick, the Cavaliers, and the church poets. The prose of Walton and the character books; Bacon, Burton, Browne, and Bunyan.

664. **The Celtic Renaissance.** Five credit hours. Spring Quarter. Four meetings each week and a fifth at the option of the instructor. Class enrollment limited to twenty. Mr. McKnight.

Subjects for study: The Ossianic literature of the eighteenth century, Lady Guest's translation of the Welsh Mabinogion and the English literary works inspired by the translation. The modern revival of ancient Irish story and the related modern literature by Yeats, A. E., George Moore, Lady Gregory, Fiona Macleod, Synge, and others.

Not open to students who have credit for English 813.

670. **Recent and Contemporary Drama.** Five credit hours. Winter Quarter. Four meetings each week with special reading in lieu of the fifth meeting. Prerequisite, a course in Shakespeare. Mr. Hatcher.

Fifty plays of the following authors will be read: Ibsen, Strindberg, Hauptmann, Wedekind, Kaiser, Chekov, Gorky, Capek, Molnar, Brieux, Claudel, Rostand, Maeterlinck, Wilde, Pinero, Galsworthy, Mayne, Ervine, Shaw, O'Neill and others.

674. **Spenser.** Five credit hours. Winter Quarter. Lectures, readings, reports. Mr. Hatcher.

A study of non-dramatic Elizabethan literature. Spenser, the development of the Elizabethan lyric, the sonnet sequences, the translations, the prose of Lyly, Sidney, Lodge, Green, and Nash.

675. **Play Production.** Five credit hours. Winter Quarter. Open to Seniors by special permission. Director, Mr. Miller.

Lectures and readings on the organization of little theater groups and the staging of plays.

676. **Shakespeare and Contemporary Dramatists.** Five credit hours. Autumn Quarter. Prerequisite, an elementary course in Shakespeare. Mr. Denney. Not open to students who have credit for English 672.

677. **Shakespeare and Contemporary Dramatists.** Five credit hours. Winter Quarter. Prerequisite, English 676. Mr. Denney.

Not open to students who have credit for English 672.

679. **Advanced Play Production.** Five credit hours. Spring Quarter. Three recitations and two hours to be arranged with the instructor. This course is open by special permission to students who have credit for English 675 and desire further work in the practical direction and production of plays. Mr. Miller.

680. **The Influence of the Theater on the Drama.** Three credit hours. Spring Quarter. Mr. Miller.

A study of the changes in dramatic form as a result of changes in the theater.

**NOTE: TEACHING COURSES.** For the Teaching Courses in this department see the Department of Education, Courses 670, 671, and 673.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

#### General Information for Graduate Students:

(1) Graduate study in English requires an undergraduate major in English (i.e. not less than 40 Quarter hours in "600" courses, twenty-five of which shall be in English courses) and a reading knowledge of either French or German. Students deficient in either of these respects,

in order to qualify for admission to candidacy for the M.A. degree, must be prepared to make up the deficiency by taking such extra work as the department may deem necessary. This will entail a longer period of residence.

(2) The graduate courses elected in preparation for the M.A. degree in English may be confined to courses offered by the English department. But this extreme concentration is not required. A student is not only permitted, but urged, to elect related courses (not exceeding one-third of his entire program) offered by other departments. Courses recognized as suitable for such election are the graduate courses in foreign languages, in history, and in philosophy and the following additional courses: Psychology 607, 621, 626, 680, 631, 645; Education 617, 670, 671; Music 601, 602, 603, 605; Fine Arts 654; Political Science 621, 622, 623. Other courses, to be acceptable, must have the approval of the Graduate Committee of the English Department.

(3) The faculty adviser of the student shall examine the student's preparation in English and in allied subjects and plan with him a suitable program of graduate study, including reading which is not a specified part of any particular course. These and other essential facts will be entered on the department record cards for its graduate students.

(4) Graduate study in the English department may be centered in the field of literature, of language, or of speech.

For an M.A. degree in English literature a candidate must offer evidence of (a) a general knowledge of the development of the English language and of the major authors and movements in English and American literature, and (b) a more detailed knowledge of one of the principal periods.

For an M.A. degree in English language a candidate must offer evidence of (a) a general knowledge of phonetics and of language history, and (b) a detailed knowledge of the stages in the development of the English language. He must also be acquainted with the literary history which forms a background in the development of the language.

For the M.A. degree in English speech a candidate must have (a) a detailed knowledge of phonetics, of rhetorical theories in their successive development, and of the theories of persuasion, and (b) a general knowledge of the main trends and personalities in English literature. He must also offer evidence of training in clear oral expression.

(5) The test of qualification for admission to candidacy for the M.A. degree will be a written examination taken by students who have fully satisfied entrance requirements for graduate study at the end of thirty Quarter hours of work.

(6) The thesis required for an advanced degree is intended to afford training in independent study and research. Since this training is a major purpose in the seminary (800) courses devoted to particular fields, the thesis will normally grow out of one of these courses. Additional credit, however, for work in preparation of the thesis may be gained by enrollment in one or more of the special dissertation courses, English 819, 820, 821.

**800. Bibliography and Methods of Research in English Literature.** Two credit hours. Autumn Quarter. Mr. Newdick.

Chief sources of material. Methods of investigation. Illustrative minor problems correlated with other courses. Recommended to graduate students as preparation for the writing of dissertations.

**801. History of the Short Narrative in English.** Two credit hours. Autumn Quarter. One two-hour session each week. Mr. Graves.

An investigation of types of the short story in English, from the Middle Ages to the present.

**802. The Lyric.** Two credit hours. Winter Quarter. One two-hour session each week. Mr. Graves.

A study of the characteristics of lyrical poetry with a history of the lyric in English literature.

**805. Studies in Criticism.** Two credit hours. One Quarter. Autumn and Spring. One two-hour session each week. Mr. Denney.

Topic for 1933-1934: History of Critical Theory.

**806. Problems in Comedy.** Two credit hours. Winter Quarter. One two-hour session each week. Mr. Denney.

**\*807. The Novel: End of the Nineteenth Century.** Two credit hours. Winter Quarter. One two-hour session each week.

A trial thesis is one artist of the field: Meredith, Hardy, James, Pater, Morris, Stevenson, Kipling, Conrad.

\* Not given in 1933-1934.

**\*808. Poetry: End of the Nineteenth Century.** Two credit hours. Autumn Quarter. One two-hour session each week.

A trial thesis in the field from Rossetti and Swinburne to the poets of the Nineties. The field will at times be extended backward to include Tennyson and Browning, and by announcement or election may be concentrated upon one or two artists.

**809. The Twentieth Century Realistic Novel: Considered in Relation to Its Origins, English and French.** Two credit hours. Spring Quarter. One two-hour session each week. Mr. Frierson.

**810. Studies in Modern English Language.** Three credit hours. Winter Quarter. One two-hour session each week. Prerequisite, English 627 or its equivalent. Mr. McKnight.

**811. Studies in the Period of Chaucer.** Three credit hours. Spring Quarter. One two-hour session each week. Prerequisite, English 653. Mr. McKnight.

**814. Studies in American Literature.** Two credit hours. Spring Quarter. One two-hour session each week.

Topic for 1934: The American Novel to 1890.

**815. Studies in Seventeenth Century Literature.** Five credit hours. One Quarter. Autumn, Winter, Spring. One two-hour session each week. Prerequisite or concurrent, English 659 and 676-677.

Topic for 1933-1934: Milton, Mr. Walley; Jacobean Drama, Mr. Walley; Restoration Drama, Mr. Wilson.

**816. Studies in Poetic Rhythm.** Two credit hours. Autumn Quarter. One two-hour session each week. Mr. Hatcher.

**818. Studies in Eighteenth Century Literature.** Five credit hours. Spring Quarter. One two-hour session each week. Prerequisite, English 636. Mr. Percival.

**822. Play Writing.** Two credit hours. Spring Quarter. One two-hour session each week. Class enrollment limited to twelve. Special permission necessary. Application must be made at least six weeks before the opening of the Quarter. Director, Mr. Miller.

Special attention to the one-act play.

**823-824. Studies in the Romantic Movement.** Five credit hours. Winter and Spring Quarters. One two-hour session each week. Except by special permission students who elect 823 will be expected to continue it with 824 in the following Quarter. Mr. Percival.

**950. Research in English.** Autumn, Winter, and Spring Quarters. Individual investigations. Mr. Denney, Mr. Graves, Mr. McKnight, Mr. Percival, Mr. Walley, Mr. Wilson.

#### PUBLIC SPEAKING

##### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**610. Advanced Debate Practice.** Five credit hours. Winter Quarter. Two practice periods and special meetings each week. Special permission necessary. Miss Denton, Mr. Glander.

An advanced course for students who show special ability in debate.

Not open to students who have credit for Public Speaking 410.

**625. The Forms of Public Address.** Five credit hours. Spring Quarter. Mr. Ketcham.

A study of the methods of the foremost American and English orators. Class discussions. Practice in the use of different forms of public address. Formal orations; inaugural; nominating speeches; after-dinner speaking; discussions of current events; political, business, and social addresses.

Not open to students who have credit for Public Speaking 525.

651. Special Problems in the Theory of Public Speaking. Five credit hours. Spring Quarter. Mr. Ketcham.

The function of the public speaker in reforms, revolutions, and public movements. Criticism and appreciation. Ideals, aesthetic standards in public speaking. Each student is required to make investigations in some special problem and to bring his results before the class for discussion.

**ENTOMOLOGY**

(See Zoology and Entomology)

**EUROPEAN HISTORY**

(See History)

**FARM CROPS**

(See Agronomy)

**FINE ARTS**

Office, 201 Hayes Hall

PROFESSORS HOPKINS, FANNING, PAYANT, LYNCH, AND BAGGS, ASSOCIATE PROFESSOR ROBINSON, ASSISTANT PROFESSORS FREY, WISER, AND RANNELLS

**FOR ADVANCED UNDERGRADUATES AND GRADUATES**

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These general prerequisites include fundamental courses in drawing, painting or sculpture, designing, and history of the fine arts, such as have been required of students majoring in the fine arts in any recognized university within the last five years.

Students whose general education, maturity and experience justify it, may be admitted to the courses without becoming candidates for the degree and pursue subjects for which they are qualified.

Requirements for the degree of Master of Arts. For properly qualified students the curricula below lead to the degree of Master of Arts. To receive this degree students must pass an examination upon the subjects taken and complete a satisfactory thesis as required of all candidates for the Master's degree. In Fine Arts this may be written, in case of the historical curriculum, or, in the technical curriculum, may consist of painting, sculpture, or of design. In any case a written statement of the problems and solution, with as many illustrations as may conveniently be compiled for presentation, is required.

**Curriculum in Fine Arts  
(Technical)**

Fine Arts	(661) 5	Fine Arts	(662) 5	Fine Arts	(663) 5
Fine Arts	(801) 5	Fine Arts	(802) 5	Fine Arts	(803) 5
Fine Arts	(670) 2	Fine Arts	(672) 2	Fine Arts	(676) 2
Fine Arts	(671) 3	Fine Arts	(673) 3	Fine Arts	(677) 3

**Curriculum in Fine Arts  
(Historical)**

Fine Arts	(670) 2	Fine Arts	(672) 2	Fine Arts	(676) 2
Fine Arts	(671) 3	Fine Arts	(673) 3	Fine Arts	(677) 3
Thesis	5	Thesis	5	Thesis	5
Fine Arts	(801) 5	Fine Arts	(802) 5	Fine Arts	(803) 5

**Combination Curricula**

In cases where Fine Arts is combined with other subjects the student should consult the department in regard to the proper sequence of courses.

600. The Theory and Practice of Teaching Art. Five credit hours. Winter Quarter. Five periods each week with outside laboratory assignments, observations and required readings.

A course dealing with the teaching and supervision of art in the elementary, middle and high schools.

Not open to students who have credit for Fine Arts 571.

**645-646-647. Portrait Painting.** Five credit hours. Autumn, Winter, and Spring Quarters. Five three-hour periods each week. Mr. Hopkins.

Painting from life. The organization and development of pictures with special reference to the delineation of character.

Not open to students who have credit for Fine Arts 545-546-547.

**654. History of Renaissance Art.** Five credit hours. Spring Quarter. Five lectures each week. Mr. Fanning.

The study of the Renaissance movement in Italy as reflected in architecture, painting, and sculpture; its influence upon other countries and its relationship to the intellectual trend from the fifteenth to the nineteenth century.

\***656. History of Oriental Art.** Five credit hours. Winter Quarter. Five lectures each week. Mr. Fanning.

The study of Asiatic culture expressed by the historical development of architecture, sculpture, and painting in Persia, India, China, and Japan. Illustrated lectures, reading, and reports.

**661-662-663. Advanced Technical Problems.** Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. Mr. Hopkins, Mr. Fanning, Mr. Payant, Mr. Frey, Mr. Wiser, Mr. Rannels.

This course is open, by permission of the department, to students who have shown particular ability in design, drawing, painting, or sculpture and who wish to pursue advanced problems in these fields under the supervision of the department. Students in Landscape Architecture pursue special work in design and construction under these courses.

**670. History of the Art of Ancient Egypt and Mesopotamia.** Two credit hours. Autumn Quarter. Mr. Fanning.

The specialized study of the ancient arts of the valleys of the Nile and Tigris-Euphrates and their influence upon eastern Mediterranean culture. Lectures, discussions and presentation by each student of some special problem of research.

**671. History of Hellenic Art.** Three credit hours. Autumn Quarter. Mr. Fanning.

The specialized study of Greek architecture, sculpture, and painting. Lectures, round table discussions and presentation by each student of some special problems of research.

\***672. History of Moslem Art.** Two credit hours. Winter Quarter. Alternating with Fine Arts 674. Mr. Fanning.

The study of Moslem architecture and minor arts with special attention to origins and influences. Lectures, reading, and reports.

**673. History of Christian Art of the Middle Ages.** Three credit hours. Winter Quarter. Mr. Fanning.

The specialized study of various phases of Romanesque and Gothic art as an expression of medieval Christianity in Italy, France, Germany, Spain, and England. Lectures, reading, discussion and reports on research topics.

**674. History of Spanish Art.** Two credit hours. Winter Quarter. Alternating with Fine Arts 672. Mr. Fanning.

The study of the architecture, sculpture, painting, and minor arts of Spain and the countries under Spanish influence. Lectures and reports.

**676. History of American Art.** Two credit hours. Spring Quarter. Alternating with Fine Arts 678. Miss Robinson.

A study of the work of the outstanding architects, painters, and sculptors in America as an index of the artistic trend of the eighteenth, nineteenth, and twentieth centuries. Illustrated lectures, reading, and reports.

**677. History of French Art from the Beginning of the Seventeenth Century to the Present Day.** Three credit hours. Spring Quarter. Alternating with Fine Arts 679. Reading knowledge of French required. Miss Robinson.

A specialized study of the architecture, sculpture, and painting of modern France. Illustrated lectures, reading, and reports.

**678. History of Art in the Low Countries.** Two credit hours. Spring Quarter. Alternating with Fine Arts 676. Reading knowledge of German or Dutch is desirable. Mr. Fanning.

Concentration upon the paintings of the Flemish and Dutch painters of the sixteenth and seventeenth centuries. Lectures and reports.

**679. History of German Art.** Three credit hours. Spring Quarter. Alternating with Fine Arts 677. Reading knowledge of German required. Mr. Fanning.

A specialized study of the architecture, sculpture, and painting of the Germanic people and their relationships to social and political development. Lectures, reading, and reports.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**801-802-803. Major Technical Problems.** Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. Mr. Hopkins, Mr. Fanning, Mr. Frey, Mr. Wiser, Mr. Baggs.

This course is open, by permission of the department, to graduate students who are qualified to do original work in ceramics, painting, or sculpture.

**804-805-806. Major Historical Problems.** Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. Mr. Fanning, Mr. Baggs.

This course is open, by permission of the department, to graduate students who are qualified to do original research in the history of fine arts.

### FRENCH

(See Romance Languages and Literatures)

### GEOGRAPHY

Office, 213 Commerce Building

PROFESSORS HUNTINGTON, VAN CLEEF, PEATTIE, AND CARLSON, ASSISTANT PROFESSOR SMITH, MR. VARVEL, MR. WRIGHT

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**603. The Localization of Manufacturing Industries of the United States.** Four credit hours. Spring Quarter. Four recitations each week. Mr. Wright.

Geographic influences on American manufacturing. The relation of land and population to the growth and variety of manufactures. The localization of particular industries. Centers of general industry. Industrial districts. Special study of representative industries, as to labor supply, sources, quantity, and value of material and power used, transportation facilities available, quantity and value of products, and problems of competition and markets. A term report will be required.

**604. Conservation of Natural Resources.** Two credit hours. Autumn Quarter. Two recitations each week. Mr. Huntington.

The importance of the fundamental natural resources: agricultural, forest, mineral, and water. The exploitation of soils, forests, mines, etc., and the movement for their conservation. Reclamation, reduction of erosion, development of forestry, elimination of waste, and problems in the utilization of inland water resources.

**605. Economic and Social Geography of Ohio.** Two credit hours. Winter Quarter. Two recitations each week. Mr. Huntington.

Geographic influences in the history of the state. Ohio's agriculture, industries, and social conditions, together with the underlying physical, climatic, and other environmental factors that have contributed to the present development of the region.

**606. Land Utilization.** Two credit hours. Spring Quarter. Mr. Huntington.

Land as a natural resource and economic factor. Agricultural, forest, mineral, and urban lands. Character and location as factors in utilization and value. Land policies and conservation policies. City planning, zoning, and suburban development.

\* Not given in 1933-1934.

**615. Climatology.** Three credit hours. Autumn Quarter. Three recitations each week. Mr. Smith.

A study of the elements of climate, particularly their geographic distribution. The controls of climate. Types of climate and their distribution, concluded by a consideration of the recent thought on the subject of climatic regions.

Not open to students who have credit for Geography 411.

**621. Geography of Europe.** Three credit hours. Autumn Quarter. Three recitations each week. Mr. Van Cleef.

A study of the major geographic problems of the continent. The economic, social, and political progress of the nations as affected by their geographic conditions.

**623. Geography of South America.** Three credit hours. Autumn Quarter. Three recitations each week. Mr. Carlson.

A study of South America by countries. Location, topography, climate, and natural resources, influencing economic, social, and political development. The commercial relations of South America, with particular reference to the United States.

**624. Geography of the Caribbean Region.** Three credit hours. Winter Quarter. Three recitations each week. Mr. Carlson.

The geography of the regions between the United States and South America. Their resources, industries, and products. The economic and social development of their people and the nature and relations of their trade, particularly with the United States.

**625. Geography of the Far East.** Three credit hours. Spring Quarter. Three recitations each week. Mr. Varvel.

Geographical aspects of the economic and political problems of Eastern and Southern Asia, the East Indies, and the island groups of the Pacific. The ratio of their natural resources to population and the resultant economic, social, and political consequences. The commercial relations of the United States with the Far East. Readings and reports.

**631. The Geography and History of Commerce.** Three credit hours. One Quarter. Autumn and Spring. Three recitations each week. Prerequisite, elementary courses in geography or four Quarters in history. Mr. Peattie.

A study of the basis and historical development of commerce of countries other than the United States.

**632. World Industries and Commerce.** Three credit hours. Autumn Quarter. Three recitations each week. Mr. Wright.

The world's important agricultural and manufacturing industries and the geographic factors influencing their location and development. Mineral resources and industries. The exchange of commodities; the direction of movement; and the balance of trade. The relation of trade balances to industrial development. Essential raw materials in national and international affairs. Possible world markets for the United States.

**634. Trade Centers and Trade Routes.** Three credit hours. One Quarter. Winter and Spring. Three recitations each week. Mr. Van Cleef.

A study of geographic factors in the establishment and growth of trade centers. The work of a port. Planning for its future.

The world's great trade routes, including land as well as water routes. The influence of the automobile, airplane, and airship upon routes.

The part played by postal, telegraph, cable, wireless, radio communication, the public press and the motion picture in the world's trade.

**641. Field Work in Geography and Commerce.** One to three credit hours. Spring Quarter. Prerequisite, eighteen hours of geography, and consent of the instructor. Not more than six hours' credit may be derived from Geography 641 and 642. Mr. Huntington, Mr. Van Cleef, Mr. Peattie, Mr. Carlson, Mr. Smith.

Special investigations in the field of applied geography. Each student will be required to write up the results of his work in a final typewritten report.

**642. Special Problems in Geography and Commerce.** Three credit hours. One Quarter. Autumn, Winter, Spring. Assigned readings, conferences, and reports. Prerequisite, eighteen hours of geography and consent of the instructor. Not more than six hours' credit may be derived from Geography 641

and 642. But three hours' credit from these courses will be given in a single Quarter.

- (a) Problems in Physical Geography. Mr. Peattie, Mr. Carlson.
- (b) Problems in Climatology. Mr. Smith, Mr. Peattie.
- (c) Problems in Political and Historical Geography. Mr. Huntington, Mr. Peattie.
- (d) Problems in Economic and Commercial Geography. Mr. Huntington, Mr. Van Cleef, Mr. Carlson.

**651. Anthropogeography.** Three credit hours. Winter Quarter. Three recitations each week. Mr. Peattie.

The influences of geographic environment. Geographic factors in history. Classes of geographic factors. Society and the state in relation to land. Geographic location. Geographic area. The significance of types of environment.

**661. Problems in Historical Geography.** Three credit hours. Winter Quarter. Three meetings each week. Mr. Peattie.

Principles of historical geography. Geographic factors in cultural developments.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**811. History of Geography.** Two credit hours. Spring Quarter. Two recitations or lectures each week. Prerequisite, eighteen hours of geography. Mr. Van Cleef, Mr. Peattie.

Readings in the classics. The history of the development of geographic theories. Modern tendencies as seen in current literature. This course is primarily intended for students majoring in geography or taking the higher degrees.

**850. Seminary in Geography and Commerce.** Two credit hours. Not more than two seminaries to be given each Quarter. The following will be given in 1933-1934:

#### AUTUMN QUARTER

- (a) Problems in Conservation. Mr. Huntington.
- (b) Problems in Foreign Commerce. Mr. Van Cleef.

#### WINTER QUARTER

- (a) Problems in Agricultural and Industrial Geography. Mr. Carlson.
- (b) Problems in Anthropogeography. Mr. Peattie.

#### SPRING QUARTER

- (a) Problems in Physical Geography and Cartography. Mr. Smith.

**950. Research in Geography and Commerce.** Autumn, Winter, and Spring Quarters.

Research work in historical and political geography will be conducted under the direction of Mr. Huntington and Mr. Peattie; in geography of conservation and land utilization under the direction of Mr. Huntington and Mr. Carlson; in physical geography and climatology under the direction of Mr. Peattie and Mr. Smith; in commercial and urban geography under the direction of Mr. Huntington and Mr. Van Cleef.

Conference, assigned problems, and reports.

## GEOLOGY †

Offices, 103, 104 Orton Hall

**PROFESSORS CARMAN AND SPIEKER, ASSISTANT PROFESSORS GRAHAM, STEWART, AND STOCKDALE, MR. STOUT, MR. COLE, MR. BERRY, MR. HOLMBERG**

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

The general prerequisites include also for Courses 605, 606, 607, 608, and 609 elementary courses in mineralogy; for 610, a course in physiography; and for 616, a course in chemistry.

**601. Advanced General Geology: Physiography.** Five credit hours. Autumn Quarter. Four recitations and one two-hour laboratory period each week. Saturday mornings must be kept open for field trips. Mr. Cole.

A detailed study of the processes at work on the land surface and the topographic forms produced by them. This course includes practice in the interpretation of topographic maps.

Not open to students who have credit for Geology 501.

† For courses in mineralogy and petrography see the Department of Mineralogy.



**602. Advanced General Geology: Structural and Dynamic.** Five credit hours. Winter Quarter. Four recitations and one two-hour laboratory period each week. Prerequisite, Geology 601. Mr. Spieker.

A detailed study of the structural features of the earth's crust and of the forces which have produced these structures. This course includes practice in the interpretation of geological maps.

Not open to students who have credit for Geology 502.

**603. Advanced General Geology: Historical.** Five credit hours. Spring Quarter. Four recitations and one two-hour laboratory period each week. Saturday mornings must be kept open for field trips. Prerequisite, Geology 602. Mr. Carman, Miss Stewart.

A study of the geological history of North America, its physical history, and life development. The course deals with the classification and distribution of the geological formations, especially those of Ohio, and with the characteristic fossils of each system.

Not open to students who have credit for Geology 503.

**605. Economic Geology: Metals.** Five credit hours. Autumn Quarter. Five recitations or lectures each week. Mr. Graham.

A study of the nature of ores, their classification and origin; the metallic deposits.

**606. Economic Geology: Non-Metals.** Three credit hours. Winter Quarter. Three recitations or lectures each week. Mr. Graham.

A study of the non-metallic deposits including coal, with special emphasis on the coals of Ohio.

**607. Economic Geology: Petroleum.** Three credit hours. Spring Quarter. Three recitations or lectures each week. Mr. Graham.

A study of petroleum, natural gas, and the solid bitumens; their origin, geological relations, and distribution.

**608. Stratigraphic Geology of Ohio.** Five credit hours. Autumn Quarter. Given in alternate years. Mr. Carman.

Field trips with reports, lectures, and assigned readings. Field trips on Saturdays (entire day) while the weather permits.

The geological formations of Ohio are studied in the field, by rock specimens, and by assigned readings. This course is intended to acquaint the student with the rock formations of Ohio.

**609. Petrology.** Five credit hours. Winter Quarter. Four recitations and one two-hour laboratory period each week. Given in alternate years. Mr. Graham, Mr. Holmberg.

A study of the origin, mode of formation, and geologic relations of rocks, with laboratory study in rock identification.

**\*610. Physiography of the United States.** Three credit hours. Winter Quarter. Three recitations and one two-hour laboratory period each week. Given in alternate years. Mr. Cole.

A study of the physiographic regions of the United States. The topographic form and physiographic history with the geologic history as a background. Designed to give the student of geology or geography a working knowledge of the physiography of the United States.

**612. Special Problems.** Three to five credit hours. All Quarters. Assigned readings, conferences, and reports.

A study of special topics by conferences and reports. Laboratory, library or field work.

**615. Geological Surveying.** Five credit hours. Spring Quarter. Two recitations and three field or laboratory periods each week. Given in alternate years. Students intending to elect this course should consult the instructor. Class limited to eight. Mr. Stockdale.

A study of the construction and interpretation of topographic and geologic maps, with special emphasis on instrument and map work in connection with oil surveying. Field practice in various methods of triangulation, traversing, and topographic sketching. Instruments used include plane table, telescopic alidade, open sight alidade, aneroid barometer, hand level, stadia, and compass.

**616. Clays.** Five credit hours. Winter Quarter. Recitations, lectures, and assigned readings. Mr. Stout.

The properties, distribution, uses, and origin of clays. Emphasis will be given to the clays of Ohio.

\* Not given in 1933-1934.

**620. Introductory Paleontology.** Three credit hours. Autumn Quarter. Two recitations and one two-hour laboratory period each week. Mr. Carman, Miss Stewart.

A study of the systematic classification of the animal kingdom as a means of becoming acquainted with the faunas that characterize the various geological formations. The course deals mainly with the generic characters of the fossil invertebrates and their use in identifying and correlating geological formations.

**621. Introductory Paleontology.** Three credit hours. Winter Quarter. Mr. Carman, Miss Stewart.

A continuation of Geology 620.

**622. Introductory Paleontology.** Three credit hours. Spring Quarter. Mr. Carman, Miss Stewart.

A continuation of Geology 621 but this course deals largely with the fossil vertebrates.

**\*623. Micro-Paleontology.** Three credit hours. Spring Quarter. Laboratory work. Given in alternate years. Prerequisite, Geology 620-621-622. Mr. Berry, Miss Stewart.

A study of fossil micro-organisms, especially the foraminifera.

**627. Field Geology.** Eight credit hours. Summer Quarter. Prerequisite, Geology 601-602-603 or equivalent and permission of the instructor. Limited to men. Mr. Stockdale.

This course offers training in the standard methods of geologic field work. It is conducted from a fixed field camp at Cumberland Spring, near Dayton, Tennessee, and employs the entire time of the students. The field for study is the Appalachian region of eastern Tennessee, which offers considerable variety in physiographic, stratigraphic, structural, and economic geology. The course begins about June 15 and continues five weeks, after which a report will be prepared by each student and submitted by the following December first.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include acceptable courses in physiography and inorganic and historical geology. If the student intends to specialize in historical geology he must have had in addition to the above, courses in chemistry and zoology; if in inorganic geology, courses in chemistry, physics and mineralogy; if in physiography, courses in physics and chemistry. The general prerequisites include for 807, Geology 620, 621, and 622.

**\*801-\*802-\*803. Advanced Historical Geology.** Three credit hours. Autumn, Winter, and Spring Quarters. Lectures and laboratory. Prerequisite, six courses in geology. Mr. Carman, Mr. Spieker.

A study of the physical history of the North American continent and of the life development which has taken place upon it. The lithology, subdivisions, geographical distribution, and fossils of each system are studied and from these the geological history of the time is interpreted.

**807. Advanced Paleontology.** Three or four credit hours each Quarter. Autumn and Winter. A student may enter at the beginning of either Quarter. Miss Stewart, Mr. Carman.

The identification and study of typical faunas from various geologic formations, with particular reference to those of Ohio. The work is individual and conducted as a laboratory course with conferences with the instructor in charge.

**810. Geology of the Eastern United States.** Three credit hours. Winter Quarter. Lectures, readings, conferences. Prerequisite, acceptable courses in historical and structural geology. Mr. Carman.

A review of the important stratigraphic and structural features of the Eastern United States. Special attention is given to the correlation of the important formations, the major structures and the geological history of the regions studied.

**811. Geology of the Western United States.** Three credit hours. Spring Quarter. Lectures, readings, conferences. Prerequisite, acceptable courses in historical and structural geology. Mr. Spieker.

A review of the important stratigraphic and structural features of the Western United States, as exemplified by the Cordilleran region. Special attention is given to the correlation of the important formations, the major structures, and the paleogeography of the region.

\*812. **Principles of Sedimentation and Stratigraphy.** Five credit hours. Spring Quarter. Prerequisite, courses in advanced general geology. Four lectures and one conference each week. Mr. Spieker.

The origin, constitution, and relationships of stratified rocks; an approach to the outstanding problems of stratigraphy, in which attention is given chiefly to processes of sedimentation and their results, the interpretative study of sedimentary rocks, and the general problems of correlation.

Not open to students who have credit for Geology 618.

815. **Seminary in Metamorphic Geology.** Two credit hours. Autumn Quarter. Prerequisite, Geology 609. Mr. Graham.

A study of the processes of metamorphism, with a critical analysis of the rock types produced.

816. **Seminary in Structural Geology.** Two credit hours. Winter Quarter. Mr. Spieker.

Conferences for the discussion of problems in geologic structure as exemplified and developed in selected mountain regions.

817. **Seminary in Earth Tectonics.** Two credit hours. Spring Quarter. Mr. Spieker.

Conferences covering the broader and more fundamental problems of earth structure, involving chiefly the nature and origin of crustal forces.

950. **Research in Geology.** Autumn, Winter, and Spring Quarters. Field, laboratory and library study. Prerequisite, acceptable courses in the field chosen and consent of instructor.

Research in stratigraphy and structural geology is conducted under the supervision of Mr. Carman, Mr. Spieker, and Mr. Stockdale; in paleontology under Mr. Carman, Miss Stewart, and Mr. Berry; in sedimentation under Mr. Spieker; in economic geology and petrology under Mr. Graham; and in physiography under Mr. Cole.

## GERMAN

Offices, 210, 211, 212, 213, 318, 319 Derby Hall

PROFESSORS EVANS, EISENLOHR, AND MAHR, LECTURER PHILIPPSON, ASSOCIATE PROFESSOR ROESELER, ASSISTANT PROFESSORS THOMAS (EMERITUS) AND GAUSEWITZ, MR. NORDSIECK

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 54.

German 685 requires acceptable courses in German composition.

**Proseminary: Eighteenth and Nineteenth Century Literature.** Three credit hours. Autumn, Winter, and Spring Quarters. Three hours lecture and quiz each week.

625. Autumn Quarter, 1933. Friedrich Schiller, Life and Work. Mr. Evans.

628. Winter Quarter, 1934. Studies in German Romanticism. Mr. Gausewitz.

632. Spring Quarter, 1934. Friedrich Hebbel, Life and Works. Mr. Mahr.

655. **German Phonetics.** Three credit hours. Autumn Quarter. Three hours lecture and drill each week. Prerequisite, six Quarters of German or equivalent. Mr. Philippson.

A study of the standard of German pronunciation and its chief variations. Practice in reading and writing phonetic texts.

†673. **Middle High German.** Three credit hours. Winter Quarter.

Introduction to the morphology and syntax of Middle High German. Reading of selections from the Nibelungenlied and Walthar von der Vogelweide.

\* Not given in 1933-1934.

† Not given during the academic year, 1932-1934.

\*675. **The German Language.** Three credit hours. Spring Quarter. Three hours lecture and quiz each week.

The study of texts illustrating the history of the German language.

685. **Advanced Composition.** Three credit hours. Spring Quarter. Three hours lecture and quiz each week. Mr. Mahr.

An advanced course in speaking and writing German, accompanied by a review of German syntax.

695. **Special Problems.** Two to ten credit hours. Autumn, Winter, and Spring Quarters. Autumn Quarter, Mr. Gausewitz; Winter Quarter, Mr. Evans; Spring Quarter, Mr. Röseler.

Investigations of minor problems in the various fields of German literature and philology.

**NOTE: TEACHING COURSES.** For the Teaching Course in this department see the Department of Education, Course 690.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

\*801. **Advanced Middle High German.** Three credit hours.

805. **Gothic.** Three credit hours. Winter Quarter. Mr. Philippon.

810. **Old High German.** Three credit hours. Spring Quarter. Mr. Philippon.

860. **Seminary in German Literature.** Five credit hours. Autumn, Winter, and Spring Quarters.

Autumn Quarter, 1933. The philosophical background of German classics. Mr. Röseler.

Winter Quarter, 1934. Studies in the German Novel. Mr. Mahr.

Spring Quarter, 1934. The Medieval Drama in Germany. Mr. Evans.

950. **Research in German.** Autumn, Winter, and Spring Quarters. Mr. Evans, Mr. Eisenlohr, Mr. Mahr, Mr. Gausewitz, Mr. Röseler.

### GREEK LANGUAGE AND LITERATURE

(See Classical Languages and Literature)

### HISTORY

Offices, 207, 204, 211, 215, 216, 217, 218, 305 University Hall

PROFESSORS WITKE, SIEBERT (RESEARCH), McNEAL, HOCKETT, WASHBURNE, AND DORN, ASSOCIATE PROFESSORS HILL, McDONALD, AND NOYES, ASSISTANT PROFESSORS ROSEBOOM, WEISENBURGER, AND SIMMS

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include at least four Quarters in the social science field, of which at least two must be in history.

607. **The Renaissance.** Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Dorn.

The Renaissance primarily as an Italian movement. The political evolution of the Italian communes into city republics, with special emphasis on Florence, Milan, Venice, Genoa, and Rome; early capitalism and industrial and commercial movements; an analysis of the culture, art, science, and literature of the Renaissance and their influence upon the Church, the Papacy, and modern modes of thought and behavior. Lectures, readings, reports, and discussions.

\* Not given in 1933-1934.

**608. The Reformation.** Three credit hours. Winter Quarter. Three class meetings each week. Mr. Dorn.

The Church and European society in the later Middle Ages; culture and thought in the age of the Reformation; the rise of the European state system; Luther and the German National movement; Zwingli and Switzerland; Calvin; the expansion of Protestantism in Europe; and the relation of the Reformation to medieval and modern civilization. Lectures, readings, reports, and discussions.

**609. The Roman Empire, the Period of the Principate.** Three credit hours. Autumn Quarter. Three class meetings each week. Prerequisite for undergraduates, History 656. Open to advanced students in the Department of Classical Languages. Mr. McDonald.

The development of the Roman government during the transition from the Republic to the Empire and the history and institutions of the Empire from Augustus to the period of confusion in the third century. Lectures, readings, reports, and discussions.

**610. The Late Roman Empire.** Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, same as for History 609. Open to advanced students in the Department of Classical Languages. Mr. McDonald.

A study of the history and institutions of the Empire from Diocletian to Justinian. Lectures, readings, reports, and discussions. The natural continuation of History 609, but may be taken separately.

**611. Constitutional History of England to 1485.** Three credit hours. Autumn Quarter. Three class meetings each week. Prerequisite, a major in History. Advanced students from other departments admitted only with the consent of the instructor. Mr. Noyes.

The origin and development of English legal institutions and government. Textbook, lectures, collateral readings, and discussions.

**612. Constitutional History of England since 1485.** Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, same as for History 611. Mr. Noyes.

A continuation of History 611. Special emphasis will be given to the evolution of parliamentary government, constitutional liberties, the cabinet and party system, Catholic emancipation, electoral reform, the Irish question, and the rise of democracy. Textbook, lectures, collateral readings, and discussions.

**613. England in the Tudor Period.** Three credit hours. Spring Quarter. Three class meetings each week. Advanced students from other departments admitted only with the consent of the instructor. Mr. Noyes.

An intensive study of England in the period of transition, emphasizing social and political conditions, together with a brief survey of contemporary Europe. Some attention will be given to the source material of the period. Lectures, readings, reports, and discussions.

**614. England in the Stuart Period.** Three credit hours. Spring Quarter. Three class meetings each week. Advanced students from other departments admitted only with the consent of the instructor. Mr. Noyes.

An intensive study of England in the seventeenth century emphasizing social and political conditions, and England's relations with Europe and North America. Some attention will be given to the source material of the period. Lectures, readings, reports, and discussions.

**617. The Absolute Monarchy (1650-1789).** Three credit hours. Spring Quarter. Three class meetings each week. Mr. Dorn.

This course offers a study of the transformation of feudal society into the modern absolute state in its social, economic and constitutional aspects, as exemplified in France, Spain, Austria, Prussia, and Russia. Special emphasis will be placed on France under Louis XIV, on the evolution of Prussia and Russia, the changing diplomatic alignments of the principal European Powers from 1660 to 1789, on the intellectual enlightenment of the eighteenth century and Enlightened Despotism. Readings, discussions, and reports.

†**619. Medieval Civilization.** Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, a major in history. Students majoring in other departments admitted only with consent of the instructor. Mr. McNeal.

The formation of feudal society; culture of castle and court; the rise of towns and their social and economic life; the evolution of the Medieval Church and its educational and artistic contributions. Lectures, readings, problems, and class discussion.

† Not given during the academic year, 1933-1934.

\*621. Expansion of Europe to 1588. Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, a major in history. Advanced students from other departments admitted only with the consent of the instructor. Mr. Washburne.

A study of the early geographical ideas of the Europeans, their first contact with the outside world, the period of discovery, the creation of the Portuguese empire in the east and the Spanish monopoly in the west, to the collapse of the Iberian control of European expansion by the destruction of the Armada in 1588. Lectures, readings, and discussions.

622. Expansion of Europe from 1588 to 1815. Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, same as for History 621. Mr. Washburne.

A study of the rise of the chartered trade companies, the ascendancy of the Dutch, the contest between the Dutch and the English for commercial supremacy and the long struggle between the English and the French for maritime supremacy, with its resultant effects upon India and North America through the settlement at the end of the Napoleonic era. Lectures, readings, and discussions.

623. Expansion of Europe from 1815 to the Present. Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, same as for History 621. Mr. Washburne.

A study of the problems of expansion in the nineteenth and twentieth centuries; the development of India; the movement into the Southern Pacific; the partition of Africa and the various phases of modern imperialism after 1876, through the readjustment of territory under the mandate system after the World War. Lectures, readings, and discussions.

624. The French Revolution and Napoleon. Three credit hours. Autumn Quarter. Three class meetings each week. Prerequisite, a major in history. Advanced students from other departments admitted only with the consent of the instructor. Mr. McNeal.

625. The Third French Republic. Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, same as for History 624. Mr. McNeal.

628. The Reconstruction of Europe (1919-1932). Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, History 630. Advanced students from other departments admitted only with the consent of the instructor. Mr. Washburne.

The first phase of reconstruction after the war, from the decisions of the Paris Conference of 1919 to the entrance of Germany into the League of Nations in 1926; the various national and international problems involved in the attempted settlement of world conditions. Lectures, readings and discussions.

629. Modern Germany (1789-1918). Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, History 401-402; advanced students from other departments without these prerequisites must obtain the consent of the instructor. Mr. Dorn.

Introductory lectures on the basic problems and tendencies of German history; Germany and the French Revolution; German Enlightenment and Romanticism and their relation to political thought; the Stein-Hardenberg reforms and the war of liberation; Prussia, Austria and the problem of German unity; the nationalist and democratic movements; the Bismarckian Empire; industrial development; William II and the World War; the German Revolution of 1918. Lectures, readings, reports, and discussions.

630. The Diplomacy of Europe (1878-1919). Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, a major in history. Advanced students from other departments admitted only with the consent of the instructor. Mr. Washburne.

A study with the use of the new material now available, of the diplomatic obligations of the European states from the Congress of Berlin of 1878 to the Paris Conference of 1919; the formation of alliances, the crisis which culminated in the war, and the attitude of European leaders. Lectures, readings, and discussions.

631. Constitutional History of the United States to 1837. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Hockett.

The purpose of this course, together with History 632, is to exhibit the growth of our constitutional system in its genetic aspects, as the product of vital social forces. Lectures, discussions, and reports.

\* Not given in 1933-1934.

632. **Constitutional History since 1837.** Three credit hours. Winter Quarter. Three class meetings each week. Mr. Hockett.

A continuation of History 631.

633. **The Slavery Controversy in the United States.** Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Simms.

The ante-bellum South and its destruction; the Civil War in the light of the forces which tended to hasten or obstruct the clash of arms. Lectures, readings, and discussions.

634. **Reconstruction and the New South (1863-1925).** Three credit hours. Winter Quarter. Three class meetings each week. Mr. Simms.

The aftermath of the slavery struggle as traced in the reconstruction of the Southern States and in the readjustment of society and of the states to the new status of the Negro, and to the economic forces of the last half century. Lectures, readings, reports, and discussions.

635. **American Diplomacy to the Close of the Civil War.** Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Hill.

The foreign relations of the United States, beginning with the diplomacy which resulted in the establishment of independence and including such subjects as the struggle for neutral rights and commercial recognition, the extension of territory on the continent, the origin of the Monroe Doctrine, and the international controversies of the Civil War. Lectures, discussions, and reports.

636. **American Diplomacy since the Civil War.** Three credit hours. Winter Quarter. Three class meetings each week. Mr. Hill.

Problems in the diplomacy of the United States resulting from the Civil War, the development of the Monroe Doctrine, the acquisition of dependencies, relations with Latin America and the Orient, arbitration, the Isthmian Canal, and neutral rights during the Great War in Europe. Lectures, discussions, and reports.

637. **Recent History of the United States (1875-1930).** Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Wittke.

An intensive study, by the topical method, of political, constitutional, industrial, and social problems during the last fifty years. Among the topics to be considered are the economic revolution; the rehabilitation of the South; the transformation of the West; agrarian unrest; third party movements; money and banking, and the tariff. Lectures, text-book, collateral readings, and discussions.

638. **Recent History of the United States (1875-1930).** Three credit hours. Winter Quarter. Three class meetings each week. Mr. Wittke.

This course is the natural continuation of History 637, but may be taken separately. Among the topics to be considered are the rise of capitalistic combinations; transportation problems; the labor movement; the women's movement; immigration; the trend of political reform; the foreign contacts of the United States; and the problems of reconstruction after the World War. Lectures, textbook, collateral readings, and discussions.

\*639. **The Influence of Immigrant Groups upon United States History.** Five credit hours. Spring Quarter. Five class meetings each week. Mr. Wittke.

The share of different immigrant groups in the building of the nation, from the colonial period to the present; with special emphasis on the influence of immigration upon American political, economic, social, and cultural development. Lectures, readings, and discussions.

640. **The Pioneer in American History to 1812.** Three credit hours. Spring Quarter. Three class meetings each week. Mr. Hockett.

This course, together with History 641, follows the expansion of settlement westward from the Atlantic coast, picturing the life of the pioneers and the rise of new communities, and tracing their influence upon national development. Lectures, discussions and reports.

\*641. **The Pioneer in American History since 1812.** Three credit hours. Spring Quarter. Three class meetings each week. Mr. Hockett.

A continuation of History 640.

643. **Political Parties in the United States.** Five credit hours. Spring Quarter. Five class meetings each week. Mr. Roseboom.

The radical part of the Revolution; the origin and growth of national parties; the slavery issue in party politics; the effect of the Civil War upon parties; party development in recent American history, special attention being devoted to the influence of the new economic and social conditions in creating new parties and policies. Lectures, readings, discussions, and reports.

\* Not given in 1933-1934.

**644. The Colonization of North America.** Three credit hours. Spring Quarter. Three class meetings each week. Mr. Roseboom.

A survey of the transplanting of European culture and institutions to North America. Colonizing methods of the leading colonial powers will be considered as well as the expansion of their colonies and the resulting international struggle for supremacy, with special emphasis upon English colonization and institutional development. Lectures, readings, reports, and discussions.

**\*645. Colonial Latin America.** Three credit hours. Winter Quarter. Three class meetings each week. Mr. Hill.

The European background; conquest and settlement; institutions and social conditions; development of the revolutionary spirit and the wars for independence. Lectures, readings, and discussions.

**646. The Latin-American Republics.** Five credit hours. Winter Quarter. Five class meetings each week. Mr. Hill.

The establishment of the republics; evolution of the larger powers, with minor attention to the smaller; relations of the republics with one another and with the outside world. Lectures, readings, and discussions.

**\*647. History of Canada.** Five credit hours. Spring Quarter. Five class meetings each week. Mr. Wittke.

An intensive study of Canadian history with special emphasis on the relations of Canada with the United States and with the mother country, and the comparison of Canadian institutions and problems with our own. Lectures, textbook, collateral readings, and discussions.

**†653. The Ancient History of the Near East.** Three credit hours. Autumn Quarter. Three class meetings each week. Mr. McDonald.

A survey of the history of Egypt, Sumer, Akkad, Babylon, and Assyria. Lectures, readings, and reports.

**654. The Age of the Crusades.** Three credit hours. Spring Quarter. Three class meetings each week. Advanced students from other departments admitted only with the permission of the instructor. Mr. McNeal.

Conditions in western Europe preceding the First Crusade, influence of the early crusading movement on the development of western Europe in the twelfth century, contemporary accounts of the Crusades. Readings, lectures, and reports on contemporary sources.

**655. Greek History.** Five credit hours. Winter Quarter. Five class meetings each week. Mr. McDonald.

An intensive study of Greece, with a brief introductory survey of the ancient civilization of the Near East. Lectures, readings, reports, and discussions.

Not open to students who have credit for History 412.

**656. Roman History.** Five credit hours. Autumn Quarter. Five class meetings each week. Mr. McDonald.

This course is the natural continuation of History 655. Lectures, readings, reports, and discussions.

Not open to students who have credit for History 413.

**\*659. The Hellenistic Age.** Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, History 655. Open to advanced students in the Department of Classical Languages. Mr. McDonald.

A study of the history, literature, and thought of the Greek world after Alexander. Lectures, readings, discussions, and reports.

**665. History of Spain and Portugal.** Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Hill.

Physiography of the Iberian peninsula and its influence on history; the Invasions, the evolution of Spanish institutions and society, with special emphasis on Arabic influence; the reconquest and rise of Modern Spain and Portugal. Lectures, readings, and discussions. Open to students majoring in Spanish with the consent of the instructor.

**NOTE: TEACHING COURSES.** For the Teaching Course in this department see the Department of Education, Course 678.

\* Not given in 1933-1934.

† Not given during the academic year, 1933-1934.



## FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84

These prerequisites include acceptable foundation courses of collegiate grade in European and American history, economics and political science.

**General Examination.** For the purposes of the general examination, required of all students who wish to be admitted to candidacy for the Ph.D. degree, the subject of history is divided as follows:

## DIVISION I

- (1) Greek History.
- (2) Roman History.
- (3) Political and Institutional History of the Middle Ages.
- (4) History of Continental Europe, 1300-1648.
- (5) English History to 1485.

## DIVISION II

- (1) English History since 1485.
- (2) History of Continental Europe, 1648-1871.
- (3) History of Continental Europe since 1871.
- (4) History of North America and the United States to 1789.
- (5) History of the United States, 1789-1876.
- (6) History of the United States since 1876.

## DIVISION III

- (1) The Expansion of Europe.
- (2) The Far East.
- (3) The Near East.
- (4) Latin-America.
- (5) Canada.

In the General Examination, every candidate will be required to pass an oral and written examination on five of the above fields (excluding the one in which his dissertation falls, which will be reserved for the final departmental examination). In defining these five fields, the candidate must select three from either Division I or II, and may select one from Division III. In no case may all be selected from one division only. The general examination must be taken not later than the middle of the second Quarter before the Quarter in which the student hopes to take his degree.

It is not intended that the mere taking of courses shall be an adequate preparation for this examination. The candidate will be expected to show a knowledge of each chosen field as a whole, and in addition the power of organization and interpretation which is essential to the pursuit of independent research. A reasonable knowledge of the literature of each field is likewise expected. Consultation with an instructor in each field will assist in intelligent preparation for this examination.

A sixth field, chosen from the above Division, to be designated as the field of the dissertation, will be made the subject of an intensive written test in the Final Examination. With the approval of the committee in charge of the General Examination, the field of the dissertation may be a definite portion of one of the fields listed in the Divisions. This written test will be followed by the Final Oral Examination. At the time of the Final Examination will be given also such written or oral tests as may be deemed necessary on such courses in other departments as may have been included in the approved courses of study. These will normally lie in the other social sciences but may for sufficient reasons be offerings in philosophy, language, literature, or other properly correlated subjects.

All candidates for the Master's degree are required to take at least two Seminars in History, under ordinary conditions, one in American History and one in European History.

All candidates for the degree of Doctor of Philosophy are required to take at least four Seminars in History, of which two must be in the field of American History and two in the field of European History.

**812. Introduction to Historical Research.** Three credit hours. Autumn Quarter. Three class meetings each week. Required of candidates for the Master's degree. Mr. Hockett.

A practice course dealing with the problems involved in the preparation of the Master's thesis. Should be taken during the student's first Quarter in the Graduate School.

Not open to students who have credit for History 601.

**813. The Great Historians, to the Nineteenth Century.** Three credit hours. Winter Quarter. Required of candidates for the Doctor's degree. Mr. Dorn, with cooperation of other members of the department.

A study of the leading historical writers and schools of Europe, with selected readings from representative writers.

Not open to students who have credit for History 651.

**814. The Great Historians of the Nineteenth Century.** Three credit hours. Spring Quarter. Prerequisite, History 813. Required of candidates for the Doctor's degree. Mr. Hockett.

A study of the leading European and American writers and schools of history of the last hundred years.

Not open to students who have credit for History 652.

**815. Seminary in European History.** Three credit hours. Autumn Quarter. This course must be preceded or accompanied by History 812 or 601. Mr. Dorn.

A practice course in research. Problem: Great French and German Historians of the Nineteenth Century.

**816. Seminary in European History.** Three credit hours. Winter Quarter. This course must be preceded or accompanied by History 812 or 601. Mr. Washburne.

A practice course in research. Problem: The Tightening of the Triple Entente in 1912.

**817. Seminary in European History.** Three credit hours. Spring Quarter. This course must be preceded or accompanied by History 812 or 601. A reading knowledge of either French or German required. Mr. McNeal.

A practice course in research. Problem: A critical study of the original sources of some phase of the twelfth and thirteenth centuries.

**819. Seminary in American History.** Three credit hours. Autumn Quarter. This course must be preceded or accompanied by History 812 or 601. Mr. Wittke.

A practice course in research. Problem: Topics in American Religious History.

**820. Seminary in American History.** Three credit hours. Winter Quarter. This course must be preceded or accompanied by History 812 or 601. Mr. Hockett.

A practice course in research. Problem: Slavery and the Constitution, 1880-1860.

**821. Seminary in American History.** Three credit hours. Spring Quarter. This course must be preceded or accompanied by History 812 or 601. Mr. Siebert.

A practice course in research. Problem: Underground Railway in the Anti-Slavery Movement.

## HISTORY OF EDUCATION

(See Education)

## HOME ECONOMICS

Office, 220 Campbell Hall

PROFESSORS GORRELL AND McKAY, ASSOCIATE PROFESSOR LINDQUIST, ASSISTANT PROFESSORS KENNEDY, DONNELLY, TURNBULL, BANCROFT, HUSTON, MINTON, AND SMITH, MISS RYAN, MISS HUGHES, MISS HEINER, MISS GRANDPREY, MISS DAVIS, MISS GRIFFITH, MISS UFER

In cooperation with the University Hospital, an opportunity is given for dietitian internes to schedule a sequence leading to the Master's degree. Candidates for appointment as student internes should be graduates of the four-year course of a recognized Home Economics department with a major in foods and nutrition or institution management.

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

Included in these general prerequisites are the following: Course 602 requires an acceptable course in agricultural chemistry; 611, fundamental courses in physiology and agricultural chemistry; 621, a course in psychology and in sociology or education; 631, a course in engineering drawing and in accounting.

**601. Clothing.** Three credit hours. One Quarter. Autumn and Spring. Three two-hour periods for class discussion and laboratory each week. Miss Heiner, Miss Ryan.

The application of the principles of color, line, and texture to costume for different types of persons and occasions. In addition an analysis is made of the factors which affect the utilization of clothing.

**\*602. Textiles.** Three credit hours. Autumn Quarter. Two hours for class discussion and one three-hour period for laboratory each week. Miss Griffith.

A study of methods of fabric analysis including microscopic, chemical, and physical tests. Discussion of recent developments in the field of textiles.

**611. Nutrition.** Five credit hours. One Quarter. Autumn, Winter, Spring. Three meetings for class discussion and two two-hour laboratory periods each week. Miss McKay, Miss Hughes.

A study of the fundamental principles of human nutrition and their application to the feeding of individuals and groups under varying physiological and economic conditions.

**612. Nutrition.** Five credit hours. Spring Quarter. Three two-hour periods each week for class discussion and laboratory; other hours to be arranged. Prerequisite, Home Economics 611. Miss McKay.

Experience in the use of current literature as a means of following the development of modern concepts of nutrition. Problems of feeding in connection with overweight, underweight, and other abnormal conditions in which diet is an important part of the treatment.

**614. Foods.** Three credit hours. One Quarter. Autumn and Winter. Three meetings each week for class discussion and demonstration. Prerequisite, Home Economics 611 and an acceptable course in the principles of economics. Miss McKay, Mrs. Minton.

This course considers problems of the modern home-maker concerning the purchase of food and the planning and preparation of meals.

**621. Child Development.** Five credit hours. One Quarter. Autumn, Winter, Spring. Four meetings for class discussion each week; laboratory to be arranged. Miss Smith, Miss Grandprey.

The nature, development, care and training of the child, and the responsibility of society for providing for the physical, mental, and social needs of the child. The Home Economics Nursery School affords an opportunity for observation and for experience with children.

**626. Principles of Home Management.** Three credit hours. One Quarter. Autumn, Winter, Spring. Three periods each week for class discussion. Prerequisite, Home Economics 611 and economics. Miss Lindquist.

A study of the management of the various resources available to the family, with a view to securing well-being and satisfaction for the members.

**627. Laboratory in Home Management.** Four credit hours. One Quarter. Autumn, Winter, Spring. One conference each week and laboratory to be arranged. Prerequisite, Home Economics 611 and 626. Mrs. Gorrell.

An application of the principles presented in other courses. Each student is provided with an opportunity to study the management of one or more homes, the needs of the student being considered. Reservations for this course must be made in advance. There is a residence fee for the course.

**630. The Purchase of Foods for Institutions.** Three credit hours. Spring Quarter. Three two-hour periods each week for discussion and laboratory. Prerequisite, Home Economics 611, a course in economics and consent of the instructor. Mrs. Kennedy.

A study of purchasing food on a large quantity basis. Marketing practices studied from the standpoint of buying for institutions.

**631. Institutional Cookery and Equipment.** Five credit hours. Autumn Quarter. Hours for discussion and laboratory to be arranged. Concurrent, Home Economics 614 and 632. Mrs. Kennedy.

Application of principles of cookery to large quantity preparation. A study of standardized formulas, calculation of food costs, the construction, operation and use of equipment, the writing of specifications, and the drawing of floor plans.

**632. Institution Organization and Administration.** Five credit hours. Autumn Quarter. Hours to be arranged. Concurrent, Home Economics 614 and 631. Mrs. Kennedy.

A study of the principles of organization and management applied to the problems of housing and feeding institution groups. Supervised experience in club service and cafeteria management.

**633. School Lunchroom Management.** Three credit hours. Spring Quarter. One lecture and four laboratory hours each week. Prerequisite or concurrent, Home Economics 611. Mrs. Kennedy.

This course is arranged for those who wish to be prepared to manage school lunch-rooms in connection with their teaching. It consists of a survey of equipment, organization, and management, with observations in city and rural school lunchrooms.

†**644. The Teaching of Home Economics.** Three credit hours. Winter Quarter. Three meetings each week for class discussion. Miss Donnelly.

The consideration of the problems of the experienced home economics teacher, discussion centering around the solution of these problems in the light of modern educational theories and practices.

**701. Special Problems in Home Economics.** Three to fifteen credit hours for one Quarter or more. To be given in units of three or five hours. Autumn, Winter, Spring. One conference or more each week.

Problems in various phases of home economics chosen for individual study. Groups will be organized as follows:

- (a) Problems in food preparation. Winter Quarter. Mrs. Minton.
- (b) Problems in nutrition and dietetics. Autumn, Winter, Spring. Miss McKay.
- (c) Problems in textiles. Autumn Quarter. Miss Griffith.
- (d) Problems in clothing. Autumn and Spring Quarters. Miss Ryan.
- (e) Problems in home furnishing. Winter and Spring Quarters. Miss Ufer.
- (f) Problems in household equipment. Spring Quarter. Miss Davis.
- (g) Problems in home management. Autumn, Winter, Spring. Miss Lindquist, Miss Smith.
- (h) Problems in institution management and equipment. Autumn, Winter, Spring. Mrs. Kennedy.
- (i) Problems in teaching home economics. Winter and Spring Quarters. Miss Donnelly.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

\***802. Seminary in Home Economics Teaching.** Three to five credit hours. Prerequisite or concurrent, Home Economics 644 and consent of the instructor. Miss Donnelly, Miss Huston.

A study of special problems in methods and supervision of home economics teaching.

**803. Seminary in Foods and Nutrition.** Three credit hours. Autumn Quarter. Prerequisite, consent of instructor. Miss McKay, Miss Hughes, Mrs. Minton.

Conferences and reports on topics in foods and nutrition.

**950. Research in Home Economics.** Autumn, Winter, and Spring Quarters. Mrs. Gorrell, Miss McKay, Miss Lindquist, Miss Donnelly, Mrs. Kennedy, Miss Smith, Miss Turnbull, Miss Griffith.

Investigational work bearing upon the problems of living, either in the home, the institution or under commercial conditions.

## HORTICULTURE AND FORESTRY

Office, 118 Horticulture and Forestry Building

PROFESSORS GOURLEY, PADDOCK, BROWN, AND LAURIE, ASSISTANT PROFESSORS CHADWICK, HOFFMAN, HOWLETT, SHOEMAKER, AND WIESEHUEGEL

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include acceptable courses in pomology, vegetable gardening, floriculture and forestry.

\***601. Horticultural Plant Breeding.** Three credit hours. Winter Quarter. Three recitations each week. Mr. Laurie.

A study of the methods of breeding of horticultural crops; the modification and improvement of plants under cultivation, together with a discussion of the theories of heredity.

\* Not given in 1933-1934.

† Not given during the academic year, 1933-1934.

**602. Experimental Horticulture.** Three credit hours. Autumn Quarter. One discussion period and six hours of laboratory work each week. Prerequisite or concurrent, Botany 605. Mr. Howlett.

This course is designed to study primarily the physiological responses of horticultural plants that have been grown under varying nutritional conditions. The emphasis will be placed upon the observation and examination of the plants themselves. Some of the subjects considered are: nitrate assimilation in horticultural plants, synthesis and reutilization of proteins, photoperiodism, nitrogen-carbohydrate relationships, potassium, phosphorus, and calcium deficiency. In this connection the student will become acquainted with some current research methods in horticulture.

**603. Experimental Horticulture.** Three credit hours. Winter Quarter. Two lectures and one recitation each week. Prerequisite, Botany 605.

This course is designed to study methods of study and interpretation of results in the field of research and experimental horticulture. Particular attention is given to planning of experimental work, a review of outstanding contributions, a critical discussion of recent articles on horticultural investigations, a summary of the work in progress at various institutions, statistical methods, and preparation of subject matter for publication.

**\*605. The Literature of Horticulture.** Three credit hours. Winter Quarter. Two recitations and one two-hour laboratory period each week. Given in alternate years. Mr. Paddock.

A study of the literature of horticulture.

**622. Advanced Vegetable Gardening.** Five credit hours. Spring Quarter. Four recitations and one two-hour laboratory period each week. Given in alternate years. Mr. Brown.

Devoted to the study of the history, anatomy, physiology, and culture of the principal vegetable crops including propagation, choice of varieties, soil adaptation, soil preparation, planting, fertilizing, cultivation, pest control, harvesting, storage methods, marketing and cost of production, and income.

Not open to students who have credit for Horticulture 422.

**628. The Marketing of Fruits and Vegetables.** Five credit hours. Spring Quarter. Five lecture periods each week. Prerequisite, Rural Economics 613. Mr. Hauck.

The principles involved in marketing fruits and vegetables will be considered. Attention will be given to various phases of preparation for market, distribution, transportation, terminal facilities, auctions, inspection, market news, etc. Emphasis will be placed upon the market outlets and methods which are most suited to Ohio products. One or two inspection trips of two or three days each will be made.

Not open to students who have credit for Rural Economics 628.

**649. Advanced Plant Propagation.** Five credit hours. Winter Quarter. Four recitations and one three-hour laboratory period each week. Mr. Chadwick.

This course is devoted to an intensive and detailed physiological, anatomical, and practical study of the principles and practices of propagation.

Not open to students who have credit for Horticulture 449.

**652. Structure of Vegetables and Ornamental Plants.** Three credit hours. Autumn Quarter. One recitation and two two-hour laboratory periods each week. Time to be arranged. Mr. Gourley.

A study of the structure of vegetables and ornamental plants as they relate to the economic production of these crops. The course is designed for advanced students who desire to make a critical study of horticultural materials.

**653. Structure of Economic Fruits.** Three credit hours. Winter Quarter. One recitation and two two-hour laboratory periods each week. Time to be arranged. Mr. Gourley.

A study of the structure and vascular arrangement of horticultural fruits. The viewpoint and emphasis of this course are designed to familiarize students with the structures that play a part in the development of various types of fruits and the relation of these structures in cultural development, spraying, storage, and culinary use.

\* Not given in 1933-1934.

\*683. **Arboriculture.** Three credit hours. Autumn Quarter. Two recitations and one three-hour laboratory period each week. Horticulture, fourth year. Given in alternate years. Mr. Laurie.

A study of the care of ornamental trees and shrubs. Fertilization, spraying, pruning, and tree surgery. A suitable course for those interested in city forestry, park maintenance, and cemetery development.

Not open to students who have credit for Horticulture 483.

701. **Minor Investigations.** Three to fifteen credit hours, taken in units of three or five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. All instructors.

This course is for students who desire to work out special problems in the fields of pomology, vegetable gardening, floriculture or forestry. Students will elect work in their desired subjects after a conference with the instructor in charge.

704. **Horticultural Seminary.** One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in horticulture. All instructors.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

950. **Research in Horticulture and Forestry.** Autumn, Winter, and Spring Quarters. Graduate students may do investigational work in some phase of the following subjects: pomology, vegetable gardening, plant breeding, floriculture, and forestry. Mr. Gourley, Mr. Brown, Mr. Laurie, Mr. Chadwick, Mr. Hoffman, Mr. Howlett, Mr. Shoemaker, Mr. Wiesehuegel.

### INDUSTRIAL ARTS EDUCATION

(See Education)

#### INDUSTRIAL ENGINEERING

Office, 125 Industrial Engineering Building

PROFESSORS YOUNGER AND KNIGHT (EMERITUS), ASSISTANT PROFESSOR RICKLY, MR. LEHOCZKY

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

601. **Engineering Organization.** Four credit hours. One Quarter. Autumn, Winter, Spring. Four recitations each week. Prerequisite, acceptable course in elementary machine work or practical experience. Mr. Younger.

The development of engineering organizations and a study of existing organizations. The differences in the functions of the jobbing and production shops. The coordination and relation of design engineering, research engineering, metallurgical engineering, production engineering, maintenance engineering, tool engineering, and safety engineering, all included under the title of Industrial Engineering.

602. **The Laws of Engineering Management.** Three credit hours. One Quarter. Autumn and Winter. Three recitations each week. Prerequisite, acceptable course in elementary machine work or practical experience. Mr. Lehoczky.

A consideration from an engineering standpoint of the fundamental laws of management.

603. **Work Analysis.** Three credit hours. One Quarter. Autumn and Spring. Three recitations each week. Prerequisite, Industrial Engineering 623 or advanced practical experience. Mr. Lehoczky.

The analysis of operations used in the manufacture of different engineering products and of work in general. The importance of using proper speeds and feeds in machining and fabrication. Work analysis as a basis for estimating in the choice of materials and in the simplification of design for production.

\* Not given in 1933-1934.

**623. Advanced Machine Work.** Three credit hours. One Quarter. Autumn and Winter. One recitation and six laboratory hours each week. Prerequisite, acceptable courses in elementary and advanced machine work. Mr. Rickly, Mr. Morrison.

A course that gives practice corresponding to that of the tool and maintenance division of commercial shops. Tools, jigs, fixtures, development work, and repairs furnish the necessary exercises.

**653. Work-Analysis Laboratory.** Three credit hours. Spring Quarter. One recitation and five laboratory hours each week. Concurrent, Industrial Engineering 603. Mr. Lehoczky.

Practice and application of time study methods to actual shop conditions. Determination from time study of piece work rates and of production costs. A term report is required of each student. This course must be taken concurrently with Industrial Engineering 603.

**661. Production Control Charts.** Three credit hours. One Quarter. Autumn, Winter, Spring. Two recitations and one two-hour laboratory period each week. Mr. Lehoczky.

The application of charts and graphs to production problems, organization, management, operation, labor and cost control. Laboratory exercises designed to supplement the theory.

**701. Selection of Manufacturing Equipment.** Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, acceptable course in elementary machine work or practical experience. Mr. Younger.

The selection of manufacturing equipment. Specialized machines versus standard machines. The growing use of semi-automatic and full-automatic machine tools. Study of the product as regards machine tool to be used and the possibility of combining operations in one machine.

**702. Work Routing.** Four credit hours. Winter Quarter. Four recitations each week. Prerequisite, Industrial Engineering 623 or practical experience. Mr. Younger.

The engineering problems involved in the proper sequence in manufacturing operations. Types of plants to secure the best arrangements of equipment and processing. Handling and supervising the product at and between machines.

**706. Methods of Waste Elimination.** Four credit hours. Spring Quarter. Four lectures and recitations each week. Mr. Younger.

A study of industrial standards, their control and application. Simplification, inspection, waste elimination, and allied subjects. Students are required to do contemporary reading and to give reports in class.

**712. Principles of Industrial Engineering.** Three credit hours. One Quarter. Autumn, Winter, Spring. Three lectures each week. Mr. Younger.

The developing of engineering organizations. Jobbing and production shops. The coordination and organization of engineering functions. Work-analysis and routing. How to select mechanical equipment. Standardization, simplification, and waste elimination.

Not open to students who have credit for Industrial Engineering 601.

**751. Tool Engineering.** Three credit hours. Autumn Quarter. One recitation and six hours of drawing-room practice each week. Prerequisite, Industrial Engineering 623 or practical experience. Mr. Rickly.

A course in the design of tools, jigs, and fixtures. Attention given to the forms, life and efficiencies of cutting tools. The simple elements of jig design, such as different forms, locating points, clamping devices, and standardized parts, with drawing-room practice leading up to design of the more complicated fixtures.

**752. Work-Routing Laboratory.** Three credit hours. Winter Quarter. One recitation and two three-hour laboratory periods each week. Concurrent, Industrial Engineering 702. Mr. Lehoczky.

Practice in the work of placing machine tools and laying out departments in their proper sequence for manufacturing specific products to best advantage. Visits to local plants to survey their methods in these respects.

**761. Elementary Production Control.** Three credit hours. One Quarter. Autumn and Winter. Three lectures and recitations each week. Prerequisite, Industrial Engineering 601 and calculus. Mr. Lehoczky.

Quantitative analysis from the standpoint of cost control of machines, equipment, and labor.

**762. Advanced Production Control.** Three credit hours. One Quarter. Winter and Spring. Three lectures and recitations each week. Prerequisite, Industrial Engineering 761 and calculus. Mr. Lehoczky.

The application of quantitative methods of control in industry in the fields of inverse relationships, least cost combinations, purchasing quantities, seasonal production and related problems.

**763. Production Control Research.** Three credit hours. One Quarter. Autumn and Spring. Three meetings each week. Prerequisite, Industrial Engineering 762 and calculus. Mr. Lehoczky.

Advanced research work in special phases of the work given in Industrial Engineering 761 and 762. Each student is required to complete a project in his chosen field.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**950. Research in Industrial Engineering.** Autumn, Winter, and Spring Quarters. Mr. Younger, Mr. Lehoczky.

Research work in the various phases of Industrial Engineering: production control, production economics, time and motion study, shop processes, etc.

### ITALIAN

(See Romance Languages and Literature)

### JOURNALISM

Office, Journalism Building

PROFESSORS MYERS AND HOOPER (EMERITUS), ASSISTANT PROFESSORS  
GETZLOE AND LUXON, MR. POLLARD

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**607. Special Newspaper Problems.** Two credit hours. One Quarter. Autumn and Spring. One recitation and one laboratory period each week on the Lantern. Mr. Myers.

Consideration of the problems of newspaper work and direction, including advertising and circulation. Individual theses are required.

**608. Special Newspaper Problems.** Two credit hours. Winter Quarter. One recitation and one laboratory period each week on the Lantern. Prerequisite, Journalism 607. Mr. Myers.

A continuation of Journalism 607.

**621. Editorial Writing.** Three credit hours. One Quarter. Autumn and Spring. Three recitations each week. Mr. Getzloe.

Study of the purpose, form, style, and spirit of the editorial. Consideration of current events, practice in news interpretation and other editorial writing, and study of editorial pages.

**622. The Press and Public Opinion.** Three credit hours. Winter Quarter. Three recitations each week. Mr. Getzloe.

Study of the newspaper's part, through news-selection and display, through editorial-writing, and in the dramatic, music and literary departments. Current events and practice editorial-writing.

**625. Journalism Practice.** Two to five credit hours. One Quarter. A laboratory course in which work is done off the campus.

Credit in this course is given to students who complete, under the supervision of the School of Journalism, not less than six weeks as full-time staff members of a newspaper or newspapers approved by the School.



## FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

802-803-804. **The Newspaper as a Force in Human Progress.** Two credit hours. Autumn, Winter, and Spring Quarters. All instructors.

Lectures, individual research, and group discussions participated in by those investigating related subjects. A study of the newspaper in its relation to democracy, and of the outstanding figures in journalism.

## LATIN LANGUAGE AND LITERATURE

(See Classical Languages and Literature)

## MANUAL ARTS

(See Education)

## MATHEMATICS

Offices, 307, 314, 315, 316, 317, 319 University Hall

PROFESSORS KUHN, RASOR, MORRIS, ARNOLD (EMERITUS), BLUMBERG, RADO, AND WEAVER, ASSOCIATE PROFESSOR MacDUFFEE, ASSISTANT PROFESSORS BAREIS, BAMFORTH, AND LA PAZ

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These general prerequisites include an acceptable course in calculus. Course 661 requires also a course in physics.

601. **Advanced Calculus.** Five credit hours. Autumn Quarter. Mr. Weaver. Selected topics from Advanced Calculus.

607. **Introduction to the Theory of Functions of a Complex Variable.** Five credit hours. Winter Quarter. Prerequisite, Mathematics 601. Mr. Rasor.

The algebra of complex numbers with their corresponding geometric representation; conformal representation; theory of power series; definition and properties of analytic functions; introduction to the theory of functions as developed by Cauchy, Riemann, and Weierstrass.

611. **Differential Equations.** Five credit hours. Winter Quarter. Mr. Kuhn.

Linear equations with constant coefficients; equations of first, second, and higher orders; numerical approximations; solutions in series; existence theorems of Picard, Cauchy, and Frobenius; simple partial differential equations; applications.

\*617. **Introduction to Modern Mathematics.** Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, ten credit hours in mathematics beyond calculus, or permission of the instructor. Mr. Blumberg.

The principal aim of this course is not the imparting of comprehensive information but the initiation of the student, by means of lectures, collateral reading and problems, into various mathematical domains. The content will be selected from the following fields: graphical and numerical methods, projective geometry, theory of numbers, the mathematical continuum, mathematical foundations, point sets, groups, probability, and relativity.

621. **Advanced Euclidean Geometry.** Five credit hours. Winter Quarter. Mr. Weaver.

Geometric constructions; points, lines and circles associated with a triangle; harmonic ranges and pencils; harmonic properties of the circle; radical axis; pole and polar with respect to a circle; inversion; symmedian points; Brocard points. This is chiefly a problem course in the field of plane geometry, and is of special value to teachers of this subject.

\* Not given in 1938-1939.

**623. Projective Geometry.** Five credit hours. Spring Quarter. Miss Bareis.

Plücker line coordinates, duality, infinite elements, projection, double ratio, projective coordinates in one and two dimensions, projective transformations, collineations and involutions in one direction, projective properties of conics.

**625. Solid Analytical Geometry.** Five credit hours. Autumn Quarter. Given in alternate years. Miss Bareis.

Systems of co-ordinates; planes and lines; types of surface; quadric surfaces; duality.

**641. Elementary Theory of Equations.** Five credit hours. Autumn Quarter. Mr. Kuhn.

Construction with ruler and compasses, numerical equations, determinants, symmetric functions; text: Dickson's First Course in the Theory of Equations.

**661. Vector Analysis.** Five credit hours. Spring Quarter. Prerequisite, Mathematics 601. Mr. Weaver.

Vector and scalar algebra and geometry, differentiation and differential operators, applications to electrical theory and to mechanics, dynamics, and hydro-dynamics.

**\*671. Introduction to the Theory of Relativity.** Five credit hours. Autumn Quarter. Prerequisite, Mathematics 661. Mr. Blumberg.

This course will be prefaced by a brief review of those parts of the classical theories of dynamics and physics which are necessary to an understanding of the special theory of relativity, its applications, and the elementary aspects of the general theory of relativity.

**\*691. Probability.** Five credit hours. Autumn Quarter. Given in alternate years. Prerequisite, Mathematics 601. Mr. Morris.

The first half of the course will be devoted to the development of the theory of probability from the standpoint of permutations, combination, choice and chance; the second half to a formal development of the subject as given by Coolidge in "Introduction to Probability."

**\*692. Finite Differences.** Five credit hours. Winter Quarter. Given in alternate years. Prerequisite, Mathematics 691. Mr. Morris.

An introduction to finite differences; development of the more important methods of interpolation and summation.

**\*696. Statistics.** Five credit hours. Spring Quarter. Given in alternate years. Prerequisite, Mathematics 692. Mr. Morris.

Derivation of statistical formulas by use of the theory of probability; least squares and their application to curve fitting; frequency distribution curves.

**700. Minor Problems.** Three to five credit hours. Autumn, Winter, and Spring Quarters.

This course consists of conferences, assigned readings, and reports for minor investigations.

**701. Introduction to Analysis I.** Five credit hours. Autumn Quarter. Prerequisite, permission of instructor. Mr. Blumberg.

The principal aim will be not to equip the student with comprehensive knowledge, but to train him in handling with some facility various fundamental notions and methods in analysis. The subject matter will be selected from the following topics: the real continuum; introduction to the Theory of Point Sets; basal notions in the field of real functions; measure; Riemann, Lebesgue, and other integrals; multiple integrals; Green's and related theorems; implicit functions; series, and in particular, introduction to Fourier series.

**702. Introduction to Analysis II.** Five credit hours. Winter Quarter. Prerequisite, permission of instructor. Mr. Blumberg.

A continuation of Mathematics 701.

**703. Introduction to Analysis III.** Five credit hours. Spring Quarter. Prerequisite, permission of instructor. Mr. Blumberg.

A continuation of Mathematics 702.

**†741-\*742-\*743. Introduction to Higher Geometry.** Five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, permission of the instructor.

Metric, affine, and projective properties of conic sections and of quadric surfaces. Fundamental notions of differential geometry. Geometry on a surface. Non-Euclidean geometries. Groups of transformations.

\* Not given in 1933-1934.

† Not given during the academic year, 1933-1934.

761-762-763. Introduction to Higher Algebra. Five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, permission of the instructor. Mr. MacDuffee.

Elementary theory of number; congruences; binary forms; continued fractions; groups; fields; matrices; invariants; elementary divisors; Galois fields; algebraic fields; ideals.

**NOTE: TEACHING COURSES.** For the Teaching Course in this department see the Department of Education, Course 687.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

Students intending to specialize in mathematics should acquire as soon as possible a reading knowledge of French, German, and Italian.

**NOTE:** Students should consult with instructors before registering for courses open only to graduates.

#### GRADUATE MATHEMATICS CLUB

The Graduate Mathematics Club fosters interest in the latest advances in Mathematics, its application and its pedagogy. The meetings, which are held fortnightly consist of reports by members of the staff and by graduate students on their own investigations or on recent books or journal articles, and of addresses intended to orient the members of the Club in reference to various mathematical branches of wide scope. As far as possible, the presentation of the papers demands a minimum of technical equipment on the part of the hearers and is on the whole intended to be intelligible to students beginning their graduate work. Since it is the Graduate Mathematics Club which brings into special focus the living, growing character of mathematical science, it is expected that all graduate students of mathematics will cooperate in the work of the Club and attend the meetings regularly.

\*801-\*802-\*803. Theory of Functions of a Complex Variable. Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Mathematics 703 or permission of the instructor.

Fundamentals. Application to Conformal Mapping.

\*804-\*805-\*806. Point Sets and Real Functions. Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Mathematics 703 or permission of the instructor. Mr. Blumberg.

A development of the ideas from the simplest to those contained in current literature. The principal aim is the comprehension of the principles for asking and answering questions in this field.

807-808-809. Ordinary and Partial Differential Equations. Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Mathematics 703 or permission of the instructor. Mr. Bamforth.

Existence theorems; properties of solutions depending upon initial conditions and parameters; geometrical properties of solutions; dynamical systems; stability of solutions; linear differential equations.

810-811-812. Calculus of Variations. Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Mathematics 703 or permission of the instructor. Mr. LaPaz.

Formulation of typical problems; classical necessary conditions; the Jacobi condition and the criteria for conjugate points due to Bliss; imbedding theorems and the Weierstrass sufficiency proof; the Hamilton-Jacobi theory; double integral problems; inverse problems and direct methods in the calculus of variations; applications in theoretical mechanics and Riemannian geometry.

\*813-\*814. Mathematical Methods in Theoretical Physics. Three credit hours. Prerequisite, Mathematics 601 or permission of the instructor. Mathematics 813 and 814 are prerequisite for Physics 860 and 861. Mr. Bamforth.

This course aims to discuss from a mathematical point of view topics which are fundamental in the study of modern theoretical physics, such as series development of arbitrary functions, integral equations, calculus of variations, boundary value problems, and potential theory.

\* Not given in 1933-1934.

**\*816. Fourier's Series and Spherical Harmonics.** Three credit hours. Spring Quarter. Prerequisite, Mathematics 701, 702, or permission of the instructor. Mr. Bamforth.

Convergence, summability, integration and differentiation of Fourier's Series, expansions of functions in terms of Legendre's Polynomials, and surface spherical harmonics; applications to physics.

**\*818. Infinite Series and Products.** Three credit hours. Autumn Quarter. Prerequisite, ten Quarter-hours of mathematics beyond calculus. Mr. Blumberg.

This course includes selections from the following topics: theories of irrationals; series of positive terms; convergence tests; general series; double series; transformation of series; infinite products; Fourier, Dirichlet and power series; special series; divergent series.

**\*820. Integral Equations.** Three credit hours. Spring Quarter.

**\*823. Tensor Analysis.** Three credit hours. Spring Quarter. Prerequisite, Mathematics 852. Mr. MacDuffee.

Invariants of differential forms with applications to geometry and the Theory of Relativity; tensors of the Calculus of Variations; physical applications.

**\*825. Partial Differential Equations.** Three credit hours. Prerequisite, permission of the instructor.

A study of partial differential equations of the first and second order, with special attention to the various applications to geometry and physics.

**841-842-843. Differential Geometry.** Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Mathematics 743 or permission of the instructor. Mr. Radó.

Review of fundamental notions. Applications of the general theory to special problems, in particular to problems in the large and to variation problems arising in connection with length, area, volume, curvature.

**\*861. Theory of Fields.** Three credit hours. Autumn Quarter. Prerequisite, Mathematics 763. Mr. MacDuffee.

Steinitz's theory of fields.

**\*862. Theory of Matrices.** Three credit hours. Winter Quarter. Prerequisite, Mathematics 861. Mr. MacDuffee.

Advanced topics in the theory of matrices with particular attention to matrices with integral elements.

**\*867. Linear Algebras.** Three credit hours. Spring Quarter. Prerequisite, Mathematics 862. Mr. MacDuffee.

A study of linear algebras and their arithmetics, with particular attention to Dickson's theory of hypercomplex integers.

**\*868. Theory of Ideals.** Three credit hours. Mr. MacDuffee.

Ideal theory of commutative and non-commutative rings.

**\*871-\*872. Finite Groups.** Three credit hours. Winter and Spring Quarters. Prerequisite, permission of the instructor. Mr. Kuhn.

Fundamentals of the theory of finite groups; the abstract, permutation, and linear groups; applications to algebra and geometry.

**\*874. Continuous Groups.** Three credit hours. Prerequisite, the permission of the instructor.

A study of Lie's theory of  $r$ -parameter continuous groups with an introduction to some of the recent investigations of Cartan and Weyl.

**\*891. Advanced Statistics.** Three credit hours. Spring Quarter. Prerequisite, Mathematics 696. Mr. Morris.

Small sample theory and its applications to statistical problems.

**950. Research in Mathematics.** Autumn, Winter, and Spring Quarters. Library work and conferences. Prerequisite, the permission of the department.

**MECHANICAL ENGINEERING**

Office, 247 Robinson Laboratory

PROFESSORS MARQUIS, MAGRUDER, NORMAN, AND JUDD, ASSOCIATE PROFESSORS BROWN, BUCHER, AND STINSON, ASSISTANT PROFESSORS FAIRBANKS, MOFFAT, BEITLER, AND ROBERTS

**FOR ADVANCED UNDERGRADUATES AND GRADUATES**

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These general prerequisites include fundamental courses in mathematics, physics and mechanics; likewise for courses 607, 614, and 615 a course in engineering drawing and for 607, a year of elementary chemistry.

**605. Heating and Ventilating.** Four credit hours. Spring Quarter. Four recitations each week. Prerequisite, Mechanical Engineering 608. Mr. Brown.

A descriptive and analytical study of the apparatus and machinery and of the layouts used in the heating and ventilating of buildings.

Not open to students who have credit for Mechanical Engineering 551 and 572.

**607. Heat-Power Engineering.** Five credit hours. Autumn Quarter. Five recitations each week. Mr. Marquis, Mr. Bucher.

The beginning of a study of thermodynamics, and of an analytical and descriptive study of steam-generating and steam-using machinery, and of air compression and refrigeration.

**608. Heat-Power Engineering.** Five credit hours. Winter Quarter. Five recitations each week. Prerequisite, Mechanical Engineering 607. Mr. Marquis, Mr. Bucher.

The continuation of Mechanical Engineering 607.

**609. Heat-Power Engineering.** Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 608. Mr. Marquis.

The continuation of Mechanical Engineering 608.

**614. Mechanism.** Four credit hours. Autumn Quarter. Four recitations each week. Mr. Stinson.

A descriptive and analytical study of kinematics, mechanisms, and mechanical movements.

**\*615. Mechanism.** Five credit hours. One Quarter. Autumn and Winter. Three recitations and two three-hour laboratory periods each week. Not given until 1934-1935. Mr. Stinson.

A classroom and drawing-board study of mechanisms and kinematics of machines.

Not open to students who have credit for Mechanical Engineering 614 and 616.

**616. Mechanism Drawing.** Two credit hours. Winter Quarter. Two three-hour laboratory periods each week. Prerequisite or concurrent, Mechanical Engineering 614. Mr. Stinson, Mr. Moffat.

Drawing-board practice in laying out mechanisms and mechanical movements.

**617. Mechanical Engineering Laboratory.** Two credit hours. Autumn Quarter. One four-hour laboratory period each week. Prerequisite, Mechanics 605 and 607. Mr. Brown, Mr. Beitler.

The calibration of pressure gauges and indicator springs. Steam engine indicator practice. The operation and testing of steam engines and boilers and of steam and centrifugal pumps.

**625. Internal-Combustion Engines.** Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 608 and 614. Mr. Magruder.

A study of internal-combustion engines and their auxiliaries.

**\*627. Materials of Engineering.** Five credit hours. One Quarter. Autumn and Winter. Five recitations each week. Not given until 1934-1935.

A study of the production of properties of the materials used in engineering structures and machinery.

Not open to students who have credit for Mechanical Engineering 427.

\* Not given in 1933-1934.

**664. Mechanical Engineering Laboratory.** Three credit hours. Winter Quarter. One five-hour laboratory period each week. Prerequisite, Mechanical Engineering 607; concurrent, Mechanical Engineering 608 and Mechanics 602. Mr. Brown, Mr. Fairbanks, Mr. Roberts.

The calibration of thermometers, pressure gauges, and other instruments; indicator practice; operation of steam engines; tests of oils, lubricants, the materials of construction, and of steam engines.

**665. Mechanical Engineering Laboratory.** Three credit hours. Spring Quarter. One five-hour laboratory period each week. Prerequisite, Mechanical Engineering 608 and 664; concurrent, Mechanical Engineering 609 and Mechanics 605 and 607. Mr. Brown, Mr. Fairbanks, Mr. Roberts.

Valve setting, moisture determination in steam, gas calorimetry, measurements of the flow of water by means of orifices, nozzles, weirs, and venturimeters, and tests of steam engines.

**704-705. Automotive Engineering.** Three credit hours. Winter and Spring Quarters. Three recitations each week. Prerequisite, Mechanical Engineering 625 or 756; concurrent, Mechanical Engineering 782-783. Mr. Stinson.

An advanced study of automotive engines, chassis and auxiliaries.

**725. Diesel Engines.** Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 625 or 704. Mr. Stinson.

An advanced study of Diesel-engine design, operation and economics.

**727. Machine Design.** Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, Mechanics 605 and 607, Mechanical Engineering 609 and 614. Mr. Norman.

A detailed course of study based upon mechanics and the materials of construction applied to the design and construction of machinery.

**728. Machine Design.** Five credit hours. Winter Quarter. Three recitations and two three-hour laboratory periods each week. Prerequisite, Mechanical Engineering 727. Mr. Norman.

The continuation of Mechanical Engineering 727.

**742. Hydraulic Machinery.** Three credit hours. One Quarter. Autumn and Winter. Three recitations each week. Prerequisite, Mechanics 603 or 605 and 607, and Mechanical Engineering 609. Mr. Judd.

The application of hydraulic principles to hydraulic machinery.

**743. Machine Design.** Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanical Engineering 728. Mr. Norman.

The continuation of Mechanical Engineering 728.

**744. Machine Design.** Five credit hours. Spring Quarter. Three recitations and two three-hour laboratory periods each week. Prerequisite, Mechanical Engineering 728. Mr. Norman.

The continuation of Mechanical Engineering 728.

**756. Aeronautical and Automotive Engines.** Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Mechanics 605 and 607, and Mechanical Engineering 625. Mr. Stinson.

A descriptive and analytical study of automotive and aeronautical engines and their auxiliaries.

**757. Aeronautical Engineering.** Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Mechanics 605 and 607. Mr. Fairbanks.

A descriptive and analytical study of the various forms of aircraft and the elementary principles of aerodynamics.

**779. Mechanical Engineering Laboratory.** Three credit hours. Autumn, Winter, and Spring Quarters. One five-hour laboratory period each week. Prerequisite, Mechanics 605 and 607, and Mechanical Engineering 609, 625, and 665. Mr. Brown, Mr. Bucher, Mr. Beitler, Mr. Roberts.

Tests of steam engines; steam boilers; gas, oil and automotive engines; air compressors; centrifugal, rotary and power pumps; impulse and turbine water wheels; fans and blowers; steam turbines.

**780. Mechanical Engineering Laboratory.** Three credit hours. Winter Quarter. One five-hour laboratory period each week. Prerequisite, Mechanical Engineering 779. Mr. Brown, Mr. Bucher, Mr. Stinson, Mr. Roberts.

The work undertaken will be elected from the following:

(a) General Mechanical Engineering Laboratory. Tests of mechanical equipment such as air compressors, steam turbines, fans, oil, gas, and automotive engines, pumps, and hydraulic turbines, so selected as to be fundamental to all branches of mechanical engineering.

(b) Automotive Engineering Laboratory. Tests of apparatus of special interest in automotive engineering such as internal combustion engines, and complete vehicles, in the laboratory and on the road. To be taken only by students who elect Mechanical Engineering 704.

**781. Mechanical Engineering Laboratory.** Three credit hours. Spring Quarter. One five-hour laboratory period each week. Prerequisite, Mechanical Engineering 780. Mr. Judd, Mr. Brown, Mr. Bucher, Mr. Stinson, Mr. Fairbanks, Mr. Roberts.

The work undertaken will be elected from the following:

(a) General Mechanical Engineering Laboratory. A continuation of Mechanical Engineering 780-a.

(b) Automotive Engineering Laboratory. A continuation of Mechanical Engineering 780-b. To be taken only by students who elect Mechanical Engineering 705.

(c) Hydraulic Power Laboratory. A laboratory study of the dynamics of jets, the flow and measurement of water and the testing impulse and reaction turbines. To be taken only by students who have credit for Mechanical Engineering 742.

**799. Special Problems in Advanced Mechanical Engineering.** Two to ten credit hours. Autumn, Winter, and Spring Quarters. All instructors.

This course is intended to give the advanced student opportunity to pursue special studies not offered in the fixed curriculum. Work undertaken will be elected from aeronautical engineering, heating, ventilating and air conditioning, hydraulic power, air compression, refrigeration, steam turbines, and other special problems in Advanced Mechanical Engineering. A student may repeat this course until he has obtained a maximum of 24 credit hours. He may accumulate not more than ten credit hours in any one of the above subdivisions.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

These prerequisites include a collegiate course in mechanics, strength of materials, machine design, steam or gas engines and knowledge of the fundamentals of hydraulics. For major work a student must hold a baccalaureate degree in mechanical engineering or the equivalent.

The following courses are offered in one or more Quarters (Autumn, Winter and Spring). The work may include lectures, conferences, library, drawing board and laboratory work. Credit hours (unless definitely stated) to be arranged.

**804. Advanced Mechanical Engineering.** Two to eight credit hours. The following course is offered in one or more Quarters. Autumn, Winter, Spring. The work includes conferences, library, drawing board, and laboratory work.

(a) Internal Combustion Engines. Mr. Magruder, Mr. Stinson, Mr. Roberts.

(b) Steam Power Plants. Mr. Marquis, Mr. Bucher.

(c) Machine Design. Mr. Norman.

(d) Heating and Ventilating. Mr. Brown.

(e) Hydraulics. Mr. Judd.

**950. Research in Mechanical Engineering.** Research work in any of the following fields, under the supervision of the following instructors: aeronautical engineering, Mr. Fairbanks; automotive and diesel engines, Mr. Stinson, Mr. Roberts; heating and ventilating, Mr. Brown; gas enginry and refrigeration, Mr. Magruder; applied hydraulics, Mr. Judd, Mr. Beitler; machine design and mechanical vibration, Mr. Norman; materials of engineering, Mr. Moffat; steam engineering and fuel testing, Mr. Marquis, Mr. Bucher.

## MECHANICS

Office, 225 Industrial Engineering Building

PROFESSOR BOYD, ASSOCIATE PROFESSOR OTT, ASSISTANT  
PROFESSORS FOLK AND POWELL, MR. CLARK

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include acceptable courses in differential and integral calculus and physics.

601. Statics. Five credit hours. One Quarter. Autumn and Winter. Five recitations each week. Mr. Boyd, Mr. Ott, Mr. Folk, Mr. Powell, Mr. Clark.

602. Strength of Materials. Five credit hours. One Quarter. Autumn, Winter, Spring. Four recitations and one two-hour laboratory period each week. Prerequisite, a course in statics. Mr. Boyd, Mr. Ott, Mr. Folk, Mr. Powell, Mr. Clark.

605. Strength of Materials. Two credit hours. One Quarter. Autumn, Winter, Spring. Two recitations each week. Prerequisite, Mechanics 602. Mr. Boyd, Mr. Ott, Mr. Folk, Mr. Clark.

Not open to students who have credit for Mechanics 603.

607. Dynamics and Hydraulics. Three credit hours. One Quarter. Autumn, Winter, Spring. Three recitations each week. Prerequisite, a course in statics. Mr. Boyd, Mr. Folk, Mr. Ott, Mr. Powell.

Not open to students who have credit for Mechanics 603.

702. Advanced Strength of Materials. Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Mechanics 605. Mr. Folk.

Deflections and reactions of indeterminate beams and simple frames of uniform and variable cross section, by area moments and slope deflections. Resilience in bending and shear. Compound stresses in space and theories of failure. Curved beams and hooks. Repeated stresses. Unsymmetrical sections and biaxial loading.

707. Advanced Dynamics. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Mechanics 607. Mr. Ott.

Acceleration, velocity and displacement from variable forces. Vibration, free and forced. Percussion and impact. Dynamic balance. Vibration and whipping of shafts. Gyroscopic motion.

710. Mechanics of Fluids. Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mechanics 607. Mr. Powell.

A continuation of hydraulics given in Mechanics 607, including additional work on the flow through orifices, over various weirs, and through other measuring devices; the flow of fluids through pipes; uniform and non-uniform flow in open channels; the various critical velocities; and the elements of dimensional analysis and dynamic similarity as applied to model testing.

## FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 24.

801-802-803. Advanced Theoretical Mechanics. Three credit hours. Autumn, Winter, and Spring Quarters. Three recitations each week. Mr. Boyd.

## MEDICAL AND SURGICAL RESEARCH

Office, 202 Kinsman Hall

PROFESSORS DOAN AND CURTIS, ASSISTANT PROFESSOR WISEMAN

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include acceptable courses in the basic pre-clinical sciences, Medical and Surgical Research 600 or 601, and proof of an interest in, and the ability to undertake the selected project.

950. Medical and Surgical Research. Autumn, Winter, Spring, and Summer Quarters. Library, conference, and laboratory work. The student may



spend part or all of his time in research work. Research work primarily in the medical field is conducted under the supervision of Dr. Doan and Dr. Wiseman; in the surgical field under Dr. Curtis; though an intimate intercorrelation is maintained at all times among the entire staff in every problem under study in the department.

## MEDICINE

### PUBLIC HEALTH AND HYGIENE

Office, Hamilton Hall

ASSISTANT PROFESSOR WILSON

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

635-636-637. Hygiene and Sanitation. Three credit hours. Autumn, Winter, and Spring Quarters. Two lectures and two hours of field work each week. Prerequisite, first three years in curriculum of Medicine. Mr. Wilson.

This course includes the hygiene and sanitation of the communicable disease, the deficiency and occupational diseases as applied to preventive medicine. Immunity, heredity, and eugenics. The diseases arising from the puerperal state and the diseases of infancy and childhood with reference to their prevention. The protection and function of food; water supply, sewage, and refuse disposal; ventilation, heating and certain aspects of personal hygiene. Public Health administration, disinfection and demography.

In addition to the theory of the subject, the student is assigned practical problems in Hygiene and Sanitation.

Not open to students who have credit for Public Health and Hygiene 604-605-606.

## METALLURGY

Office, 100 Lord Hall

PROFESSORS DEMOREST AND MUELLER, ASSISTANT PROFESSOR LORD

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

These general prerequisites include fundamental courses in physics and metallurgy. Course 620 requires also a course in descriptive mineralogy; Course 652, the elementary course in chemistry.

605. Iron and Steel Metallurgy. Three credit hours. Autumn Quarter. Three lectures or recitations each week. Prerequisite, Metallurgy 651. Mr. Demorest, Mr. Lord.

Lectures and problem work on the production of iron and steel and the manufacture of iron and steel shapes.

606. Principles of Metallography. Three credit hours. Autumn Quarter. One lecture and five hours of laboratory each week. Prerequisite, one year of college physics and two Quarters of college chemistry. Mr. Lord.

Lectures and laboratory work on the structure and properties of metals. Equilibria of metals are studied by the aid of the microscope.

610. Non-Ferrous Metallurgy. Five credit hours. Spring Quarter. Five recitations each week. Prerequisite, one year each of college physics and college chemistry. Mr. Mueller.

Lectures, recitations, and problem work on the metallurgy and properties of non-ferrous metals, with special attention to the principles of igneous concentration of the precious metals and study of hydro-metallurgical and electro-metallurgical processes of the present day.

620. Principles of Ore Dressing. Five credit hours. Autumn Quarter. Three lectures or recitations and two three-hour laboratory periods each week. Prerequisite, a course in descriptive mineralogy and one year of college physics. Mr. Mueller.

Lectures, recitations, and laboratory work on the principles of ore dressing, reclamation of minerals and metals, and coal washing.

**650. Pyrometry.** Two credit hours. One Quarter. Autumn and Winter. One lecture or recitation and one three-hour laboratory period each week. Mr. Demorest, Mr. Lord.

Lectures, laboratory, and problem work on the calibration and use of resistance thermoelectric, optical, and total radiation pyrometers.

**651. Fuels.** Three credit hours. One Quarter. Autumn and Winter. Three lectures or recitations each week. Mr. Demorest, Mr. Mueller, Mr. Lord.

Lectures, recitations, and problem work on solid, liquid, and gaseous fuels, their use, preparation and efficiencies, the thermo-chemistry of combustion and gas equilibria.

**652. Gas Testing and Calorimetry.** One credit hour. Autumn Quarter. One three-hour laboratory period each week. Concurrent, Metallurgy 651. Mr. Demorest, Mr. Lord.

Laboratory work and problems on the analysis of flue and fuel gases.

**665. General Metallurgy.** Five credit hours. Spring Quarter. Five lectures or recitations each week. Prerequisite, two Quarters of college chemistry. Mr. Mueller, Mr. Lord.

Lectures, recitations, and problem work on the metallurgy of iron, steel, copper, lead, zinc, gold, silver, etc., including the principles of igneous, hydro-metallurgical and electro-metallurgical processes for recovery and refining of the common metals.

**701. Advanced Metallography.** Four credit hours. Winter Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, Metallurgy 606. Mr. Lord.

The microscopic examination and micro-photography of normal samples of irons, steels, brasses, with special attention to faults and sources of weakness.

**705. Metallurgical Construction.** Four credit hours. Winter Quarter. Two lectures or recitations and three two-hour laboratory periods each week. Prerequisite, Metallurgy 651, 605, 720, 610 or 655. Mr. Mueller.

Lectures, recitations, and drawing-room practice on the principles, practice, and design of concentrators and coal-washing plants.

**706. Metallurgical Construction.** Four credit hours. Spring Quarter. Two lectures or recitations and two three-hour laboratory periods each week. Prerequisite, Metallurgy 705. Mr. Demorest, Mr. Lord, Mr. Mueller.

Option: continuation of Metallurgy 705 with special reference to operation, control, costs, and handling of materials; or lectures, recitations, and drawing-room practice on the principles, practice, and design of metallurgical furnaces and plants with special reference to refractories and heat transfer and to operation, control, costs, and handling of materials.

**709. Advanced Fuel Testing and Problems.** Four credit hours. Autumn Quarter. Two lectures and two three-hour laboratory periods each week. Prerequisite, Metallurgy 651. Mr. Demorest.

Lectures, problems, and laboratory work on the technology and thermodynamics of combustion and fuel production and utilization.

**720. Ore Dressing.** Three credit hours. Winter Quarter. One lecture and two three-hour laboratory periods each week. Prerequisite, Metallurgy 620. Mr. Mueller.

Lectures and laboratory work in the design of flow sheets and concentration practice for ores, and leaching processes.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**950. Research in Metallurgy.** Autumn, Winter, and Spring Quarters. Mr. Demorest, Mr. Mueller, Mr. Lord.

## MINE ENGINEERING

Office, 219 Lord Hall

PROFESSORS NOLD AND F. A. RAY (EMERITUS), ASSOCIATE PROFESSOR O'ROURKE  
FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

The general prerequisites include also for courses 601, 602, 721, and 760 a course in geology; and for course 721 a course in physics.

**601. Prospecting and Preliminary Operations.** Five credit hours. Winter Quarter. Five recitations each week. Mr. O'Rourke.

Prospecting and boring, their geologic and economic interpretation. Supporting excavations and the materials used.

**602. Explosives and Rock Work.** Three credit hours. Winter Quarter. Three recitations each week. Elective for students whose major work is not in mine engineering. Prerequisite, a course in chemistry and general geology.

Explosives, quarrying, tunnelling, shaft sinking, dredging and excavating machinery.

Not open to students who have credit for Mine Engineering 761.

**701. Development and Methods of Mining.** Three credit hours. Spring Quarter. Three recitations each week. Prerequisite, Mine Engineering 601. Mr. Nold.

Development, location of openings, methods of mining, etc.

**702. Mine Operations.** Five credit hours. Autumn Quarter. Five recitations each week. Prerequisite, Mine Engineering 701, Electrical Engineering 642 and 643. Mr. Nold.

Drainage, haulage, hoisting, ventilation, illumination, mine gases, and explosions.

**703. Mine Examinations and Reports.** Five credit hours. Winter Quarter. Five lectures each week. Prerequisite, Mine Engineering 702 or 721. Mr. Nold, Mr. O'Rourke.

Mine examinations, estimation of ore reserves, valuation, reports, organization, administration and determination of costs.

**721. Petroleum Engineering.** Five credit hours. Autumn Quarter. Four recitations and one two-hour laboratory period. Mr. O'Rourke.

Prospecting, drilling and development of oil and gas fields, recovery methods, power, gathering systems, preparation of crude for market, storage, transportation. Laboratory work in testing crude petroleum and petroleum bearing rocks.

**750. Mine Investigations.** Three to eight credit hours. Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. Prerequisite, consent of the instructor. This course may be repeated until the student has accumulated not to exceed fifteen credit hours. Mr. Nold, Mr. O'Rourke.

(a) Study and Investigation of Some Phases of Mine Development and Operation.

(b) Study of Mine Ventilation and Laboratory Work with Ventilating Equipment.

(c) Study of the Engineering Problems of Petroleum and Natural Gas Exploration, Production, and Transportation.

(d) Design of mines, mining plants, or planning of petroleum and natural gas field development.

**760. Principles of Mining.** Three credit hours. Spring Quarter. Three recitations each week. Mr. Nold.

Recitations and lectures on the principles of prospecting and mining.

## FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34

**950. Research in Mine Engineering.** Autumn, Winter, and Spring Quarters. Mr. Nold, Mr. O'Rourke.

Library, conference, laboratory, and field work on some phase of mining or mine operations.

## MINERALOGY

Office, 115 Lord Hall

PROFESSOR McCAUGHEY, ASSISTANT PROFESSOR BRANT

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include fundamental courses in crystallography and mineralogy. The general prerequisites for course 611 include a fundamental course in geology and elementary petrology; for 621, a college course in physics covering light; for course 654, calculus and a year of college physics. Students majoring in mineralogy and petrography must have fundamental courses in geology, chemistry and physics.

**601. Advanced Crystallography.** Five credit hours. Spring Quarter. Mr. McCaughey.

Study of the thirty-two crystal groups and their representative crystals. Structure of crystals as determined by X-ray analysis. Laboratory practice with the two circle goniometer in the measurement of crystals and in the drawing and projection of crystals.

**605. Thermochemical Mineralogy.** Three credit hours, Autumn Quarter. Four credit hours, Spring Quarter. Three or four lectures each week. Prerequisite, an acceptable course in physical chemistry. Mr. McCaughey.

Thermal properties of minerals, their formation and transformation in silicate mixtures.

**606. Advanced Thermochemical Mineralogy.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Mineralogy 605. Mr. McCaughey.

Continuation of Mineralogy 605. Formation and solid solution of silicate minerals in multiple component systems.

**611. Elementary Microscopic Petrography.** Four credit hours. One Quarter. Winter and Spring. Two lectures and two two-hour laboratory periods each week. Mr. McCaughey, Mr. Brant.

Instruction and practice in the use of the petrographic microscope in the identification and study of minerals and rocks in this section.

**621. Microscopic Mineralogy.** Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Mr. McCaughey.

The use of a polarizing microscope in the identification of minerals in fine powder and thin section. Determination of the optical constants of minerals and crystallized substances with the polarizing microscope.

**631. Mineralogical Investigations.** Three to five credit hours. One Quarter. Autumn, Winter, Spring. Library, conference, and advanced laboratory work. Prerequisite, Mineralogy 621 or 611. Mr. McCaughey.

(a) Microscopic Petrography. Study and investigation of igneous, metamorphic, and sedimentary rocks in this section.

(b) Soil Mineralogy. Mineralogical investigation of loose rock, such as soils, sand, and clays.

(c) Applied Microscopic Mineralogy. Application of the principles of microscopic mineralogy to the determination of melting and transformation temperature of minerals; microscopic study of refractories, ceramic products and glasses.

(d) X-ray Crystal Analysis. Practice in the application of X-rays to the study of minerals and crystallized materials. Calculation for and determination of the fine structure of crystals.

**654. X-rays and Crystal Structure.** Three credit hours. Winter Quarter. Three lectures and recitations each week. Given in alternate years. Mr. Blake, Mr. McCaughey, Mr. Mack, Mr. Harris.

This course is designed for those students in physics, chemistry, and mineralogy who intend to do research work in crystal structures and X-ray analysis.

This course is the same as Chemistry 654 and Physics 654.

Not open to students who have credit for Physics 814.

### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**950. Research in Mineralogy and Petrography.** Autumn, Winter, and Spring Quarters. Library, conference, and laboratory. Mr. McCaughey, Mr. Brant.

## MUSIC

Offices, 1, 2, 3, 4 Page Hall

PROFESSORS HUGHES, WALL, WEIGEL, AND LEEDER, ASSOCIATE PROFESSOR  
WILSON, ASSISTANT PROFESSOR JONES

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

Detailed information concerning these prerequisites follow:

## Requirements for Admission to Graduate Work in Music

1. One hundred hours of acceptable academic work, including English, Science, History, Psychology, etc.
  - (a) Students majoring in Music Education should also have courses in the theory of education and adequate preparation in the field of Music Education.
  - (b) Students majoring in the History of Music should also have a reading knowledge of either French or German sufficient for purposes of research.
2. Seventy hours of the theory of music, including a satisfactory amount of sight-singing and ear-training, harmony, analysis and form, history of music, conducting and instrumentation.
3. Twenty hours of applied music, including
  - (a) for majors in Music Education, courses in strings, wood-wind and brass, and a degree of advancement in piano and voice satisfactory to the department;
  - (b) for majors in the History of Music, an acquaintance with instrumental literature and performance ability on some instrument (preferably piano) satisfactory to the department.
4. A period of at least one year between the awarding of the bachelor's degree and completion of the requirements for the master's degree, preferably before the beginning of graduate study; this period should be spent in music teaching, and, in the case of majors in music education, must be so spent.

## Requirements for the Master of Arts Degree

1. Music Education
  - (a) Music—15 hours from the following group, recommended according to the interest and preparation of the student.  
Conducting (642)—3 hours; (643)—3 hours  
History and Appreciation (602)—3 hours; (605)—3 hours  
Other courses chosen in consultation with the department.
  - (b) Music—Minor Problems (650)—15 hours.
  - (c) Electives in other fields—15 hours  
Under certain circumstances, a part of this requirement may be taken in music.
2. In History of Music
  - (a) Music  
History of Music (602)—3 hours; (605)—3 hours  
Music electives, as advised—9 hours
  - (b) Music—Minor Problems (650)—15 hours
  - (c) Electives in other fields—15 hours.

**601. The Romanticists.** Four credit hours. Autumn Quarter. Four lectures each week. Prerequisite, permission of the instructor. Mr. Hughes.  
The music of the romantic period in Germany and France.

**602. Wagner and the Music Drama.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, permission of the instructor. Mr. Hughes.

Study of the works of Wagner and his contribution to the opera.

**603. Modern Music.** Four credit hours. Winter Quarter. Four lectures each week. Prerequisite, permission of the instructor. Mr. Hughes.  
A brief survey of modern developments with special reference to the composers of France and Russia.

**605. History of Choral Music.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, permission of the instructor. Mr. Hughes.  
Choral composers and literature with special consideration of the sixteenth and seventeenth centuries.

Not open to students who have credit for Music 305 and 306.

**610. Music in the Junior High School.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, courses in school music for primary and intermediate grades. Mr. Leeder.

Materials, problem discussions, junior high school organizations. A course for supervisors of music or for special music teachers in the junior high school.

**611. High School Music.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, courses in school music for primary and intermediate grades. Mr. Leeder.

Materials for musical organizations in the high school. Teaching of the theory of music in the high school. A course for supervisors of music or for special teachers of music in high schools.

**630. Instrumentation.** Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, a course in harmony, and an amount of applied music satisfactory to the instructor. Mr. Wilson.

Scoring for brass or wood-wind instruments in small combinations, and for full band.

**632. Instrumentation.** Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, Music 630. Mr. Wilson.

Scoring for stringed instruments, for strings in combination with other instruments, and for full orchestra.

**642. Organization of the School Band and Orchestra: Conducting II.** Three credit hours. Winter Quarter. Three recitations each week. Mr. Weigel.

Organization and administration of the high school orchestra and band. Selection of materials; seating plans; preparation for rehearsal; rehearsal routine and conductor problems. Orchestral and band literature suitable for grade and high school use; the student will study and conduct these materials.

**643. Band and Orchestra Materials: Advanced Conducting III.** Three credit hours. Spring Quarter. Three lectures and drill periods each week. Prerequisite, Music 630, 632, 642 and completion of an amount of the required courses in applied music satisfactory to the instructor. Mr. Weigel.

This course aims to develop the power to interpret the larger forms of orchestral literature and to read from full score; it includes problems of tempo, phrasing, nuance, balance, timbre, and special study of baton technique. Qualified students will be given opportunity to conduct one of the University Orchestras.

**650. Minor Problems.** One to five credit hours. All Quarters. Prerequisite, the consent of the department. All instructors.

Investigation of minor problems in the field of music.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**950. Research in Music.** Autumn, Winter, and Spring Quarters.

Original investigation of theory and history or of practices in the field of teaching. Research is possible under the general heads: History. Mr. Hughes; Music Education. Mr. Leeder; Piano Methods, or certain musical aspects of psychology and aesthetics, Mr. Wilson; Instrumental Aspects of Music Education, Mr. Weigel.

## NURSING

### PUBLIC HEALTH AND HYGIENE

Office, Hamilton Hall

ASSISTANT PROFESSOR SELBERT

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**602. Public Health Problems.** Five credit hours. One Quarter. Autumn, Winter, Spring. Four class periods and one field trip each week. Students provide their own means of conveyance on trips. Mrs. Selbert.

A résumé of theories and discoveries pertaining to the causes and prevention of disease. An elementary consideration of the public health aspects of such problems as food supplies, water, sewage, refuse, ventilation, communicable diseases, maternity and infant welfare, housing and school hygiene, camp and rural sanitation, tuberculosis, cancer, goiter, quackery, mental and industrial hygiene, vital statistics, and health administration.

**608. Child Health.** Two credit hours. One Quarter. Autumn, Winter, Spring. One lecture and one demonstration or excursion each week. Mrs. Selbert.

The principles of child welfare are considered including ante-natal, neo-natal, and post-natal periods of infancy; the pre-school and school age through early adolescent life. Disease conditions are not considered.

Not open to students who have credit for Public Health and Hygiene 403.

## OPERATIVE DENTISTRY

Office, Hamilton Hall

PROFESSORS SEMANS, BOTTENHORN, AND GRAHAM, ASSISTANT PROFESSORS  
HEBBLE, JONES, KITCHIN, AND SNYDER

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include adequate preparation in technical courses concerned.

**701-702-703. Minor Problems in Operative Dentistry.** One to three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, adequate preparation in technical courses concerned. Mr. Semans, Mr. Bottenhorn, Mr. Graham, Mr. Hebble, Mr. Jones, Mr. Snyder, Mr. Kitchin.

Students will have assigned to them special problems in Operative Dentistry.

### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include adequate preparation in technical and practical courses in operative dentistry.

**950. Research in Operative Dentistry.** Autumn, Winter, and Spring Quarters. Mr. Semans, Mr. Bottenhorn, Mr. Graham, Mr. Hebble, Mr. Snyder, Mr. Kitchin.

Research relating to and found in the various endeavors concerning treatment and restoration to normal condition of teeth and their contiguous parts.

## PATHOLOGY

Office, Hamilton Hall

PROFESSORS SCOTT AND SPOHR, ASSISTANT PROFESSOR REINHART, MISS MILLER,  
MRS. HELZ, MR. MITCHELL, MR. FIDLER

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

Courses 600-621 inclusive are open only to students who are doubly registered in the College of Medicine and the Graduate School, to the extent of fifteen Quarter hours.

**600. General Pathology.** One credit hour. Spring Quarter. One lecture each week. Prerequisite, Anatomy 624. Mr. Scott, Mrs. Helz.

An introduction to pathology, covering the history of pathology, etiology and the nature of disease, degeneration, regeneration and inflammation.

**600. General Pathology.** One credit hour. Spring Quarter. One lecture and six laboratory hours each week. Prerequisite, Anatomy 624. Mr. Scott, Mrs. Helz, Mr. Mitchell.

Pathology of inflammatory, regenerative, and retrogressive lesions.

**602. Special Pathology.** Five credit hours. Spring Quarter. Two lectures and nine laboratory hours each week. Prerequisite, Pathology 601. Mr. Scott, Mrs. Helz, Mr. Mitchell.

Pathology of the special organs and tumors.

**603. Clinical Pathology.** Three credit hours. Autumn Quarter. Two lecture and four laboratory hours each week. Prerequisite, Bacteriology 641-642 and Physiological Chemistry 601-602. Mr. Spohr, Miss Miller.

Sputum, urine, spinal fluid, gastric contents, feces, animal parasites and ova, transudates and exudates, blood cultures, blood typing and matching, miscellaneous examinations.

**604. Clinical Pathology.** Three credit hours. Winter Quarter. Two lecture and four laboratory hours each week. Prerequisite, Bacteriology 641-642 and Physiological Chemistry 601-602. Mr. Spohr, Miss Miller.

Blood, a study of unstained and stained specimens. Special blood pathology. Blood chemistry and functional tests. Serodiagnostic methods.

**605. Surgical Pathology.** Two credit hours. Spring Quarter. One two-hour lecture each week. Mr. Reel.

A course correlating the symptomatology with the operative specimen.

**606. Medical Pathology.** Two credit hours. Spring Quarter. One two-hour lecture each week. Mr. Reinhart.

A course correlating the symptomatology with the post-mortem pathology.

**607. Post-Mortem Demonstration.** One credit hour. One Quarter. Autumn, Winter, Spring. Mr. Scott, Mr. Reinhart, Mr. Mitchell, Mr. Fidler.

**608-609-610. Advanced Pathology.** Three to five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Pathology 601-602 and Bacteriology 641-642. Mr. Scott, Mr. Reinhart, Mr. Mitchell, Mr. Fidler.

Autopsy technique.

**611-612-613. Advanced Special Pathology.** Three to five credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Pathology 601-602 and Bacteriology 641-642. Mr. Scott, Mr. Reinhart, Mrs. Helz.

Minor problems in pathology.

**614-615. Experimental Pathology.** Three to five credit hours. Winter and Spring Quarters. Prerequisite, Pathology 601-602, 603-604, and Bacteriology 641-642. Mr. Spohr, Miss Miller.

Experimental infections and immunity as applied to medicine.

**616-617-618. Advanced Clinical Pathology.** Three credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Pathology 603-604. Mr. Spohr, Miss Miller.

Study of materials collected in the hospital wards and out-patient departments.

**619-620-621. Neuropathology.** One credit hour. Autumn, Winter, and Spring Quarters. Prerequisite, Pathology 601 and 602. Mr. Scott.

The gross and microscopic lesions of the nervous system.

**653-654. Clinical Pathology.** Three credit hours. Autumn and Winter Quarters. One lecture and four laboratory hours each week. Prerequisite, acceptable courses in bacteriology and chemistry. Mr. Spohr, Miss Miller.

A study of the changes in the blood, secretions, serums, and exudates of the body brought about by disease.

**660. Pathology Lectures.** One credit hour. Autumn Quarter. One lecture each week. Prerequisite, Zoology 609 and a course in microscopic technique. Mr. Scott, Mrs. Helz.

A discussion of the effects of infection, irritation, and the changes of nutrition upon the tissues of the body, and the theories and classification of tumors.

**661. General Pathology.** Three credit hours. Winter Quarter. One lecture and six laboratory hours each week. Prerequisite, acceptable courses in anatomy, bacteriology, and physiology. Mr. Scott, Mrs. Helz.

A laboratory course presenting the histological changes resulting from the pathological processes discussed in Pathology 600.

**662. Special Pathology.** Five credit hours. Spring Quarter. One lecture and nine laboratory hours each week. Prerequisite, Pathology 601. Mr. Scott,

The gross and microscopical study of the lesions in the organs of the body illustrating the course and results of various diseases.



**666. Pathologic Technique.** Three credit hours. Winter Quarter. Six laboratory hours each week. Prerequisite, a course in microscopic technique or Zoology 609. Mrs. Helz.

The technique of preparing and the staining of surgical tissues for immediate diagnosis, supra-vital staining.

**667. Pathologic Technique.** Three credit hours. Spring Quarter. Six laboratory hours each week. Mr. Scott, Mr. Hamilton.

The methods of preservation and mounting of specimens for museum purposes, microphotographic technique.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include adequate courses in pathology or clinical pathology completed in any acceptable medical school.

**950. Research in Pathology.** Autumn, Winter, and Spring Quarters.

Research problems in pathology under the direction of Mr. Scott and Mr. Reinhart; in clinical pathology under Mr. Spohr and Miss Miller.

### PHILOSOPHY

Office, 320 University Hall

PROFESSORS LEIGHTON, CHANDLER, AND AVEY, ASSISTANT PROFESSOR HALL,  
MR. LEVINGER

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

Courses bearing numbers 601 to 650 are historical; courses bearing numbers 651 to 700 are systematic.

**601. Ancient Philosophy.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Mr. Chandler.

The development of philosophical thought from the Greeks to the Middle Ages. Most of the time is devoted to Greek Philosophy. A natural continuation of this course will be found in Philosophy 602; a more specialized treatment of medieval philosophy will be found in Philosophy 609.

**602. Modern Philosophy to Kant.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Mr. Leighton.

The development of philosophical thought from the Renaissance to the middle of the nineteenth century. A natural continuation of this course will be found in Philosophy 603.

**603. Philosophy since 1800.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, Philosophy 602. Mr. Leighton.

The development of philosophical thought from the beginning of the nineteenth century to the present.

**\*607. Development of Hebrew Ideas in the Old Testament.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Given in alternate years. Mr. Avey.

Methods of scholarly study of ancient historical documents are considered, and then applied to the writings of the Old Testament for the purpose of determining their chronological order. On this basis is developed a history of Hebrew ideas, including early tradition; the ideals of the prophets; legal formalism; religious poetry; the Messianic hope.

**608. Philosophy and Poetry.** Three credit hours. Winter Quarter. Given in alternate years. Mr. Chandler.

A discussion of Lucretius, Dante's "Divine Comedy," and Goethe's "Faust," for the light they throw on the history of thought and the nature of poetic excellence.

\* Not given in 1933-1934.

**609. Medieval Philosophy.** Three credit hours. Winter Quarter. Prerequisite, Philosophy 601, 607 or 610. Mr. Levinger.

The development of philosophical thought from the Church Fathers, through the Arabic, Jewish and scholastic writers, to the Renaissance. A natural continuation of this course will be found in Philosophy 602.

**\*610. Origins of Christian Thought.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Given in alternate years. Prerequisite, Philosophy 601, 607, or 611. Mr. Avey.

A historical inquiry into the content and meaning of the psychological, ethical, and metaphysical teaching of the New Testament with an inquiry into the development of Christian thought up to the formation of the Nicene Creed.

**611. Origin and Development of Religious Ideas.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Mr. Avey.

A general survey of the fundamental ideas of the most important historical religions, including primitive beliefs: Brahmanism; Buddhism; Confucianism; Mohammedanism; Judaism; the various forms of Christianity.

**623. Representative Greek Philosophers.** Five credit hours. Winter Quarter. Prerequisite, Philosophy 601. Mr. Chandler.

Topic for 1934, Plato.

**625. Representative Modern Philosophers.** Five credit hours. Winter Quarter. Given in alternate years. Prerequisite, Philosophy 602. Mr. Reither.

A few representative works of classic thinkers of the period from Bacon and Descartes to Schopenhauer will be selected for intensive study.

**\*650. Elements of Symbolic Logic.** Three credit hours. Autumn Quarter. Prerequisite, a course in logic. Mr. Avey.

A continuation of the study of logic for students who wish to become acquainted with recent methods of representing logical concepts by means of symbols and with their manipulation in deductive processes.

**\*652. Philosophy of Science.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Given in alternate years. Prerequisite, ten hours of philosophy and ten hours in natural science.

A study and critical discussion of a few general interpretations of the methods and basic assumptions of the natural and social sciences.

**653. Philosophy of Religion.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, one of the following: Philosophy 601, 602, 607, 610, 611, 656. Students are advised to take Philosophy 611 as a background for this course. Mr. Avey.

The physical and social nature of religion: a systematic examination of the fundamental religious conceptions—the idea of God in relation to the idea of the world, the idea of man, and the problem of human destiny.

**655. Esthetics.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Prerequisite, one course in philosophy and one course in psychology. Mr. Chandler.

A study of the various fine arts including music and literature, and of the beauty of nature, with the aim of discovering their relation to human nature, their respective limitations, and their value for individual and social life.

Not open to students who have credit for Philosophy 415.

**656. Principles of Social Ethics.** Three credit hours. Spring Quarter. Prerequisite, one of the following: a fundamental course in philosophy and a course in ethics, Philosophy 601, 602, 607, 611, and ten hours of social science. Mr. Leighton.

Systematic development of a philosophy of human values, and its application to the chief forms and activities of civilized life—industrial and economic activities, the state, education, culture, and religion. Emphasis is laid on the social function of education as being the most important instrument of individual welfare and social progress.

Not open to students who have credit for Philosophy 406.

\* Not given in 1933-1934.

**660. Minor Problems.** Two to ten credit hours. Autumn, Winter, and Spring Quarters. Mr. Chandler, Mr. Avey.

Investigation of minor problems in the history of philosophy or systematic philosophy. Students ordinarily expect to take this course for from two to five credit hours, but Honors students may receive credit up to ten credit hours.

**661. Metaphysics of Knowledge and Nature.** Three credit hours. Winter Quarter. Given in alternate years. Prerequisite, two of the following: Philosophy 601, 602, 603, 623, 625. Mr. Leighton.

A systematic consideration of the nature of scientific method and the scientific conception of nature in its bearings on the problems of man.

**662. Metaphysics of Personality and Values.** Three credit hours. Spring Quarter. Given in alternate years. Prerequisite, two of the following: Philosophy 601, 602, 603, 623, 625. Philosophy 661 will ordinarily precede this course. Mr. Leighton.

A systematic consideration of the nature of the self and society, the problem of values, and the problem of the meaning of existence as a whole.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These general prerequisites include acceptable foundation courses either in psychology, logic and ethics, or in the history of philosophy, and in some cases in all of these subjects.

Prospective students are likewise strongly recommended to prepare for graduate work in this department by taking related courses in other departments. Psychology is regarded as related to all courses in philosophy. The following are suggested as related courses in other departments. For students of logic and metaphysics: mathematics, and natural sciences, especially general and theoretical physics, general and historical chemistry, and evolution (Zoology 509); for students of ethics and the philosophy of religion: sociology, politics, and history; for students of the history of philosophy: European history, and the history of Greek, German, English, and French literatures. Students proposing to specialize in philosophy must previously have completed the equivalent of at least eighteen Quarter-credit hours in philosophy and psychology. In case of students whose main interest in ethics, two Quarters' work in the principles of sociology may be accepted in partial fulfillment of the above requirement.

Candidates for the Ph.D. degree in Philosophy are required to present themselves for general examinations in the elements of the entire subject, and also for more intensive examinations on six of the following subdivisions:

1. Greek philosophy through Aristotle
2. Graeco-Roman philosophy from the death of Aristotle to Plotinus
3. Modern philosophy through Kant
4. Modern philosophy from Kant to 1900 (including Kant)
5. Ethics
6. Social and Political Philosophy
7. Methodology of the Sciences
8. Symbolic logic
9. Theory of knowledge
10. Metaphysics
11. Aesthetics
12. History and Philosophy of religion

The candidate's choice of topics shall be made in consultation with the department and shall be relevant to the topic of his thesis.

Philosophy 661, 662, or their equivalent, are required of all candidates for the Doctor's degree.

**801. Seminary in Systematic Philosophy.** Three credit hours. Autumn Quarter. Mr. Leighton.

**802. Seminary in Systematic Philosophy.** Three credit hours. Winter Quarter. Mr. Leighton.

**803. Seminary in Systematic Philosophy.** Three credit hours. Spring Quarter. Mr. Avey.

**\*805. Scientific Method.** Five credit hours. Autumn Quarter. Three class meetings each week, a fourth and fifth at the option of the instructor.

The course aims to describe the main logical methods used by the sciences, to consider the relation of methods to different subject matters and different scientific purposes, and to compare the types of science arising from these differences.

\* Not given in 1933-1934.

\*820. **Philosophy of History.** Three credit hours. Autumn Quarter. Prerequisite, any two of the following: Philosophy 601, 602, 605, 656. Mr. Leighton.

A discussion of the place of history in the system of human knowledge, the humanistic significance of the historical attitude, the concepts of civilization, culture, development and progress. The aim of the course is to formulate a philosophy of culture.

Not open to students who have credit for Philosophy 665.

950. **Research in Philosophy.** Autumn, Winter, and Spring Quarters. Mr. Leighton, Mr. Chandler, Mr. Avey, Mr. Hall.

## PHONETICS

Office, 324 Derby Hall

PROFESSOR RUSSELL, MISS MASON

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

604. **Clinical Practice in Speech Correction.** Five credit hours. Autumn Quarter. Mr. Russell.

Actual clinical practice in speech correction and training of visual hearing.

605. **Standard American Pronunciation.** Five credit hours. Winter Quarter. Mr. Russell.

Norms of cultured speech, deviations therefrom, and their historical origin.

606. **Lip-reading Techniques.** Five credit hours. Spring Quarter. Miss Mason.

700. **Human Speech: Minor Research.** Three to five credit hours. One Quarter. Autumn, Winter, Spring. Conference, library, and laboratory work. Prerequisite, satisfactory courses in the field of the problem undertaken. A student may repeat this course and spend such time as the problem calls for during the Quarter. Mr. Russell.

This course is designed to permit any properly qualified person to avail himself of the library and laboratory facilities of the University for carrying out a minor or preliminary investigation, or for adding to his knowledge and technique in any phase of the study of human speech and sound as related thereto, or of the mechanism involved in its production, or of its known defects and their correction.

### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

950. **Research in Phonetics.** Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. Prerequisite, acceptable courses in the chosen field of research, and demonstrated ability to pursue independent investigation in that field. Credit dependent on the time spent and the type of work done. Mr. Russell.

Designed for those desiring to pursue advanced research in the general field of scientific phonetics.

\* Not given in 1933-1934.

## PHYSICAL EDUCATION FOR MEN

Office, The Gymnasium

PROFESSORS ST. JOHN, WILCE, AND OBERTEUFFER, ASSOCIATE PROFESSORS METCALF AND HINDMAN, ASSISTANT PROFESSORS WOOD AND DUFFEE

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

†601. Principles of Football Coaching and Management. Three credit hours. Prerequisite, coaching experience.

A course for advanced students of football. The course will consider the principles underlying various types of football strategy, the designing of plays, methods of teaching and controlling players; also, special problems of management, such as those connected with selecting, handling equipment, and making trips.

615. Problems in Intramural Sports. Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, Physical Education 621 and 682. Mr. Wood.

A critical analysis of intramural sports programs with a view to their justification from the standpoint of objectives, age level and contribution to the general welfare of the students participating. Problems of policy and administration of programs for boys and men on the elementary, secondary, and college levels will be studied. Lectures, readings, reports, and discussions.

Not open to students who have credit for Physical Education 815.

621. Principles of Physical Education. Five credit hours. Winter Quarter. Prerequisite, ten hours of physiology or equivalent biological training; courses in the theory and practice of physical education, or equivalent. Miss Hersey.

The nature of physical education, especially in relation to overlapping fields, such as health education and community recreation, and to education in general. A critical analysis of various objectives advanced; a review, with applications to physical education of modern conceptions of education and of modern principles in psychology and physiology.

Not open to students who have credit for Physical Education 683.

625. Tests and Measurements in Physical Education. Three credit hours. Winter Quarter. Three lectures each week. Mr. Hindman.

A critical study of various specific tests and types of tests, including those designed to measure neuromuscular capacity or proficiency. Among the tests studied will be those of Schneider, Brace and Rogers, and a number of efficiency standards in use in public school systems and elsewhere.

626. Supervision of Physical and Health Education. Four credit hours. Autumn Quarter. Four lectures each week. Mr. Oberteuffer.

A study of the opportunities and problems of the supervisor in city, county, and state school systems; the relations of the supervisor to the superintendent and to the teacher; rating teachers; methods of assisting teachers. Separate units of the course will consider supervisory problems unique to the sexes.

630. Individual Physical Education. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Metcalf, Miss Gilman.

Making a physical education program meet the needs of handicapped individuals, fundamental principles in the selection and adaptation of activities in corrective procedures, abnormal physical conditions that come to the care or attention of the physical educator, methods of examining and determining individual needs, activity program of both formal and informal character to meet the needs in schools and colleges, will be the problems dealt with in this course. The problems will be discussed in the light of modern objectives of education and particularly individual physical education. There will be lectures, recitations, demonstrations, term projects, and occasional trips to various orthopedic hospitals for observation purposes.

632. Rhythmic Analysis. Three credit hours. Autumn Quarter. Two lectures and three laboratory meetings each week. Prerequisite, one Quarter of advanced dancing, elementary rhythmic analysis, or the equivalent. Miss Watson.

A study of the rhythmic pattern of body movement in more complex dance forms; the kinesthetic theory of rhythmic perception, and the development of a discriminating sense of rhythmic values as carried into individual and group competition.

† Not given during the academic year, 1933-1934.

**635. Problems in Sports for Girls and Women.** Three credit hours. Spring Quarter. Three lectures each week. Miss Palmer.

A discussion of outstanding problems in the organization of a sports program for girls and women: policies, activities, types of competition, point systems, awards, and athletic associations.

**641. Personal Health Problems.** Three credit hours. Spring Quarter. Three lectures and recitations each week. Mr. Oberteuffer.

A study of the problems of living as they involve the health of the adult. Problems of the adjustment of the individual to conditions of rural and urban life. An informational and problems course elective for all University students. Serves also as a basic subject matter course for advanced study in health education.

**643. Principles of Health Education.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Physical Education 692 or its equivalent. Mr. Oberteuffer.

A basic survey of educational opportunities in health found in the various aspects of school life. Principles underlying the school health program. Survey of available teaching materials used in the classroom. Includes a study of official and non-official health agencies and their bearing upon the school health program. No discussion of the techniques of teaching.

**644. The Teaching of Health in Secondary Schools and Colleges.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Physical Education 643. Miss Palmer, Mr. Metcalf.

How to teach and what to offer in hygiene or health classes. Discussions of the methods and subject matter used in presenting hygiene to students. Includes a study of the opportunities for integration of health material with other subjects of the organized curriculum.

**\*645. Administration of Physical Education for Superintendents and Principals.** Three credit hours.

A course for high school principals and city superintendents dealing with problems of organization and management of physical education activities.

**646. Professional Preparation of Teachers in Physical and Health Education.** Three credit hours. Autumn Quarter. Three class meetings each week. Prerequisite, fifteen hours in education, Physical Education 621, 643, 682. Graduates from other schools without these prerequisites must obtain the consent of the instructor. Miss Hersey.

The principles underlying the professional training of teachers in physical and health education; curriculum construction; selection of candidates; supervised teaching; staff personnel; problems pertaining to professional students.

**649. Camping: Its Organization and Administration.** Three credit hours. Spring Quarter. Lectures, readings, and field demonstrations. Three lectures each week. Occasional Saturday mornings will be scheduled for field trips. The course is an elective given jointly by the Departments of Physical Education and Social Administration. Prerequisite for Social Administration students, Sociology 645. Prerequisite for Physical Education students, ten hours of sociology, and courses in the theory and practice of physical education. Mr. Mason, Mr. Metcalf, Miss Waterman.

The organization and direction of camps, particularly summer camps for boys and girls. Special attention is given to the social and educational program for adolescents. Designed for those preparing for the direction of boys' and girls' work. Practical demonstrations in camping will be included.

This course is the same as Social Administration 649.

**651. Minor Problems in Physical Education.** One to four credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, twenty-five credit hours in physical education. Before registering, students must secure permission of instructor. Mr. Hindman.

Investigation of minor problems in the field of physical and health education.

**652. Survey and Clinical Practice in the Care of the Physically Handicapped.** Three credit hours. Winter Quarter. Two lectures and three laboratory periods each week. Prerequisite, Physical Education 630, and Physiology 620,

\* Not given in 1933-1934.

or equivalent and consent of the instructor. Advised background in child psychology and abnormal psychology. Miss Gilman, Mr. Metcalf.

Observation of orthopedic diagnosis and surgery, physiotherapy methods in various educational and medical centers. Clinical experience under the supervision of the orthopedic surgeon in the after care of infantile paralysis, spastic paralysis, post-operative, scoliosis, and other orthopedic deformities. Laboratory, lectures, readings, reports, and discussions.

**682. Organization and Administration of Physical Education.** Five credit hours. Winter Quarter. Five lectures each week. Prerequisite, Physical Education 683. Mr. St. John, Miss Palmer.

A consideration of the problems of organization for physical education in elementary and secondary schools and colleges, including standards and methods in administration of inter-scholastic, intercollegiate, and intramural athletics. The first eight lectures will deal with problems common to both men's and women's work. Thereafter, the women's classes will be conducted separately, with emphasis on problems peculiar to this field. The personnel of a department, athletic and gymnastic facilities, and construction, purchase and care of equipment, keeping of records and reports, handling of finances, schedule making, publicity, insignia and awards, managerial systems, scholastic and athletic eligibility, and professionalism will be included in the problems discussed.

**685. Prevention and Care of Injuries.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. Duffee.

A consideration of the methods of prevention and care of injuries occurring in physical education and competitive sports. The course also includes a discussion of the conditioning of men for athletic contests.

**691. Kinesiology.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. Metcalf, Miss Waterman.

Lectures and recitations dealing with the anatomical mechanism of movements. The purpose of the course is to acquaint the student with means of analyzing movements intelligently and prescribing programs of gymnastics, sports, and dancing for developmental or corrective purposes.

**692. The School Health Service.** Three credit hours. Spring Quarter. Three lectures each week. Mr. Duffee.

A consideration of the problems in connection with the health of the school child and teacher. Discussions and reports relating to medical inspection, physical examinations, symptoms and control of common school diseases, malnutrition, and the health environment of the school child.

**NOTE:** For course in the Physiology of Exercise see the Department of Physiology, Course 620.

**NOTE:** For course in the Administration of Health Education for Superintendents and Principals see the Department of Education, Course 731.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**801. Seminary in Physical and Health Education.** Two to six credit hours. Autumn, Winter, and Spring Quarters. Mr. Oberteuffer, Mr. Duffee, Miss Hersey, Mr. Hindman, Miss Palmer.

Autumn Quarter, problems in the field of health education.

Winter Quarter, problems in the field of physical education.

Spring Quarter, problems in competitive sport and athletics for both sexes.

Not open to students who have credit for Physical Education 628.

**805. Physical Education in Schools and Colleges.** Three credit hours. Spring Quarter. Three lectures and discussions each week. Prerequisite, Physical Education 621 or its equivalent. Mr. Oberteuffer.

An analysis of existing school and college programs considered in the light of acceptable practices in school administration. Will involve some case studies with summaries drawn in terms of principles. Arranged for students with teaching experience.

**810. Scientific Studies in Physical Education.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, ten hours of physiology and ten hours of psychology. Mr. Hindman.

A survey and evaluation of published researches in the field of physical education, including those in physiology of exercise.

**816. Problems in Interschool and College Athletics.** Three credit hours. Autumn Quarter. Three lecture and recitation hours each week. Prerequisite, courses in principles of physical education, and organization and administration of physical education. Mr. St. John, Mr. Oberteuffer.

The relation of athletics to education; problems of athletic organization; eligibility; finance; current trends and developments in management and purpose; public relations.

**820. Problems in Health Education.** Three credit hours. Spring Quarter. Three lecture and recitation periods each week. Prerequisite, course in principles of health education. Mr. Oberteuffer.

Problems of the relation of medicine to education; the physician in the school; legal aspects of the school health program; social medicine; trends and developments in mental and social hygiene. Individual and group readings and forum discussions.

**950. Research in Physical Education.** Autumn, Winter, and Spring Quarters. Mr. Oberteuffer, Mr. Hindman, Mr. Metcalf.

#### FOR WOMEN

Office, Pomerene Hall

ASSISTANT PROFESSORS PALMER, HERSEY, GILMAN, AND WATERMAN,  
MISS WATSON

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**615. Problems in Intramural Sports.** Three credit hours. Spring Quarter. Three class meetings each week. Prerequisite, Physical Education 621 and 682. Mr. Wood.

A critical analysis of intramural sports programs with a view to their justification from the standpoint of objectives, age level and contribution to the general welfare of the students participating. Problems of policy and administration of programs for boys and men on the elementary, secondary and college levels will be studied. Lectures, readings, reports and discussions.

Not open to students who have credit for Physical Education 815.

**621. Principles of Physical Education.** Five credit hours. Winter Quarter. Prerequisite, ten hours of physiology or equivalent biological training, courses in the theory and practice of physical education, or equivalent. Miss Hersey.

The nature of physical education, especially in relation to overlapping fields, such as health education and community recreation, and to education in general. A critical analysis of various objectives advanced; a review, with application to physical education of modern conceptions of education and of modern principles of psychology and physiology.

**625. Tests and Measurements in Physical Education.** Three credit hours. Winter Quarter. Three lectures each week. Mr. Hindman.

A critical study of various specific tests and types of tests, including those designed to measure neuromuscular capacity or proficiency. Among the tests studied will be those of Schneider, Brace and Rogers, and a number of efficiency standards in use in public school systems and elsewhere.

**626. Supervision of Physical and Health Education.** Four credit hours. Autumn Quarter. Four lectures each week. Mr. Oberteuffer.

A study of the opportunities and problems of the supervisor in city and county school systems; the relations of the supervisor to the superintendent and to the teacher; rating teachers; methods of assisting teachers. Separate units of the course will consider supervisory problems unique to the sexes.

**630. Individual Physical Education.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Physical Education 493. Mr. Metcalf, Miss Gilman.

Making a physical education program meet the needs of handicapped individuals, fundamental principles in the selection and adaptation of activities in corrective procedures, abnormal physical conditions that come to the care or attention of the physical educator, methods of examining and determining individual needs, activity programs of both formal and informal character to meet the needs in schools and colleges will be the problems dealt with in this course. The problems will be discussed in the light of modern objectives of education and particularly individual physical education. There will be lectures, recitations, demonstrations, term projects, and occasional trips to various orthopedic hospitals for observation purposes.



**631. Dance Composition (Women).** Three to five credit hours. Spring Quarter. Miss Watson.

Lectures, readings, and discussions of the dance as an art. The study of body movement as an expressive medium based upon analysis of old and new dance forms. Practice in program-making and opportunity to assist in recital production.

**632. Rhythmic Analysis.** Three credit hours. Autumn Quarter. Two lectures and three laboratory periods each week. Prerequisite, one Quarter of advanced dancing, elementary rhythmic analysis, or the equivalent. Miss Watson.

A study of the rhythmic pattern of body movement in more complex dance forms; the kinesthetic theory of rhythmic perception and the development of a discriminating sense of rhythmic values as carried into individual and group competition.

**635. Problems in Sports for Girls and Women.** Three credit hours. Spring Quarter. Three lectures each week. Miss Palmer.

A discussion of outstanding problems in the organization of a sports program for girls and women; policies, activities, types of competition, point systems, awards, and athletic associations.

**641. Personal Health Problems.** Three credit hours. Spring Quarter. Three lectures and recitations each week. Mr. Oberteuffer.

A study of the problems of living as they involve the health of the adult. Problems of the adjustment of the individual to conditions of rural and urban life. An informational and problems course elective for all University students. Serves also as a basic subject matter course for advanced study in health education.

**643. Principles of Health Education.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Physical Education 692 or its equivalent. Mr. Oberteuffer.

A basic survey of educational opportunities in health found in the various aspects of school life. Principles underlying the school health program. Survey of available teaching materials used in the classroom. Includes a study of official and non-official health agencies and their bearing upon the school health program. No discussions of the techniques of teaching.

**644. The Teaching of Health in Secondary Schools and Colleges.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Physical Education 643. Miss Palmer.

How to teach and what to offer in hygiene or health classes. Discussions of the methods and subject matter used in presenting hygiene to students. Includes a study of the opportunities for integration of health material with other subjects of the organized curriculum.

**\*645. Administration of Physical Education for Superintendents and Principals.** Three credit hours.

A course for high school principals and city superintendents dealing with problems of organization and management of physical education activities.

**646. Professional Preparation of Teachers in Physical and Health Education.** Three credit hours. Autumn Quarter. Three class meetings each week. Prerequisite, fifteen hours in Education, Physical Education 621, 643, 682. Graduates from other schools without these prerequisites must obtain the consent of the instructor. Miss Hersey.

The principles underlying the professional training of teachers in physical and health education; curriculum construction; selection of candidates; supervised teaching; staff personnel; problems pertaining to professional students.

**649. Camping: Its Organization and Administration.** Three credit hours. Spring Quarter. Lectures, readings, and field demonstrations. Three lectures each week. Occasional Saturday mornings will be scheduled for field trips. The course is an elective given jointly by the Departments of Physical Education and Social Administration. Prerequisite, fundamental courses in sociology and in the theory and practice of physical education. Mr. Mason, Mr. Metcalf, Miss Waterman.

The organization and direction of camps, particularly summer camps for boys and girls. Special attention is given to the social and educational program for adolescents. Designed for those preparing for the direction of boys' and girls' work. Practical demonstration in camping will be included.

This course is the same as Social Administration 649.

\* Not given in 1933-1934.

**651. Minor Problems in Physical Education.** One to four credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, twenty-five hours in physical education. Before registering, students must secure permission of the instructor. Miss Palmer and others.

Investigation of minor problems in the field of physical and health education.

**652. Survey and Clinical Practice in the Care of the Physically Handicapped.** Three credit hours. Winter Quarter. Two lecture and three laboratory periods each week. Prerequisite, Physical Education 493, 630, and Physiology 620, or equivalent and consent of the instructor. Advised background in child psychology and abnormal psychology. Miss Gilman, Mr. Metcalf.

Observation of orthopedic diagnosis and surgery, physiotherapy methods in various educational and medical centers. Clinical experience under the supervision of the orthopedic surgeon in the after care of infantile paralysis, spastic paralysis, post-operative, scoliosis, and other orthopedic deformities. Laboratory, lectures, readings, reports, and discussions.

**682. Organization and Administration of Physical Education.** Five credit hours. Winter Quarter. Five lectures each week. Prerequisite, Physical Education 683. Mr. St. John, Miss Palmer.

A consideration of the problems of organization for physical education in elementary and secondary schools and colleges, including standards and methods in administration of inter-scholastic, intercollegiate and intramural athletics. The first eight lectures will deal with problems common to both men's and women's work. Thereafter, the women's classes will be conducted separately, with emphasis on problems peculiar to this field. The personnel of a department, athletic and gymnastic facilities, and construction, purchase and care of equipment, keeping of records and reports, handling of finances, schedule making, publicity, insignia and awards, managerial systems, scholastic and athletic eligibility, and professionalism, will be included in the problems discussed.

**691. Kinesiology.** Three credit hours. Autumn Quarter. Two lectures and three laboratory periods each week. Miss Waterman.

Lectures and recitations dealing with the anatomical mechanism of movements. The purpose of the course is to acquaint the student with means of analyzing movements intelligently and prescribing programs of gymnastics, sports, and dancing for developmental or corrective purposes.

**692. The School Health Service.** Three credit hours. Spring Quarter. Three lectures each week. Mr. Duffee.

A consideration of the problems in connection with the health of the school child and teacher. Discussions and reports relating to medical inspection, physical examinations, symptoms and control of common school diseases, malnutrition, and the health environment of the school child.

**NOTE:** For course in the Physiology of Exercise see the Department of Physiology, course 620.

**NOTE:** For course in the Administration of Health Education for Superintendents and Principals see the Department of Education, Course 731.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**801. Seminary in Physical and Health Education.** Two to six credit hours. Autumn, Winter, and Spring Quarters. Mr. Oberteuffer, Mr. Duffee, Miss Hersey, Mr. Hindman, Miss Palmer.

Autumn Quarter, problems in the field of health education.

Winter Quarter, problems in the field of physical education.

Spring Quarter, problems in competitive sport and athletics for both sexes.

Not open to students who have credit for Physical Education 628.

**805. Physical Education in Schools and Colleges.** Three credit hours. Spring Quarter. Three lectures and discussions each week. Prerequisite, Physical Education 621 or its equivalent. Mr. Oberteuffer.

An analysis of existing school and college programs considered in the light of acceptable practices in school administration. Will involve some case studies with summaries drawn in terms of principles. Arranged for students with teaching experience.

**810. Scientific Studies in Physical Education.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, ten hours of physiology and ten hours of psychology. Mr. Hindman.

A survey and evaluation of published researches in the field of physical education, including those in physiology of exercise.

**816. Problems in Interschool and College Athletics.** Three credit hours. Autumn Quarter. Three lectures and recitation hours each week. Prerequisite, courses in principles of physical education, and organization and administration of physical education. Mr. St. John, Mr. Oberteuffer.

The relation of athletics to education; problems of athletic organization; eligibility; finance; current trends and developments in management and purpose; public relations.

**820. Problems in Health Education.** Three credit hours. Spring Quarter. Three lectures and recitation periods each week. Prerequisite, course in principles of health education. Mr. Oberteuffer.

Problems of the relation of medicine to education; the physician in the school; legal aspects of the school health program; social medicine; trends and developments in mental and social hygiene. Individual and group readings and forum discussions.

**950. Research in Physical Education.** Autumn, Winter, and Spring Quarters. Mr. Oberteuffer, Mr. Hindman, Mr. Metcalf.

## PHYSICS AND ASTRONOMY

### PHYSICS

Office, 107 Mendenhall Laboratory

PROFESSORS ALPHEUS W. SMITH, BLAKE, AND LANDE, ASSOCIATE PROFESSORS ALVA W. SMITH AND THOMAS, ASSISTANT PROFESSORS HEIL, ZUMSTEIN, GREEN, KNAUSS, AND POOL, MR. HESTHAL, MR. NIELSEN, MR. BENNETT, MR. INGLIS

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These general prerequisites include fundamental courses in physics and mathematics. The following courses require a knowledge of calculus: 607, 608, 609, 610, 611, 612, 620, 621, 622, 623, 624, and 625.

**607. Physical Optics.** Four credit hours. Winter Quarter. Four lectures and recitations each week. Prerequisite, calculus and three Quarters of college physics. Mr. Zumstein.

Lenses; systems of lenses; defects of images and their correction; diffraction; interference; polarization; optical rotation; dispersion and anomalous dispersion; optical instruments such as plane grating, concave grating; prism spectroscope for visible ultra-violet and infra-red; interferometers; spectrophotometers; and microphotometers.

**608. Advanced Electricity.** Four credit hours. Autumn Quarter. Four lectures and recitations each week. Prerequisite, calculus and one year of college physics. Mr. Bennett.

An introductory course in the mathematical theory of electricity and magnetism.

**609. Molecular Physics and Heat.** Four credit hours. Autumn Quarter. Four lectures and recitations each week. Prerequisite, calculus and one year of college physics. Mr. Inglis.

A study of the kinetic theory of gases and related topics.

**610. Conduction of Electricity through Gases and Radioactivity.** Four credit hours. Winter Quarter. Four lectures and recitations each week. Prerequisite, calculus and one year of college physics. Mr. Heil.

An introductory course on the passage of electricity through gases and evacuated tubes, ionic velocities, photo-electricity, cathode rays and positive rays, radioactivity, elementary introduction to electron theory of matter, etc.

**611. Modern Spectroscopy.** Four credit hours. Spring Quarter. Four lectures and recitations each week. Prerequisite, calculus and three Quarters of college physics. Mr. Hesthal.

A discussion of recent progress in spectroscopy covering the following topics; series lines in spectra, Ritz principle of combination, Bohr's explanation, neutral and ionized states, ionization potential, types of series, electron orbits, generalization of Bohr's assumption, total and partial quantum numbers, Stark effect, intensity of lines; recent infra-red work; new work in ultra-violet; rest-strahlen, and focal isolation; Zeeman effect; absorption spectra, "raies ultimes".

**612. Periodic and Transient Electric Currents.** Four credit hours. Spring Quarter. Three lectures and recitations and one two-hour laboratory period each week. Prerequisite, calculus and three Quarters of college physics. Mr. Alva Smith.

Transient and stationary states in electrical circuits containing impulsive or periodic electromotive forces treated by the methods of differential equations and vector analysis; periodic and aperiodic currents in single circuits with resistance, inductance and capacity in series or parallel; coupled circuits; resonance phenomena; damped oscillations; theory of alternating current bridge measurements; pulsating currents; Fourier's analysis of periodic non-sinusoidal wave forms; electromagnetic radiation.

**616. Advanced Physical Laboratory.** Three to twenty-four credit hours. All Quarters. Two three-hour laboratory periods each week. Prerequisite, one year of college physics. Mr. Heil.

This course is intended to give the advanced student in science practice in precise physical measurements, involving the use of high grade mechanical, optical, electrical and thermal instruments.

The work undertaken will be elected from the following topics:

(a) **Mechanics and Heat.** Exact measurements involving determinations of elasticities of solids, moments of inertia, torsional rigidity, torsional hysteresis "g" by physical pendulum, coefficient of viscosity, density of gases and vapors, hygrometry, specific heats, heat values of gases, thermoelectromotive forces, etc.

(b) **Advanced Optical Measurements.** Exact determination of indices of refraction by means of spectrometers, wave lengths by means of ruled gratings and interferometers, dispersion, polarization, absorption, analysis of spectra, etc.

(c) **Advanced Electrical Measurements.** Exact measurements of currents, resistances, electromotive forces, magnetic permeability, capacity and inductance, transient phenomena involving the determination of time constants of circuits; fundamental alternating current measurements; the use of the oscillograph in the study of alternating and transient currents.

(d) **Advanced Measurements in Ionization and Radioactivity.** Use of electrometers and electroscopes for exact measurements of currents in gases, saturation currents, discharge of electricity and ionizing properties of radioactive materials, absorption of radiation: ionizing properties of flames and incandescent solids; characteristic curves of two and three electrode tubes and applications, photo-electricity, etc.

(e) **Pyrometry and High Temperature Measurements.** Thermo-electric pyrometers, resistance thermometers, optical pyrometers, total radiation pyrometers, temperature recorders and controlling devices, transition points and thermal analysis at high temperatures.

(f) **Acoustics.** Measurements on characteristics of speech sounds, limits of audition, masking effect of different sounds, binaural beats, acuity of hearing, acoustic filters, reflection and absorption of sound, reverberations, resonance in tubes and pipes, velocity of sound in different media.

Any one of the above topics may be selected during any Quarter with the exception of topic (d), which is offered only during the Winter Quarter.

A student may repeat this course until he has obtained a maximum of twenty-four credit hours. Only three credit hours may be taken during any Quarter except during the Summer Quarter, when six credit hours may be obtained. A student may accumulate not more than six credit hours in any one of the above topics.

This course is the same as Physics 602, 603, 604 and 605.

**620. X-rays and Atomic Structure.** Four credit hours. Autumn Quarter. Four lectures and recitations each week. Prerequisite, calculus and three Quarters of college physics. Mr. Pool.

Production, measurement and effects of X-rays, including gamma rays; classical electron theory of the reflection, refraction, absorption and scattering of X-rays; quantum theory of the origin of X-ray spectra and structure of heavy atoms.

**621. Acoustics.** Four credit hours. Winter Quarter. Four lectures and recitations each week. Prerequisite, calculus and three Quarters of college physics. Mr. Knauss.

A discussion of wave motion, forced vibrations, origin, propagation, velocity, interference, diffraction, resonance and energy relations of sound waves, vibration of strings and organ pipes, speech sounds, acoustics of buildings, etc.

**622. Thermionics and High Vacuum Phenomena.** Four credit hours. Spring Quarter. Four lectures and recitations each week. Prerequisite, calculus and three Quarters of college physics. Mr. Heil.

An introductory course in the physical theories of thermionic emission; the discharge of electricity from incandescent solids in gases and high vacua; the effect of space charge and electrode potentials on currents in vacuum tubes; the methods of production and measurement of high vacua; the application of thermionic devices to rectification of alternating currents and to the production and detection of oscillations; use of thermionic devices for measurement of very low pressures; the application of multiple electrode tubes to the study of radiation potentials and ionization potentials.

**623-624-625. Introduction to Theoretical Physics.** Three credit hours each Quarter. Autumn, Winter, Spring. Three lectures and recitations each week. Prerequisite, Mathematics 601 and 611 and three Quarters of college physics or their equivalents. Mr. Thomas.

This course is an introductory mathematical survey of the field of theoretical physics with emphasis on the application of mathematical methods to the solution of physical problems. The content of the course is selected from the following topics: dynamics of a particle, dynamics of rigid and deformable bodies, hydrodynamics of perfect and elastic fluids, dynamical theory of gases, electrostatics and electromagnetics, transient and alternating currents, electromagnetic waves along wires and in free space.

**630. Minor Investigations.** Three to five credit hours for one or two Quarters. Autumn, Winter, Spring. Prerequisite, nine Quarter-credit hours of Physics 616, or equivalent, and two of the following theoretical courses: Physics 607, 608, 609, 610, 611, 612, or equivalent. All instructors.

After consulting the instructor in charge, the student may select for investigation a subject in radiation, including X-rays, radioactivity, conduction of electricity through gases, radio communication, electricity and magnetism. Opportunity is also offered to repeat certain classical experiments in physics.

**654. X-rays and Crystal Structure.** Three credit hours. Winter Quarter. Three lectures and recitations each week. Prerequisite, calculus and one year of college physics. Given in alternate years. Mr. Blake, Mr. McCaughey, Mr. Mack, Mr. Harris.

This course is designed for those students of physics, chemistry, and mineralogy who intend to do research work in crystal structures and X-ray analysis.

This course is the same as Mineralogy 654 and Chemistry 654.

Not open to students who have credit for Physics 814.

**NOTE: TEACHING COURSES.** For the Teaching Course in this department see the Department of Education, Course 684.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

A reading knowledge of German and French is highly desirable.

**\*801. Electromagnetic Theory of Light.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Physics 607 and 625 or their equivalent.

This course deals with propagation of waves in crystals, circular and elliptic polarization, theory of reflection and refraction, Maxwell's theory, Hertz's verification, boundary conditions, theories of dispersion, optical properties of metals, magneto-optics.

**803-804. Thermodynamics.** Three credit hours. Winter and Spring Quarters. Prerequisite, Physics 625 or its equivalent. Mr. Landé.

This course deals with the fundamental principles of thermo-dynamics and their application to such topics as osmotic pressure, electrolytic conduction, diluted and concentrated solutions, the phase rule, chemical equilibrium, metastability of matter, Nernst's heat theorem and the modern theories of specific heats.

\* Not given in 1933-1934.

\*805. **Theory of Electricity and Magnetism.** Three credit hours. Winter Quarter. Prerequisite, Physics 625 or its equivalent. Mr. Landé.

This course deals with the electromagnetic theory as originally developed by Maxwell. It includes also a consideration of the modern theories of electricity and magnetism. It is essentially a mathematical course.

\*806. **Theory of Electricity and Magnetism.** Three credit hours. Spring Quarter. Mr. Landé.

A continuation of Physics 805.

\*809. **General Theory of Small Oscillations.** Three credit hours. Autumn Quarter. Prerequisite, Physics 625 or its equivalent. Mr. Blake.

The general theory of small oscillations will be developed both for free and forced oscillations, with and without damping. The properties of the coefficients of inertia, resistance and elastance will be studied and illustrated. The properties of normal functions will be studied.

\*810. **Applications of the Theory of Oscillations.** Three credit hours. Winter Quarter. Prerequisite, Physics 809. Mr. Blake.

The theory of a loaded string and the conditions under which it stimulates a uniform string will be studied and applied to modern telephone engineering. The vibrations of square and circular membranes will be studied and applied.

\*811. **Applications of the Theory of Oscillations.** Three credit hours. Spring Quarter. Prerequisite, Physics 810. Mr. Blake.

The theory of thermionic oscillators will be developed and applied, electrical and acoustical filters will be studied and some of the theory of transmission networks will be developed.

813. **Line Spectra and Atomic Structure.** Three credit hours. Autumn Quarter. Three lectures and recitations each week. Prerequisite, Physics 610 and 611 or their equivalent. Mr. Green.

Interpretation of spectra series, stationary states and term values, spinning electrons and fine line structure, vector models of atoms, Zeeman effect and Stark effect, intensity and polarization of spectral lines, Pauli's exclusion principle, hyperfine structure and nuclear moment.

815. **X-rays and Quantum Theory of Atomic Structure.** Three credit hours. Spring Quarter. Three lectures and recitations each week. Prerequisite, Physics 610 and 620. Mr. Blake.

The Thomas-Fermi distribution of electrons in atoms and the Hartree distribution in relation to atomic scattering; the theory of coherent and incoherent scattering; the dimensions of atoms and molecules as determined by X-ray and electronic scattering; the fine line structure of emission lines and of absorption limits. The use of X-rays in the study of molecular structure.

817-818-819. **Quantum and Wave Mechanics.** Three credit hours. Autumn, Winter, and Spring Quarters. Three lectures each week. Prerequisite, Physics 625 or its equivalent. Mr. Landé.

Wave mechanics of Schrodinger and deBroglie; matrix mechanics of Born, Heisenberg, and Jordan; relation to classical mechanics; atomic models and spectral lines; band-spectra and vibrations of complex molecules; applications of wave mechanics to the diatomic oscillator-rotator; intensity relations; perturbation theory; degeneracy in spectra; homopolar molecules and nuclear spin; general transformation theory of Dirac and Weyl with deduction of wave equation; applications to emission and absorption; many electron problems; Heisenberg's uncertainty principle.

824. **Statistical Mechanics.** Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Physics 625 or its equivalent. Mr. Thomas.

Basis of statistical mechanics and its relation to thermodynamics; vapor pressure; rate of evaporation; fluctuations and Brownian movements; Einstein-Bose statistics; the Pauli-principle and Fermi-Dirac statistics; applications to temperature-radiations; specific heats of gases and crystals; thermionics and the theory of metallic conduction.

†825. **Applications of Wave Mechanics to Physico-Chemical Phenomena.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Physics 824. Mr. Thomas.

Heitler and London's theory of homopolar compounds; dielectric constants and magnetic susceptibilities of gases; paramagnetism of rare earths; Heisenberg's theory of ferromagnetism; collision problems; ionization by radiation and by collision; radioactive processes.

\* Not given in 1933-1934.

† Not given during the academic year, 1933-1934.

\*826. **Problems in Astrophysics.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Physics 825. Mr. Thomas.

Contributions of theoretical physics to the solution of major problems in astrophysics; emphasis on the application of the quantum theory to stellar phenomena; a discussion of such problems as: thermodynamic methods, radioactive equilibrium, cosmic rays, radiation pressure, statistical mechanics and physical properties of gaseous media, Milne's theory of stellar chromospheres, Eddington's theory of stellar interiors and Jean's theory of the structure of stars.

851. **Band Spectra and Related Topics.** Three credit hours. Winter Quarter. Three lectures and recitations each week. Prerequisite, Physics 610 and 611.

Classification of molecular spectra; electronic and oscillation bands; Zeeman effect and isotrope effect in band spectra; Raman effect; formation and dissociation of molecules; fluorescence; nature of certain chemical reactions in gases; applications of quantum mechanics to band spectra.

852. **Infra-red Molecular Spectra.** Three credit hours. Spring Quarter. Three lectures and recitations each week. Prerequisite, Physics 610 and 611. Mr. Nielsen.

An interpretation of various types of infra-red bands in terms of vibrating and rotating molecular models; a detailed treatment of symmetric and asymmetric rotators on the basis of both classical and quantum mechanics, intensities of vibration bands and rotation lines; solution of data on infra-red molecular spectra to related chemical and physical phenomena.

860. **Mathematical Physics.** Three credit hours. Winter Quarter. Prerequisite, Mathematics 832 or its equivalent. Mr. Thomas.

Continuation of treatment of mathematical methods considered in Mathematics 831-832 with special emphasis on the applications of the general principles of mechanics to the fields of hydrodynamics, electrodynamics, elasticity, theory of potential and conduction of heat; solution of particular physical problems by the methods series and singularities.

861. **Mathematical Physics.** Three credit hours. Spring Quarter. Prerequisite, Physics 860. Mr. Thomas.

Continuation of Physics 860.

950. **Research in Physics.** Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Prerequisite, acceptable courses in physics and mathematics. The student may spend a part or all of his time on his chosen field of research. This course is intended primarily to meet the needs of students who must complete either a thesis or a dissertation as part of the requirements for a degree. Mr. Alpheus W. Smith, Mr. Blake, Mr. Landé, Mr. Alva W. Smith, Mr. Thomas, Mr. Heil, Mr. Green, Mr. Zunstein, Mr. Pool, Mr. Knauss, Mr. Hesthal, Mr. Nielsen, Mr. Bennett, Mr. Inglis.

#### ASTRONOMY

Office, Emerson McMillin Observatory

PROFESSOR MANSON

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

605. **Introduction to Celestial Mechanics.** Four credit hours. Winter Quarter. Four lecture and recitation periods each week. Prerequisite, Mathematics 443 and ten Quarter hours of astronomy or ten Quarter hours of college physics. Mr. Manson.

A discussion of rectilinear motion under the law of inverse squares and under the law of direct distance; central forces, including the character of the orbit under different laws of attraction; the potential and attraction of bodies; the problem of two bodies; including the computation of positions of planets and comets.

606. **Introduction to Celestial Mechanics.** Four credit hours. Spring Quarter. Four lecture and recitation periods each week. Prerequisite, Astronomy 605 or its equivalent. Mr. Manson.

A discussion of the determination of orbits of planets and comets; the general integrals of problems of "n" bodies and an introductory discussion of the problem of three bodies, lunar theory and perturbations.

\* Not given in 1933-1934.

**611. Minor Problems in Astronomy.** Three to nine credit hours. Autumn, Winter, and Spring Quarters. Conference, library and laboratory work. Prerequisite, Astronomy 502. A student may repeat this course until he has earned a total of nine credit hours but not more than three credit hours may be taken in one Quarter. Mr. Manson.

This course is designed to permit properly qualified students to avail themselves of the facilities of the Observatory to work independently on a special problem in practical astronomy, to develop the necessary techniques for the successful use of astronomical instruments and to get some acquaintance with the methods of astronomical research. Each problem must be selected after consultation with the instructor in charge of the course.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**950. Research in Astronomy and Astrophysics at the Perkins Observatory.** Autumn, Winter, and Spring Quarters. Prerequisite, acceptable courses in astronomy, mathematics, and physics. In accordance with an arrangement made by the Boards of Trustees of The Ohio State University and of Ohio Wesleyan University, students registered in the Graduate School may carry on their research work at the Perkins Observatory of Ohio Wesleyan University under the guidance of the Director of that Observatory. Subject of research to be chosen after consultation with the Director. The course may be repeated as often as necessary in pursuit of any special research. (See page 11 for research facilities offered by the Perkins Observatory.) Mr. Stetson, with the cooperation of the staff of the Perkins Observatory.

### PHYSIOLOGICAL CHEMISTRY, PHARMACOLOGY, AND MATERIA MEDICA

Office, Hamilton Hall

PROFESSOR SMITH, ASSOCIATE PROFESSOR BROWN, ASSISTANT  
PROFESSOR WIKOFF

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include fundamental courses in general chemistry, qualitative analysis and organic chemistry.

Courses 601, 602 and 671 are open only to students doubly registered in the College of Medicine and the Graduate School. Courses 631, 632, 633 are open only to students doubly registered in the College of Dentistry and the Graduate School to the extent of 15 Quarter hours.

#### PHYSIOLOGICAL CHEMISTRY

**601. Physiological Chemistry.** Five credit hours. Autumn Quarter. Two lectures, one quiz, and six laboratory hours each week. Prerequisite, general chemistry, qualitative analysis, and organic chemistry. In addition to these prerequisites a course in quantitative analysis is highly desirable. Mr. Smith, Mr. Brown.

The chemistry of carbohydrates, lipins, and proteins.

**602. Physiological Chemistry.** Five credit hours. Winter Quarter. Two lectures, one quiz, and six laboratory hours each week. Prerequisite, Physiological Chemistry 601. Mr. Smith, Mr. Brown.

The chemistry of digestion, metabolism, and excretion.

**611. Physiological Chemistry.** Five credit hours. Autumn Quarter. Two lectures, one quiz, and six laboratory hours each week. Prerequisite, quantitative analysis, Chemistry 647, 648, 649, 650. Miss Wikoff.

The chemistry of the carbohydrates, lipins, and proteins.

Not open to students who have credit for Physiological Chemistry 601. Not available for graduate credit for students majoring in Physiological Chemistry.



**612. Physiological Chemistry.** Five credit hours. Winter Quarter. Two lectures, one quiz and six laboratory hours each week. Prerequisite, Physiological Chemistry 611. Miss Wikoff.

The chemistry of digestion, metabolism, and excretion.

Not open to students who have credit for Physiological Chemistry 602. Not available for graduate credit for students specializing in Physiological Chemistry.

**613. Quantitative Methods of Blood and Urine Analysis.** Three credit hours. Spring Quarter. One lecture and six laboratory hours each week. Prerequisite, Physiological Chemistry 612. Miss Wikoff

Determination of important constituents of the blood and urine.

Not open to students who have credit for Physiological Chemistry 603.

**614. Biochemical Methods of Research.** Five credit hours. Autumn Quarter. Two hours of lecture or quiz and nine laboratory hours each week. Prerequisite, Physiological Chemistry 612. Miss Wikoff

The quantitative analysis of the protein, fats and carbohydrates. Special methods for the analysis of biological materials.

**618. Toxicology.** Three credit hours. Autumn Quarter. Two lecture and three laboratory hours each week. Prerequisite, a course in quantitative analysis and Chemistry 647, 648, 649, 650. Mr. Smith.

A course dealing with the effects and detection of poisons.

Not open to students who have credit for Physiological Chemistry 608.

**619. Minor Problems in Physiological Chemistry.** Two to fifteen credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Physiological Chemistry 614. A student may repeat this course and may spend all or part of his time on it during a Quarter. Mr. Smith, Mr. Brown, Miss Wikoff.

This course is designed to permit any properly qualified person to avail himself of the facilities of the department for carrying out a minor investigation or for adding to his knowledge and technique in physiological chemistry. A student may exercise complete freedom in his choice of instructor to direct his work in this course.

**631. Physiological Chemistry.** Three credit hours. Winter Quarter. One lecture, one quiz, and three laboratory hours each week. Open only to students registered in the College of Dentistry. Prerequisite, general chemistry, qualitative analysis, and organic chemistry. Mr. Brown.

The chemistry of the carbohydrates, lipins, and proteins.

**632. Physiological Chemistry.** Five credit hours. Spring Quarter. Three lecture or quiz hours and six laboratory hours each week. Open only to students registered in the College of Dentistry. Prerequisite, Physiological Chemistry 631. Mr. Brown.

The chemistry of digestion, absorption, metabolism, and excretion; the tissues; the internal secretions.

**633. Physiological Chemistry.** Two credit hours. Autumn Quarter. One lecture and one quiz hour each week. Open only to students registered in the College of Dentistry. Prerequisite, Physiological Chemistry 632. Mr. Brown.

The elements of human nutrition; the effects of diets on the human body; the relation of diets to dentistry.

#### PHARMACOLOGY

**671. Pharmacology.** Five credit hours. Spring Quarter. Two lectures, one quiz, and six laboratory hours each week. Open only to students registered in the College of Medicine. Prerequisite Physiology 604, 605, 606, Physiological Chemistry 602 or 612 and Materia Medica 606 or 670. Mr. Smith.

This course treats of the modification of the normal physiological processes of the body by the presence of the more common drugs used in medicine.

Not open to students who have credit for Pharmacology 605.

**675. Methods of Biologic Drug Assay.** Two credit hours. Spring Quarter. One lecture and three laboratory hours each week. Prerequisite, permission of the instructor. Mr. Smith.

This course includes consideration of the methods in common use for the biological standardization of drugs.

Not open to students who have credit for Pharmacology 607.

## FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**Qualifying Examination for the Master's Degree:** At least one Quarter prior to the Convocation at which he expects to receive the Master's degree the candidate must pass a written examination covering general inorganic chemistry, analytical chemistry, and the fundamentals of organic chemistry.

**807. Advanced Physiological Chemistry.** Three credit hours. Spring Quarter. One lecture or quiz and six laboratory hours each week. Prerequisite, Physiological Chemistry 612. Mr. Brown.

An advanced course in biochemical preparations, including the isolation of enzymes, lipins, proteins, and such hormones as epinephrin and insulin.

**813. Seminary in Physiological Chemistry.** Two credit hours. Spring Quarter. Prerequisite, Physiological Chemistry 612. Mr. Smith.

Topic for 1934: The Alkaloids and their Detection.

**815. Biochemical Biography.** One credit hour. Spring Quarter. Prerequisite, Physiological Chemistry 612. Required of all candidates for graduate degrees in physiological chemistry. Miss Wikoff.

**830. Chemistry of Medicinal Substances.** Three credit hours. Winter Quarter. Three conference hours each week. Prerequisite, Physiological Chemistry 611, 612, or Chemistry 841 and 842. Mr. Smith.

**950. Research in Physiological Chemistry and Pharmacology.** Autumn, Winter, and Spring Quarters. Research in Physiological Chemistry will be conducted under the guidance of Mr. Smith, Mr. Brown, Miss Wikoff; research in *Materia Medica* under the guidance of Mr. Smith and Miss Wikoff.

## PHYSIOLOGY

Office, 209 Hamilton Hall

PROFESSORS SEYMOUR, BLEILE (EMERITUS), AND NICE, ASSOCIATE PROFESSOR E. P. DURRANT, ASSISTANT PROFESSORS McPEEK, HITCHCOCK, AND HAMLIN. MR. R. R. DURANT

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These general prerequisites include for course 622, a course in organic chemistry, and for 618, a course in general chemistry.

**604. Advanced Physiology.** Six credit hours. Autumn Quarter. Four lecture or recitation hours and six laboratory hours each week. Open only to students registered in the College of Dentistry. Mr. Nice.

This course deals with the physiology of the contractile tissues, reflexes, lymph, blood, and circulation. The course is based upon animal experimentation by the students, supplemented by demonstrations by the instructors. The bearing of the data obtained upon clinical phenomena is considered.

Not open to students who have credit for Physiology 601 or 615.

**605. Advanced Physiology.** Six credit hours. Winter Quarter. Three lecture or recitation hours and nine laboratory hours each week. Open only to students registered in the College of Dentistry. Mr. Nice.

A continuation of Physiology 604, dealing with respiration, digestion, excretion, metabolism, the central nervous system and sense organs.

Not open to students who have credit for Physiology 602 or 616.

**607. Physiology.** Two credit hours. Spring Quarter. Two lecture or quiz hours each week. Open only to students registered in the College of Dentistry. Prerequisite, Physiology 604 and 605. Mr. McPeek.

The application of the data of Physiology 604 and 605 to certain clinical diagnostic conditions.

Not open to students who have credit for Physiology 603, 606, or 503.

**611. Physiological Laboratory.** Five credit hours. Autumn Quarter. Two conference and nine laboratory hours each week. Prerequisite, Physiology 615 or 616 or equivalent training. Mr. Nice, Mr. Hitchcock, Mr. E. P. Durrant, Mr. R. R. Durant.

A laboratory course in advanced and specialized physiology of circulation, respiration, neuromuscular phenomena, endocrinology, etc., as the student may elect.

This course should not be elected without previous conference with the instructor in charge.

**612. Physiological Laboratory.** Five credit hours. Winter Quarter. Two conference and nine laboratory hours each week. Prerequisite, Physiology 615 or 616, or equivalent training. Mr. Nice, Mr. Hitchcock, Mr. E. P. Durrant, Mr. R. R. Durant.

See description under Physiology 611.

This course should not be elected without previous conference with the instructor in charge.

**613. Physiological Laboratory.** Five credit hours. Spring Quarter. Two conference and nine laboratory hours each week. Prerequisite, Physiology 615 or 616, or equivalent training. Mr. Nice, Mr. Hitchcock, Mr. R. R. Durant.

See description under Physiology 611.

This course should not be elected without previous conference with the instructor in charge.

**615. Advanced Physiology.** Five credit hours. One Quarter. Autumn and Spring. Four lecture or quiz periods and six laboratory hours each week. Mr. Nice, Mr. McPeck.

This course deals with the physiology of the contractile tissues, reflexes, autonomic nervous system, lymph, blood, and circulation.

Not open to students who have credit for Physiology 601.

**616. Advanced Physiology.** Five credit hours. Winter Quarter. Four lecture or quiz periods and six laboratory hours each week. Mr. Nice, Mr. McPeck.

A study of respiration, foods, digestion, metabolism, excretion, internal secretions, central nervous system, and special senses.

Not open to students who have credit for Physiology 602.

**618. Physiology of Metabolism.** Three or five credit hours. Winter Quarter. Three lecture hours or three lecture and six laboratory hours each week. Mr. Hitchcock.

This course deals with both the theoretical and practical aspects of human metabolism as measured by determination of the respiratory exchanges. Some of the more important abnormal variations in the metabolic rate are considered. In the laboratory the student is familiarized with some of the simpler types of apparatus for measuring the metabolic rate.

**619. Physiology of Reproduction.** Three or five credit hours. Winter Quarter. Three lecture hours or three lecture and six laboratory hours each week. Mr. E. P. Durrant.

This course considers the fundamental phenomena of reproduction in both the simpler and higher forms of living matter. It presents a brief survey of embryonic development and a study of the mammalian gonads with particular emphasis on their hormonal relations. The laboratory work will be devoted to demonstrating the activities of the gonads and the resulting effects upon body processes.

**620. Physiology of Exercise.** Five credit hours. Spring Quarter. Three lecture hours and six laboratory hours each week. Class limited to twenty students. Mr. Hamlin.

This course deals with present conceptions of muscle physiology, the role of the nervous and endocrine systems in the control of muscular activity, the correlation of circulation, respiration and other body mechanisms with the intensity of muscular exercise, in brief, all those physico-chemical processes which make possible and occur as a result of muscular action.

**621. Physiological Technique.** Three credit hours. Autumn Quarter. Two conference hours and three laboratory hours each week. Mr. E. P. Durrant.

A course designed to familiarize the student with the technique of mammalian experimentation. Fundamental experiments in circulation, respiration, digestion, and excretion will be presented as a preparation for advanced mammalian physiology.

**622. General Physiology.** Five credit hours. Winter Quarter. Three lecture or quiz periods and six laboratory hours each week. Mr. Hitchcock.

This course deals with the fundamental physico-chemical principles involved in the physiological manifestations of life. A study is made of the physico-chemical constitution of living matter, surface tension, diffusion, osmotic pressure, the physiological significance of the colloid state and the part played by electrolytes and ionic concentration in vital phenomena.

Not open to students who have credit for Physiology 406 or 617.

**623. General Physiology.** Five credit hours. Spring Quarter. Three lecture or quiz and six laboratory hours each week. It is desirable but not essential that this course be preceded by Physiology 622. Mr. Hitchcock.

This course is designed primarily as a continuation of Physiology 622 and presents a study of irritability and contractility, together with a brief comparative study of the circulatory, respiratory, secretory, and digestive processes in lower and higher organisms.

**634. Introduction to Applied Physiology.** Four credit hours. Spring Quarter. Three lecture or recitation hours and one three-hour laboratory period each week. Open only to students registered in the College of Medicine. Mr. McPeck, Mr. E. P. Durrant, Mr. Hitchcock, and assistants.

The course deals with the general physiologic considerations relating to the maintenance of irritability and reactions of the body: physiology of the blood, contractile tissues, nerves, reflexes, central nervous system, autonomic nervous system and cutaneous receptors. Laboratory demonstrations by the instructors supplement the class room instruction.

Not open to students who have credit for Physiology 604 or 615.

**635. Applied Physiology.** Five credit hours. Autumn Quarter. Three lecture or recitation hours and two three-hour laboratory periods. Open only to students registered in the College of Medicine. Prerequisite, Physiology 634 or equivalent biological training. Mr. McPeck, Mr. R. R. Durant, Mr. Hitchcock, and assistants.

The course includes a study of the special receptor systems, eye, ear, etc., heart, vasomotor and lymphatic systems, respiration and metabolism. The relations of the abnormal to the normal reactions are stressed in lecture and quiz, supplemented by laboratory work by the student and demonstrations by the instructors.

Not open to students who have credit for Physiology 605 or 616.

**636. Applied Physiology.** Five credit hours. Winter Quarter. Three lecture or quiz hours and two three-hour laboratory periods. Open only to students registered in the College of Medicine. Prerequisite, Physiology 634 and 635. Mr. McPeck, Mr. R. R. Durant, Mr. Hitchcock, and assistants.

The course includes a study of the digestive and excretory systems and of the endocrine glands. The relations of the abnormal to the normal reactions are stressed in lecture and quiz, supplemented by laboratory work by the student and demonstrations by the instructors.

Not open to students who have credit for Physiology 606.

**700. Minor Problems.** Three or five credit hours. Autumn, Winter, and Spring Quarters. A student may register at the beginning of any Quarter. Special problems with assigned readings, conferences, and reports. Prerequisite, four Quarters of physiology and permission of the instructor in charge.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**815-816-817. Seminary in Physiology.** One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in Physiology. All instructors.

**950. Research in Physiology.** Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Mr. Nice and staff members.

**POLITICAL SCIENCE**  
Office, 100 University Hall

PROFESSORS SPENCER, SHEPARD, AND ODEGARD, ASSOCIATE PROFESSOR  
WALKER, ASSISTANT PROFESSOR HELMS, MR. AUMANN

**FOR ADVANCED UNDERGRADUATES AND GRADUATES**

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**605. Principles of Public Administration I.** Five credit hours. Winter Quarter. Five meetings each week. Mr. Walker.

A consideration of the general problems of public administration; relations between the administration and the other branches of government—executive, legislative, and judicial; the civil service; personnel administration; budgets and accounting; centralized purchasing.

**606. Principles of Public Administration II.** Five credit hours. Spring Quarter. Five meetings each week. Prerequisite, Political Science 403. Mr. Walker.

An examination of the principles of public administration as applied to the rendering of service to the public by national, state and local governments. Attention will be paid to such functions as the protection of life and property, the promotion of trade and commerce, the regulation and operation of public utilities, city and metropolitan planning, and the furtherance of public welfare, noting in each case the part which is played by each of the levels of government.

**607. Municipal Government.** Five credit hours. One Quarter. Autumn and Spring. Five meetings each week. Mr. Helms.

A comparative study of modern municipalities in the United States and the principal countries of Europe; their social significance; their governmental structure; their relation to the state; the experience with government by council, mayor, commission, and manager; methods of popular participation.

**\*610. Problems of County and Rural Government.** Three credit hours. Spring Quarter. Three meetings each week. Prerequisite, Political Science 607 and 608.

A study of structure and functions of county government under both rural and urban conditions and an examination of problems of rural government.

**611. Introduction to Jurisprudence.** Five credit hours. Autumn Quarter. Five meetings each week. Mr. Spencer.

An introductory study of legal concepts. An attempt is made both to give the prospective law student an analytical and historical guide into his subject, and to give those who do not intend to pursue the study of law an idea of its significance in social organization, and its relation to political and economic science.

**\*612. International Law.** Five credit hours. Winter Quarter. Five meetings each week. Mr. Spencer.

A study of the principles of international law in their growth and present status, with particular attention to unsettled points, and problems raised by the World War.

**613. Contemporary International Politics.** Five credit hours. Winter Quarter. Five meetings each week. Mr. Spencer.

Methods and ideals of diplomacy; current problems in international relations, such as the reorganization of Europe, Pan-Americanism, and the Far East; tendencies toward administrative, judicial, and legislative world-organization.

**\*615. Administration of Justice.** Three credit hours. Spring Quarter. Three meetings each week. Mr. Aumann.

A study of the nature, purposes, and limitations of law as administered through courts. The development, organization, and procedure of our judicial system. Recent trends in legal thinking.

**616. American Constitutional Law.** Three credit hours. Winter Quarter. Three meetings each week. Mr. Aumann.

A study of leading constitutional principles in the United States as interpreted by the courts. Special studies will be made of such topics as the following: the adoption and amendments of constitutions; the judicial power; citizenship; private rights; the powers of Congress; war powers; police power of the states; political privileges. Designed for students who desire a non-technical knowledge of the more important federal and state constitutional principles in the United States.

\*Not given in 1933-1934.

**617. Administrative Law.** Three credit hours. Spring Quarter. Three meetings each week. Prerequisite, Political Science 616. Mr. Odegard.

Administrative organization; procedure of administrative bodies; limits of administrative discretion; quasi-judicial and quasi-legislative powers of administrative bodies; relief against administrative action; conclusiveness of administrative findings. Cases and readings.

**621. Ancient and Medieval Political Thought.** Three credit hours. Autumn Quarter. Three meetings each week. Mr. Shepard.

The chief theories of European government from the time of Plato to the opening of the modern period. Political Science 621, 622, and 623 are intended to present consecutively the development of European political philosophy.

Not open to students who have credit for Political Science 619.

**622. Modern Political Thought.** Three credit hours. Winter Quarter. Three meetings each week. Mr. Shepard.

The chief theories of European and American government from the sixteenth century to the middle of the nineteenth century. This course is naturally preceded by Political Science 621, though the latter is not required, and is naturally followed by Political Science 623.

Not open to students who have credit for Political Science 619.

**623. Contemporary Political Thought.** Three credit hours. Spring Quarter. Three meetings each week. Mr. Shepard.

An examination of the more important contemporary trends of political thought and of the theoretical problems of the nature of the state, of government, and of law.

Not open to students who have credit for Political Science 620.

**631. Methods of Governmental Research.** Three credit hours. Autumn Quarter. Three meetings each week. Given in alternate years. Prerequisite, permission of the instructor. Mr. Walker.

The materials of political science; history of procedure in political science research; research technique; presentation of results of research.

**633. Legislation.** Three credit hours. Autumn Quarter. Three meetings each week. Mr. Walker.

The process of law making in the United States, the constituent process, statute law making, legislative drafting, legislative procedure, judicial review, the common law, executive ordinances, popular law making.

**634. Public Opinion and Political Processes.** Five credit hours. Autumn Quarter. Five meetings each week. Mr. Odegard.

A study of the forces which mould the public mind, and of the channels through which public opinion is expressed, viz., the family, the school, the church, the movies, radio, press, pressure groups and propaganda.

Lectures and discussion.

**635. Elections and Parties.** Five credit hours. Winter Quarter. Five meetings each week. Mr. Odegard.

A study of voting qualifications, ballot forms, the direct-primary and other forms of nomination, systems of proportional representation, the organization and methods of political parties, and the position and functions of the party system in democracies.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include a foundation laid in college courses in the historical and social sciences.

**HISTORICAL CONFERENCE:** In addition to the formal courses indicated below, a monthly conference is held, composed of the instructors and graduate students in the departments of History and Political Science. The discussions in this conference cover a wide range of topics of general interest to students and investigators in these fields.

**805. Political Thought.** Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Shepard.

Research in the history of political ideas and in the theoretical problems of contemporary politics.

**806. Comparative Government.** Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Spencer.

Research in the governments of foreign countries.  
Problem for 1933-1934: Parties in European Parliaments.

**807. Public Opinion and Political Parties.** Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Odegard.

A systematic study of the informal phases of politics. Special attention will be given to individual projects dealing with pressure groups, political party organization and procedure, and other aspects of the governmental process.

**808. Public Administration.** Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Walker.

Research in staff and line activities of national, state, and local government. Field work, group seminary, individual conference, and written report.

**809. Municipal Government.** Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Helms.

Reading and research in the municipal governments of the United States and Europe.

**810. International Relations.** Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Spencer.

Research in international relations. Problem for 1933-1934: Lessons of the Ten Years' experience with the League of Nations.

**811. Public Law.** Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Aumann.

Readings and research in the field of public law including selected problems in the fields of constitutional law or judicial administration.

**950. Research in Political Science.** Autumn, Winter, and Spring Quarters. Prerequisite, six Quarter-courses in political science.

This course presents an opportunity for advanced research in political science, in such portion of the field as may be agreed upon with the individual student. It is offered in every Quarter, and with any of the members of the department in residence.

## POULTRY HUSBANDRY

### Poultry Husbandry Building

PROFESSOR DAKAN, ASSISTANT PROFESSOR WINTER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34. These general prerequisites include for course 606, courses in chemistry and zoology, including a course in heredity, and for 607, courses in chemistry and biological science.

**603. Marketing and Processing Poultry Products.** Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, Business Organization 700 or Rural Economics 613. Mr. Dakan.

Processing frozen, dried, and shell eggs. Marketing live and dressed poultry, eggs, and egg products.

\***606. Poultry Genetics.** Five credit hours. Autumn Quarter. Three lectures and two conference periods each week. Given in alternate years. Mr. Dakan.

The principles of genetics applied to the breeding of poultry. A critical review of the literature on poultry genetics and allied subjects.

\***607. Advanced Poultry Nutrition.** Five credit hours. Spring Quarter. Three lectures and two conference periods each week. Given in alternate years. Mr. Winter.

A study of experimental methods involved in conducting research in poultry nutrition. A critical review of the literature on poultry nutrition and allied subjects.

\* Not given in 1933-1934.

**701. Special Problems in Poultry Husbandry.** Three to fifteen credit hours, taken in units of three to five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. Mr. Dakan, Mr. Winter.

Limited to advanced students and must be arranged with the professor in charge. Each student will be required to make an exhaustive study of some particular phase of poultry husbandry and write a thesis of his study and research. The work must comprise in part some original investigation by the student.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**950. Research in Poultry Husbandry.** Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Prerequisite, acceptable courses in the chosen field of research. The student may spend a part or all of his time on research work. Mr. Dakan, Mr. Winter.

Research may be done in genetics, embryology, metabolism, and nutritional diseases.

### PRACTICAL ARTS AND VOCATIONAL EDUCATION

(See Education)

### PRINCIPLES AND PRACTICE OF EDUCATION

(See Education)

### PROSTHESIS

Office, Hamilton Hall

PROFESSOR COTTRELL, ASSISTANT PROFESSORS WILTBERGER AND KITCHIN, MR. STARR

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84. These prerequisites include adequate preparation in technical courses concerned.

**704-705-706. Minor Problems in Prosthesis.** One to three credit hours. Autumn, Winter, and Spring Quarters.

Students will have assigned to them special problems in Prosthesis.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84. These prerequisites include adequate preparation in technical and practical courses in prosthesis.

**950. Research in Prosthesis.** Autumn, Winter, and Spring Quarters.

Research relating to and found in the various endeavors concerning the restoration of the mouth to normal conditions through substitutions for lost parts.

### PSYCHOLOGY

Office, 325 Education Building

PROFESSORS ARPS, BURTT, GODDARD, MAXFIELD, PRESSEY, TOOPS, DOCKERAY, RENSHAW, AND ENGLISH, ASSOCIATE PROFESSORS WILLIAMS AND VALENTINE, ASSISTANT PROFESSORS ROGERS, L. C. PRESSEY, DUREA, AND EDGERTON, MRS. STOGDILL

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

The department offers instructional and training facilities in practically all divisions of



psychology. For administrative purposes and for the general guidance of the student, these have been grouped into a number of areas but there is great flexibility in the working out of a unified program of study. For this last the student is urged at once upon entering on graduate study (or even before when this is possible) to consult with a member of the staff. Not later than the second Quarter of graduate study the student should request the appointment of a major adviser and an advisory committee.

The general comprehensive examination required by the Graduate School of candidates for the doctorate covers all the areas of the department in a general way but permits of some specialization in the fields of the student's chief interest.

The areas of the department are as follows:

1. General theoretical, experimental and comparative Psychology.
2. Educational Psychology (including mental and educational tests; this area also administers a service course of remedial work with students on probation).
3. Clinical and Abnormal Psychology. In addition to class instruction, this area maintains a service clinic for the examination of children, and a consultation service for students in the University. Men should make appointment with Mr. Durea, women with Mrs. Emily Stogdill.
4. Statistics of Psychology and College Personnel. (This area also administers the University Intelligence Tests).
5. Industrial and Business Psychology.

**601. Experimental Psychology.** Three credit hours. Autumn Quarter. One lecture and two laboratory periods each week. Mr. Renshaw.

The laboratory training course in experimental psychology for advanced undergraduate and graduate students. The experiments are selected both for general cultural value and for preparation for technical research in experimental psychology.

Courses 601, 602, 603 comprise a unit year's work. In special cases students may enter course 602 without having credit for 601.

**602. Experimental Psychology.** Three credit hours. Winter Quarter. One lecture and two laboratory periods each week. Mr. Renshaw.

**603. Experimental Psychology.** Three credit hours. Spring Quarter. One lecture and two laboratory periods each week. Mr. Renshaw.

**605. Physiological Psychology.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. Goddard.

The aim of this course is to give a consistent picture of the physical basis of mind. It uses the important facts of the anatomy and physiology of the central and automatic nervous systems and the more generally accepted theories of nerve functions and their correlations with mental processes.

**606. Advanced Physiological Psychology.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, Psychology 605 or permission of the instructor. Mr. Goddard.

This course will deal with the larger problems of the dependence of mental phenomena upon physiological processes such as: the emotions and the sympathetic system; temperament and the endocrines; consciousness and the circulation; nerve activity without consciousness; effect of unusual physiological conditions (e.g., produced by fatigue, alcohol, syphilis or other toxins) upon various mental processes.

**607. Genetic Psychology.** Five credit hours. Spring Quarter. Five lecture hours each week. Lectures, recitations, and report. Mr. Williams.

This course is designed to present the facts of mental development and their significance. Topics considered are: individual development, particularly with reference to the development of the nervous system; inheritance of mental traits; innate tendencies, their characteristics, description, and modification; play; mental states, their physiological basis and development with growth and training; moral and religious development; physical development; methods of child study; exceptional children (observation of atypical children in city and state institutions).

**608. Educational Statistics: Elementary.** Four credit hours. Autumn Quarter. Two lectures and two two-hour laboratory periods each week. Mr. Toops, Mr. Edgerton.

A basic statistical course for students intending to conduct major or minor research. Frequency distributions, methods of measuring central tendencies and variability; construction of graphs and charts; interpretation of results in terms of probability; simple treatment of correlation. Extended practice in the use of calculating machines and computational devices.

Not open to students who have credit for School Administration 613 or 643.

**609. The Exceptional Child.** Three credit hours. One Quarter. Winter and Spring. Three lecture hours each week. Lectures, reports, clinics, and

visits to public institutions. Prerequisite, fifteen hours of psychology or ten hours of psychology and five hours of professional educational subjects or sociology. Mr. Maxfield, Mr. Berry.

Individual differences among children with respect to mental, physical, and social traits. The social and pedagogical significance of talent and defect. Consideration of gifted children, special abilities and disabilities, blindness, deafness, speech defect, mental retardation, and behavior problems. Emphasis will be placed on the psychology of the exceptional child as a foundation for educational classification and treatment.

**610. Adolescence.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. English.

A study of the outstanding characteristics of the adolescent boy and girl, the educational and social problems arising at this period, and means for dealing with these problems.

**611. The Mentally Deficient Child.** Three credit hours. Autumn Quarter. Three lecture hours each week. Lectures, reports, clinics, and visits to public institutions. Prerequisite, fifteen hours of psychology or ten hours of psychology and five hours of professional educational subjects or sociology. Mr. Maxfield.

The varieties and grades of mental deficiency, including the backward child of the schools and the distinctly feeble-minded. Consideration of mental deficiency and defect for purposes of educational treatment and social disposition. The psychology of feeble-mindedness; types, degrees, causes, and consequences. Minor consideration of the special pedagogy of backward children.

**612. Educational Statistics: Intermediate.** Three credit hours. Winter Quarter. Two lectures and one two-hour laboratory period each week. Prerequisite, Psychology 608. Mr. Toops.

Fuller treatment of correlation; regression coefficients and equations; partial and multiple correlation; uses of normal probability curve; reliability and validity of test data; comparable measures.

Not open to students who have credit for School Administration 644.

**613. Mental and Educational Tests.** Three credit hours. Autumn Quarter. Three lecture hours each week. Lectures, readings, classroom demonstrations, and special reports. Mr. Pressey.

A broad basic course for teachers and students of psychology, clinical work, and sociology. The course will begin with a discussion of tests in school subjects, will then take up tests of general and special ability and "non-intellectual" traits, and will conclude with a general discussion of the construction of tests and their use in dealing with various practical and research problems.

**\*615. Laboratory in Tests and Educational Diagnosis.** Three credit hours. Spring Quarter. Six laboratory hours each week. Prerequisite, Psychology 613 or permission of the instructor. Mr. Pressey.

Practice in the giving and scoring of tests and in the use of tests in dealing with educational problems. Special attention will be given to use of test materials in the diagnosis of special disabilities and difficulties in school work.

**616. Individual Testing by the Binet-Simon Method.** Two credit hours. One Quarter. Autumn and Winter. Two laboratory periods each week. Reports, laboratory demonstrations, and individual testing. Prerequisite, fifteen hours of psychology or ten hours of psychology and five hours of professional educational subjects or sociology. Mr. Maxfield, Mr. Durea.

Practice on the technique of the Stanford revision of the Binet-Simon scale for measuring intelligence. Brief historical and descriptive treatment of the Binet scale, followed by intensive training in its practical use.

**617. Advanced Binet Testing.** Two credit hours. One Quarter. Winter and Spring. Two laboratory periods each week. Reports, laboratory demonstrations, and individual testing. Prerequisite or concurrent, Psychology 616. Mr. Maxfield, Mr. Durea.

Advanced study and application of the Binet-Simon method. Review of revisions of the Binet-Simon scale. Intensive training in the practical use of the revision by Kuhlmann, Herring, and Hayes.

**618. Clinical Tests.** Two credit hours. One Quarter. Autumn and Spring. Two laboratory periods each week. Laboratory demonstrations and individual testing. Prerequisite, fifteen hours of psychology. Mr. Maxfield, Mr. Durea.

Descriptive and practical laboratory study of standard diagnostic tests and techniques, particularly those known as performance tests.

**619. Psychological Clinic.** Two or four credit hours. One Quarter. Autumn, Winter, Spring. One four-hour laboratory period each week. Clinic practicum. Individual case studies, reports, case conferences, home visits, and clinical procedure. May be taken for one or two Quarters with a maximum credit of four hours. Prerequisite, Psychology 616 and 618; prerequisite or concurrent, Psychology 617 or permission of the instructor. Mr. Goddard, Mr. Maxfield.

Theory and practice of clinical case study, including family history, personal history, school history, and social history. Interpretation of reports of medical examiners, teachers, social agencies, etc., as well as interpretation of test results. Participation in the regular work of the Psychological Clinic conducted by the Department of Psychology. Training in the preparation of clinical reports.

NOTE: A student may profitably receive the special training which this course gives for a Quarter. Repetition does not involve repetition of content but additional practice in clinical procedure.

**620. Advanced Psychological Clinic.** Two credit hours. One Quarter. Autumn, Winter, Spring. Assignments equivalent to two laboratory periods each week. Prerequisite, Psychology 619 or permission of the instructor (students are advised to consult instructor before registering). May be taken for one or two Quarters with a maximum credit of four hours. Mr. Goddard, Mr. Maxfield, Mrs. Stogdill.

Students will engage in actual clinical service, under the supervision of the instructor. Cases will be studied in the laboratory and in the nearby public schools and institutions. Special training in the diagnosis of borderline, psychopathic and doubtful cases. Case studies involving psycho-educational or behavior problems. Follow-up work on cases previously studied in the clinic. Problems of educational and vocational guidance. Advanced training in the preparation of clinical reports. Students expecting to deal with problems of college personnel will be assigned to work in this field.

NOTE: A student may profitably receive the special training which this course gives for a second Quarter. Repetition does not involve repetition of content but additional practice in clinical procedure.

**621. Social Psychology.** Three credit hours. Winter Quarter. Three lecture hours each week. Mr. Arps.

The nature and variety of innate tendencies; the relation of these tendencies to acquired behavior and social control; the development of personality.

**622. The Psychology of the Delinquent Child.** Three credit hours. Spring Quarter. Three lecture hours each week. Lectures, reports, and visits to the Bureau of Juvenile Research. Prerequisite, ten hours of psychology or permission of the instructor. Mr. Goddard.

The meaning and significance of delinquency; its psychological basis; causes and prevention; the home and school as factors determining delinquent behavior; the significance of psychological findings for juvenile court procedure; present day methods of dealing with the problem.

**\*624. Psychology of Vision and Hearing.** Five credit hours. Spring Quarter. Five lectures each week. Prerequisite, Psychology 602. Mr. Williams.

Production, measurement and control of photic stimuli and measurements of the variations in their effectiveness as determined by physical and physiological factors. The work will consist in part of lecture-demonstrations and experiments and in part of a critical study of the reports of original authors. Special attention will be given to the facts and hypotheses of color-vision and to visual problems in industry.

**626. Problems in Learning and Thinking.** Three credit hours. Winter Quarter. Three lecture and discussion hours each week. Mr. Renshaw.

The development of the principles which underlie the acquired modifications of human behavior, from associationism to the present time.

**628. Principles and Economy of Learning.** Three credit hours. Spring Quarter. Three lectures each week. Lectures, readings in monographs and journals, discussions. Mr. English.

An advanced course in educational psychology, dealing with certain especially important problems in the field, such as the control of the learning process, memory and forgetting, transfer of training, generalization and thinking in relation to memory and the more elaborate types of learning such as are seen in school work. Special attention will be paid to recent experimentation and theories.

**629. Advanced Psychology.** Five credit hours. Autumn Quarter. Five lectures each week. Miss Rogers.

The purpose of this course is to give a larger background to the advanced student of psychology, with respect to other disciplines, especially the sciences, leading to a systematic development of structuralistic psychology.

**630. Psychology of Feeling and Emotion.** Five credit hours. Winter Quarter. Five lectures each week. Miss Rogers.

A study of the various theories of feeling and emotion and the fundamental relations of emotion to instinct. Emotions in relation to various physiological activities. Methods of investigating emotion.

**631. Psychological Theories of Ability.** Three credit hours. Winter Quarter. Three lecture hours each week. This course alternates with Psychology 676. Mr. English.

Critical consideration of naïve ideas about ability; faculty psychology. Influence of Darwinism on conceptions of intelligence. Early mental testing. Binet and his successors. Test results and theories of intelligence. Problems of special abilities and of mental types. Relation of measurement of ability to systematic psychology.

**634. Criminal and Legal Psychology.** Five credit hours. Winter Quarter. Five lectures each week. Mr. Burt.

Psychological factors in the determination of reliability of testimony; the technique of detecting crime and falsehood; responsibility; the relation of crime to mental disease or defect; the prevention of crime through environmental factors and heredity.

**635. Psychology of Advertising.** Three credit hours. One Quarter. Autumn and Spring. Three lectures each week. Mr. Burt.

The psychological principles involved in effective advertising, notably attention, memory and action, with the contributory factors of association, feeling, instinct, suggestion, and reasoning.

**637. Industrial Psychology.** Three credit hours. Autumn Quarter. Three lectures each week. Mr. Burt.

The application of psychology to problems of industrial learning, adjustment of technical to mental factors, monotony, fatigue, environmental conditions, industrial unrest, morale, and accidents.

**\*638. Industrial and Vocational Psychology Laboratory.** Three credit hours. Spring Quarter. Two three-hour laboratory periods each week. Prerequisite, permission of the instructor. Mr. Burt.

Laboratory work in the application of psychology to industrial and vocational problems, with especial emphasis on the development of psychological techniques for hiring employees. Practice in the devising and standardizing of occupational tests; obtaining and evaluating production ratings; correlation of ratings and tests; interpretations of results from the standpoint of vocational selection or guidance. A portion of the work of the course is frequently done in local business and industrial plants.

**639. Psychology and Personnel.** Three credit hours. Winter Quarter. Three lectures each week. Mr. Burt.

The application of psychology to problems of personnel. Selection and placement of employees by tests of intelligence and special ability. Trade tests, job analysis, and rating scales.

**640. Educational and Vocational Guidance.** Three credit hours. Winter Quarter. Mr. Toops.

A course dealing with the technique of evaluating psychological and related factors as a basis for making educational and vocational recommendations to individuals. The place of vocational and educational tests, previous record, and personality traits in determination of choice of occupation or course of study.

Not open to students who have credit for Psychology 417.

**641. Abnormal Psychology.** Five credit hours. Winter Quarter. Five lectures each week. Lectures and reports. Mr. Goddard.

The abnormal mental phenomena—viz., disorders of perception, association, memory, affection, judgment, action, volition, and personality, with especial emphasis on their relation to the respective normal phenomena. The grouping of these disorders into the syndromes exhibited in the main types of insanity.

**642. Psychopathology.** Three credit hours. Spring Quarter. Three lectures each week. Lectures and reports. Mr. Goddard.

This course deals with the unusual (so-called pathological) manifestations of mind. Beginning with a consideration of subconscious phenomena—sleep, dreams, hypnosis, automatic writing, etc., there will be discussed: phobias, suggestion, the psychological aspects of hysteria, and multiple personality, psychasthenia, neurasthenia, and other disorders of personality.

**644. Human Motives and Incentives.** Three credit hours. Autumn Quarter. Three hours each week. Lectures, recitations, and assigned readings. Mr. Toops.

The psychological bases of initiation and improvement of work. The role of instinct, habit, custom, and tradition, rationalization and psychopathy in motivation. The incentive values of self-ratings, competition, punishment, and such rewards as money, bonuses, participation, and promotion, in relation to the capacities of individuals.

**645. History of Psychology.** Five credit hours. Autumn Quarter. Five lectures each week. Prerequisite, sixteen hours in psychology. Mr. Williams.

The course aims to view modern psychological problems in the light of their historical antecedents. The development of various theories such as those of sensation, attention, space perception, and emotion will be traced from earliest times to the present. As far as possible assignments will involve reference to original sources.

**646. Principles of Human Behavior.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, sixteen hours in psychology. Mr. Dockeray.

A study of the development of theories of human behavior and a consideration of the simplest assumptions necessary and sufficient to explain the facts of human behavior as dependent on social and biological conditions.

†**647. Theoretical Psychology.** Three credit hours. Winter Quarter. Three lectures each week. Prerequisite, sixteen hours in psychology. Mr. Dockeray.

Lectures and assigned readings bearing on the evolution of psychological theory in its relation to the physical and the social sciences.

**650. Minor Problems.** One or more credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, sixteen hours in psychology and the permission of the instructor. All instructors.

Investigation of minor problems in the various fields of psychology.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

†**652. Psychology of High School Subjects.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, a course in educational psychology. Mr. Pressey.

An analysis of the specific psychological processes involved in algebra, language, science, and other high school subjects, with consideration of the conditions which promote learning in each subject, and examination of textbooks and methods from this point of view.

Not open to students who have credit for Psychology 410.

**655. Comparative Psychology.** Five credit hours. Autumn Quarter. Five lectures each week. Mr. Williams.

The principles of animal behavior in relation to human behavior. A study of the similarities and differences in the behavior of animals and of humans and the explanation of these similarities and differences, with special reference to those principles definitely involved in the organism's instinctive and acquired mode of adjusting to its environment.

Not open to students who have credit for Psychology 627.

**656. Comparative Psychology.** Three credit hours. Spring Quarter. Three lectures each week. Prerequisite, Psychology 655. Mr. Williams.

A continuation of Psychology 655. Devoted largely to contemporary literature in Comparative Psychology.

Not open to students who have credit for Psychology 627.

† Not given during the academic year, 1933-1934.

**657. Comparative Psychology Laboratory.** Three credit hours. Autumn Quarter. One lecture each week and laboratory periods to be arranged. Mr. Williams.

The methods and results of investigation of animal behavior in relation to human behavior.

**\*659. University Personnel Psychology.** Three credit hours. Autumn Quarter. Two lectures and one two-hour laboratory period each week. Given in alternate years. Mr. Toops.

A course designed for students who are preparing for positions in vocational guidance or personnel work in universities and those interested in the achievement of adults. The giving, scoring and interpretation of tests of university entrants. Reading tests and tests of special capacities of adults. Planning a testing program for adults. Theories of adult testing. Comparative study of University personnel programs and procedures. The content of the course will vary somewhat from year to year.

**660. Comparative Psychology Laboratory.** Three credit hours. Spring Quarter. One lecture each week and laboratory periods to be arranged. Prerequisite, Psychology 657. Mr. Williams.

A continuation of Psychology 657.

**662. The Pre-School Child.** Three credit hours. Winter Quarter. Two lectures and one conference hour each week. Mr. Durea.

This course will present the elements of child nature, individual differences and fundamental appetites. The process of socialization will be considered in terms of the variety of situational settings impinging on the child. All of the content of the course will be concerned with the significance of early behavior patterns.

**663. Psychology of the Elementary School Period.** Five credit hours. Winter Quarter. Four class meetings a week and one hour or more of observations or laboratory work. Required of students specializing in elementary education. Mr. English, Mr. Pressey.

The psychological development of the child from five to twelve years. Effects of the school and out-of-school activities on development. Analysis of significant psychological problems involved in curricular activities. Provision by school and other social agencies for the psychological needs of the child.

Not open to students who have credit for Psychology 410.

**674. Research Problems of the Dean of Women.** One or more credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, Survey 665, or its equivalent, and the approval of the instructor. Mrs. Gaw.

Investigation of the minor psychological problems which arise in connection with the social, scholastic, and vocational adjustments of undergraduate women.

**\*676. Methods and Viewpoints in Educational Psychology.** Three credit hours. Winter Quarter. Three lectures each week. This course alternates with Psychology 631.

A critical appraisal of the implications for education of modern psychological movements from Preyer and G. S. Hall to the present day.

**677. Graphic Methods.** Two credit hours. Spring Quarter. Two lectures each week. Given in alternate years. Mr. Toops.

Graphic presentation of the results of experiments and investigations; histograms, bar charts, specialized charts; tri-dimensional presentation.

**678. Psychology of Personality.** Three credit hours. Spring Quarter. Three lectures each week. Mr. Durea.

This course will consider the individual both as a social and biological unit, relating each group of factors to the development of personality. Ample attention will be given to questions such as integration, measurement of traits, personality types, related physical and chemical factors, etc. The course is correlative to Psychology 641.

## FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

These prerequisites include the equivalent of at least two years of psychology; or of one year of psychology and one year of college work in one of the following subjects: philosophy, mathematics, physiology, physics, zoology, sociology.

802. Seminary in Experimental Psychology. Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Renshaw, Mr. Dockeray, Miss Rogers.

803. Seminary in Educational Psychology. Two credit hours. Autumn Quarter. Mr. English.

804. Seminary in Tests and Measurements. Two credit hours. Winter Quarter. Mr. Pressey.

Reliability and validity of tests. Interpretation of scores. Statement of results; graphing. Criteria for selecting tests; organization of test work; records; application of test results in dealing with educational problems. Tests of the emotions and of other special types. The work will be illustrated throughout by use of standard mental and educational tests. Students having data of their own are urged to make use of this material.

Not open to students who have credit for Psychology 614.

805. Contemporary Psychological Literature. One credit hour. Autumn, Winter, and Spring Quarters. Mr. Renshaw.

806. Seminary in Abnormal Psychology. Two credit hours. Winter and Spring Quarters. Mr. Maxfield, Mrs. Stogdill.

807. Seminary in Industrial Psychology. Two credit hours. Winter Quarter.

808. Psycho-Analysis. Two credit hours. Autumn Quarter. Two lectures each week. Mr. Goddard.

This course will deal with the history and development of psycho-analysis; the theories of Freud, Jung, and others. Special emphasis will be placed on those concepts that are of value to teachers in their effort to appreciate the individual differences in students. The significance of the unconscious and the various methods of tapping the unconscious.

†810. Psychological Problems in Higher Education. Two credit hours. Autumn Quarter. One meeting each week. Prerequisite, permission of the instructor. Mr. Pressey.

A critical review of the research work thus far done on such problems as study methods, background information essential for college work, individual differences, placement tests, measurement of progress. The course is intended to give graduate students preparing for college or university positions contact with current educational research regarding the problems they will meet, and develop a research attitude toward these problems.

811. Advanced Theoretical Psychology. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Psychology 647. Mr. Dockeray.

814. Advanced Statistics. Three credit hours. Spring Quarter. Two lectures and one two-hour laboratory period each week. The general prerequisites must include Psychology 612 or equivalent and a course in college algebra. Mr. Edgerton.

Special cases in correlation; non-linear regression; straight lines of best fit; construction of criteria; elementary probability; random sampling; derivation of commonly used equations; critical readings; construction of tables and graphs to meet the research needs of individual students.

Not open to students who have credit for Psychology 654.

815. Seminary in Psychological Statistics. Two credit hours in each of two successive Quarters, Autumn and Winter Quarters. One two-hour discussion period each week. Mr. Toops, Mr. Edgerton.

Statistical background equivalent to the sequence Psychology 608, 612, 814 is assumed.

† Not given during the academic year, 1933-1934.

**950. Research in Psychology.** Autumn, Winter, and Spring Quarters. All instructors.

Primarily intended for students offering theses for advanced degrees.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

## RHETORIC AND ENGLISH LANGUAGE

(See English)

## ROMANCE LANGUAGES AND LITERATURES

Office, 111 Derby Hall

PROFESSORS HENDRIX, MOORE, HAVENS, AND ROCKWOOD, ASSOCIATE PROFESSORS ANIBAL AND DEMOREST, ASSISTANT PROFESSORS HAMILTON, GUTIERREZ, FOURE, AND SCHUTZ, MRS. FOURE

### GRADUATE ROMANCE CLUB

The Graduate Romance Club fosters an interest in advanced work in the Romance Languages and Literatures. Its meetings, held monthly, consist of reports by graduate students or faculty members on their own investigations as well as on books and articles bearing on the field.

The problems of graduate students and themes suggested by faculty members will be discussed. Regular attendance of graduate students in the department is strongly urged.

### FRENCH

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

In addition to the general prerequisites, two introductory courses in French literature are required for French 600, 601, 602, 603, 605, 606, 607, 608, 609, 610, 611, and 612.

**600. French Literature of the Seventeenth Century, 1680-1715.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Lectures, collateral reading, and reports. Mr. Rockwood.

The close of the seventeenth century. The Quarrel of the Ancients and the Moderns. Selected works of LaFontaine, LaBruyère, Fénelon, Bossuet, and Fontenelle will be read.

**601. French Literature of the Seventeenth Century, 1600-1660.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Lectures, collateral reading, and reports. Mr. Rockwood.

The pre-Classic period: formation of the school of 1660. The Libertines, growth of French comedy and tragedy, The Précieuses, The French Academy will be discussed. Selected works of Malherbe, De Viau, Descartes, Balzac, and Corneille will be read.

**602. French Literature of the Seventeenth Century, 1660-1680.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Lectures, collateral reading, and reports. Mr. Rockwood.

The school of 1660. Selected works of Pascal, Molière, Boileau, Racine, La Rochefoucauld, Mme. de Sévigné, and Mme. de Lafayette will be read.

**\*603. French Literature of the First Half of the Nineteenth Century.** Five credit hours. Spring Quarter. Five recitations each week. Lectures, collateral reading, and reports. Mr. Havens.

French literature from 1800 to 1850. The development of romanticism in the novel, poetry, and the theatre.

**\*605. French Literature of the Fifteenth and Sixteenth Centuries.** Three credit hours. Autumn Quarter. Three lectures each week. Given biennially. Mr. Moore.

Villon, Rabelais and contemporaries.

**\*606. French Literature of the Sixteenth Century.** Three credit hours. Winter Quarter. Three recitations each week. Given biennially. Mr. Moore.

Montaigne; the Pléiade.

\* Not given in 1933-1934.



607. French Literature of the Eighteenth Century, 1700-1750. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Havens.

Rapid reading, with lectures and reports. Fontenelle, Bayle, Crébillon, Voltaire, Montesquieu, Marivaux, and others.

608. French Literature of the Eighteenth Century, 1750-1789. Three credit hours. Winter Quarter. Three lectures each week. Mr. Havens.

Rapid reading, with lectures and reports. Voltaire, Rousseau, Diderot, Beaumarchais, and others.

609. The French Novel to 1850. Three credit hours. Autumn Quarter. Three lectures each week. Given biennially, alternating with French 611-612. Mr. Havens.

Rapid survey of the French novel during the sixteenth, seventeenth, and eighteenth centuries and the first half of the nineteenth century. Mme. de Staël, Chateaubriand, George Sand, Hugo, and Balzac. Lectures, reports, and collateral reading.

610. The French Novel, 1850 to the Present Day. Three credit hours. Winter Quarter. Three lectures each week. Given biennially, alternating with French 611-612. Mr. Demorest.

Flaubert, Maupassant, Zola, Daudet, France, Bazin, Loti, and others. Lectures, reports, and collateral reading.

\*611. The Comedy of Manners in the Nineteenth Century, 1800-1880. Three credit hours. Autumn Quarter. Three lectures each week. Given in alternate years. Mr. Rockwood.

La Pièce Bien Faite, La Pièce à Thèse, Picard, Scribe, Dumas fils, Augier, Sardou. Rapid readings with lectures and reports.

\*612. The Comedy of Manners in the Nineteenth Century, 1880-1914. Three credit hours. Winter Quarter. Three lectures each week. Given biennially, alternating with French 609-610. Mr. Rockwood.

Le Theatre Libre, Becque, Curel, Hervieu, Lavedan, Donnay, Bernstein. Bataille, Guitry. Rapid reading with lectures and reports.

623. Cours de Style. Three credit hours. One Quarter. Autumn and Winter. Three recitations each week. Prerequisite, a "600" course in French literature and permission of the instructor. This course is conducted in French. It is limited to twenty students. Mr. Fouré.

624. Cours de Style (Continued). Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, French 623 and permission of the instructor. This course is conducted in French. It is limited to twenty students. Mr. Fouré.

625. Explication de Textes. Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, French 624. This course is conducted in French. Mr. Fouré.

The course aims to introduce the student to a method of literary appreciation based upon a critical study of well selected texts representing the main characteristics of each writer.

†627. French Phonetics. Three credit hours. Three meetings each week with laboratory practice. Prerequisite, six Quarters of collegiate French or the equivalent, with a grade not less than "C," and permission of the instructor. This class is limited to twelve.

The formation of French sounds. Lectures, with exercises in the use of the symbols of the International Phonetic Association. A systematic study of the rules of French pronunciation. Careful drill in the reading of French. Designed for advanced students who expect to teach French.

Not open to students who have credit for French 632.

628. Modern French Syntax. Three credit hours. Spring Quarter. Prerequisite, six Quarters of collegiate French or the equivalent, with a grade not less than "C." Mr. Demorest.

A careful elucidation of French grammar, with composition to illustrate. Designed for advanced students who expect to teach French.

\* Not given in 1933-1934.

† Not given during the academic year, 1933-1934.

**629. History of the French Language.** Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, French 628 or permission of the instructor. Mr. Schutz.

A rapid survey of the development of the French language, with special reference to the social and cultural conditions involved.

**632. French Phonetics and Diction.** Five credit hours. One Quarter. Autumn and Winter. Five meetings each week with laboratory practice. Prerequisite, six Quarters of collegiate French or the equivalent, with a grade not less than "C," and permission of the instructor. The class is limited to twelve. Mrs. Fouré.

The formation of French sounds. Lectures, with exercises in the use of the symbols of the International Phonetic Association. A systematic study of the rules of French pronunciation and diction. Careful drill in the reading of French. Designed for advanced students who expect to teach French.

Not open to students who have credit for French 627.

**701. Minor Problems in French.** Three to five credit hours. Autumn, Winter, and Spring Quarters. Professors and Associate Professors.

**NOTE: TEACHING COURSES.** For the Teaching Course in this department see the Department of Education, Course 692.

### ITALIAN

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**601. Modern Italian Literature, 1800-1850.** Five credit hours. Autumn Quarter. Five recitations each week. Mr. Moore.

Foscolo, Manzoni, Pellico, Leopardi.

**602. Modern Italian Literature, 1851-1900.** Five credit hours. Spring, Quarter. Five recitations each week. Given in alternate years. Mr. Moore.

Rovetta, Carducci, Giacosa, Fogazzaro.

**\*611. Dante's Life and Works.** Three credit hours. Winter Quarter. Three lectures each week. Given in alternate years. Prerequisite, Italian 602 or the permission of the instructor. Mr. Moore.

Reading of the Vita Nuova and The Inferno, Cantos 1-16.

### SPANISH

#### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

In addition to the general prerequisites, two introductory courses in Spanish literature are required for Spanish 607, 608, 609, 610, 611, 614, 615, 616, 617, 620, 626, 630.

**\*605. Advanced Composition and Conversation.** Three credit hours. Autumn Quarter. Three recitations each week. Given in alternate years. Prerequisite, a course in Spanish composition, and a "600" course in Spanish literature. Mr. Gutierrez.

This course, conducted wholly in Spanish, is designed especially for prospective teachers and for persons desiring a practical command of the language. The subject matter will be for the most part in history, customs, and manners of Spain.

**\*606. Advanced Composition and Conversation (Continued).** Three credit hours. Winter Quarter. Three recitations each week. Given in alternate years. Prerequisite, Spanish 605. Mr. Gutierrez.

This course, conducted wholly in Spanish, is designed especially for prospective teachers and for persons desiring a practical command of the language. The subject matter will be for the most part in history, customs, and manners of Spain.

\* Not given in 1933-1934.

607. **The Modern Spanish Novel.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 609-610. Mr. Hendrix.

A careful study of the development of the modern Spanish novel, reading of representative authors. Lectures, collateral reading, and reports.

608. **The Modern Spanish Novel (Continued).** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 609-610. Mr. Hendrix.

A careful study of the development of the modern Spanish novel, reading of representative authors. Lectures, collateral reading, and reports.

\*609. **Romantic Drama and Poetry of the Nineteenth Century.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 607-608. Mr. Hendrix.

A survey of the movements in Spanish drama and poetry during the first half of the nineteenth century. Lectures, collateral reading, and reports.

\*610. **Modern Spanish Drama.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 607-608. Mr. Hendrix.

A survey of the movements in Spanish drama and poetry during the second half of the nineteenth century. Lectures, collateral reading, and reports.

611. **Drama of the Golden Age.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Given in alternate years. Mr. Anibal.

An intensive study of a limited number of plays of the representative dramatists. Lectures, collateral reading, discussion, and reports.

614. **Cervantes.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given in alternate years. Mr. Anibal.

A study of the works of Cervantes, with especial emphasis on the Quixote. Lectures, collateral reading, discussion, and reports.

\*615. **Survey of Spanish Literature from the Earliest Times to the Seventeenth Century.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given in alternate years. Mr. Anibal.

Lectures, collateral reading, discussion and reports.

\*616. **Survey of Spanish Literature of the Seventeenth and Eighteenth Centuries.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Mr. Anibal.

Lectures, collateral reading, discussion, and reports.

617. **Modern Spanish Syntax.** Three credit hours. Autumn Quarter. Three recitations each week. Mr. Anibal.

Study of syntax, designed for advanced students who expect to teach Spanish.

620. **Spanish Phonetics.** Five credit hours. Winter Quarter. Five recitations each week.

Careful and detailed study of special problems involved in teaching Spanish to English-speaking students. Laboratory analysis of differences between English and Spanish pronunciation. Not open to students who have credit for Phonetics 605.

†626. **The Spanish Drama of the Sixteenth Century.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 630. Mr. Anibal.

\*630. **Survey of Spanish-American Literature.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 626. Mr. Hendrix.

A study of the masterpieces of Spanish-American literature. Lectures, collateral reading, discussion, and reports.

\* Not given in 1933-1934.

† Not given during the academic year, 1933-1934.

**701. Minor Problems in Spanish.** Three to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Anibal, Mr. Hendrix.

**NOTE: TEACHING COURSES.** For the Teaching Course in this department see the Department of Education, Course 692.

### ROMANCE LANGUAGES FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

Students intending to major in Romance Languages are urged to elect the following courses outside the department: History of France (History 624, 625), Introduction to the Study of the History of Language (Greek 701), the History of Philosophy (Philosophy 601-602-603), the History of Critical Theory (English 805), Vulgar Latin (Latin 627), Comparative Literature (Latin 606). No student will be considered as a candidate for the M.A. degree unless his program includes at least two courses exclusively for graduates.

French 801 and 802 are required of candidates for the Master's degree in French.

Spanish 805 and 806 are required of candidates for the Master's degree in Spanish.

#### FRENCH

**801. Introduction to Old French.** Three credit hours. Autumn Quarter. Three recitations each week. Prerequisite, three years of collegiate French. Mr. Schutz.

Elements of Old French phonology and morphology. Intensive readings in representative texts. A knowledge of Latin is recommended.

**802. Introduction to Old French (Continued).** Three credit hours. Winter Quarter. Three recitations each week. Prerequisite, French 801. Mr. Schutz.

**\*803. Old Provençal.** Three credit hours. Autumn Quarter. Prerequisite, French 802. Mr. Schutz.

Study of the language and literature of the Troubadours; Appel's *Provenzalische Chrestomathie* (Leipzig, 6th edition).

**804. Old Provençal (Continued).** Three credit hours. Winter Quarter. Prerequisite, French 802. Mr. Schutz.

Study of the language and literature of the Troubadours; Appel's *Provenzalische Chrestomathie* (Leipzig, 4th edition).

**811. Seminary in French Literature.** Three credit hours. Autumn Quarter. Prerequisite, three years of collegiate French and the permission of the instructor. Mr. Moore.

Studies in specific literary fields.

**812. Seminary in French Literature (Continued).** Three credit hours. Winter Quarter. Prerequisite, three years of collegiate French and the permission of the instructor. Mr. Havens.

Studies in specific literary fields.

**813. Old French Literature.** Three credit hours. Spring Quarter. Prerequisite, French 801 or the equivalent. Mr. Moore.

Rapid reading of Aucassin et Nicolette, selected works of Marie de France and Chretien de Troyes. Reports on outside reading. Lectures on the main aspects of Old French Literature.

**817. Seminary in French Literature.** Three credit hours. Spring Quarter. Prerequisite, three years of collegiate French and the permission of the instructor. Mr. Rockwood.

Studies in specific literary fields.

**950. Research in French Language or Literature.** Autumn, Winter, and Spring Quarters. Prerequisite, not less than four years of collegiate French and the permission of the instructor in charge. Mr. Moore, Mr. Havens, Mr. Rockwood, Mr. Schutz, Mr. Demorest.

This course is designed to meet the needs of individual graduate students who are pursuing a major study in the Department of Romance Languages.

\* Not given in 1922-1924.

## ITALIAN

950. Research in Italian Language or Literature. Autumn, Winter, and Spring Quarters. Mr. Moore.

This course is designed to meet the needs of individual graduate students who are pursuing a major study in the Department of Romance Languages.

## SPANISH

805. Old Spanish. Three credit hours. Autumn Quarter. Prerequisite, not less than three years of collegiate Spanish and the permission of the instructor in charge. Mr. Hendrix.

806. Old Spanish (Continued). Three credit hours. Winter Quarter. Prerequisite, not less than three years of collegiate Spanish and the permission of the instructor in charge. Mr. Hendrix.

815. Seminary in Spanish Literature. Three credit hours. Autumn, Winter, and Spring Quarters. Lectures, readings, and reports. Prerequisite, three years of collegiate Spanish and permission of the instructor in charge. Mr. Hendrix, Mr. Anibal.

\*821. Old Spanish Literature. Three credit hours. Prerequisite, three years of collegiate Spanish and the permission of the instructor. Mr. Anibal. El libro de buen amor, and other works not included in the usual survey courses.

950. Research in Spanish Language or Literature. Autumn, Winter, and Spring Quarters. Prerequisite, not less than three years of collegiate Spanish and the permission of the instructor in charge. Mr. Hendrix, Mr. Anibal.

This course is designed to meet the needs of individual graduate students who are pursuing a major study in the Department of Romance Languages.

## RURAL ECONOMICS

Office, 113 Townshend Hall

PROFESSOR FALCONER, ASSOCIATE PROFESSORS LIVELY, McBRIDE, FOSTER, ARNOLD, AND TETREAU, ASSISTANT PROFESSORS HENNING, HAUCK, AND FOSTER

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include for courses 606, 607, and 608, twenty hours in sociology or its social science equivalent.

NOTE: For Marketing courses given in cooperation with other departments, see the following courses.

Animal Husbandry 608. Livestock Marketing.

Animal Husbandry 626. The Marketing of Dairy Products.

Horticulture 628. The Marketing of Fruits and Vegetables.

602. Advanced Farm Organization. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Falconer.

A more detailed and advanced consideration of the economic principles involved in farm organization. The application of these principles to current agricultural production problems.

603. Cooperation in Agriculture. Five credit hours. Winter Quarter. Five lectures each week. Mr. Foster.

A study of agricultural cooperation, mainly as found in the United States. The types of cooperative marketing, manufacturing and purchasing organizations, collective bargaining, cooperative credit and insurance.

605. The Agricultural Industry. Three credit hours. Winter Quarter. Three lectures each week. Mr. Falconer.

The importance of the agricultural industry to the welfare of the nation. Some characteristics of the farming industry. Foreign competition, present and prospective. State and federal regulation, encouragement and aid to agriculture in the United States and foreign countries.

\* Not given in 1933-1934.

**606. Rural Sociology.** Five credit hours. Autumn Quarter. Mr. Lively, Mr. Tetreau.

A general course in the sociology of rural life. Emphasizes the fundamental and conditioning factors in rural social development, rural social institutions and the nature of rural social organization.

Not open to students who have credit for Rural Economics 405.

**607. Rural Social Organization.** Four credit hours. Winter Quarter. Mr. Lively, Mr. Tetreau.

An intensive course in the theory and technique of rural organization. The characteristics of rural group life, the processes of group organization, and the conditions and factors affecting the nature, permanence and success of groups organized on a local, state, and national basis are given consideration.

**608. Rural Social Environment.** Three credit hours. Autumn Quarter. Mr. Lively.

A detailed study of the environmental factors surrounding rural people and the relation of these factors to their behavior. Particular consideration is given to the mental and social characteristics commonly attributed to country people.

**612. Price of Farm Products.** Three credit hours. Spring Quarter. Three lectures each week. Mr. Arnold.

A study of the prices of farm land and of farm products. Adjusting the farm business to meet price fluctuations.

**613. Marketing Farm Products.** Five credit hours. One Quarter. Autumn and Spring. Five lectures each week. Mr. Foster, Mr. Henning.

A study of local and terminal marketing services and agencies involved in the marketing of farm products.

**\*614. Business Management in Agricultural Marketing.** Three credit hours. Winter Quarter. Two lectures and one laboratory period each week. Given in alternate years. Mr. Foster.

A detailed study of representative agricultural marketing agencies, including their problems of administration, finance, selling, transportation and warehousing.

**701. Special Problems.** Three to fifteen credit hours, given in units of three or five hours a Quarter for one or more Quarters. Autumn, Winter, Spring. Prerequisite, at least eight hours of work in the department and the consent of the instructor. Mr. Falconer, Mr. Arnold, Mr. Foster, Mr. Lively, Mr. McBride, Mr. Tetreau, Mr. Henning, Mr. Hauck.

This course is for students who desire to work out special problems in the field of rural economics and rural sociology.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 24.

These prerequisites include an acceptable course in the principles of economics or sociology, and one year's study of farm management and agricultural economics or sociology.

**950. Research in Rural Economics.** Autumn, Winter, and Spring Quarters. Opportunity is offered to carry on special research in agricultural economics and rural sociology. Mr. Falconer, Mr. Arnold, Mr. Foster, Mr. Lively, Mr. McBride, Mr. Tetreau.

### SCHOOL ADMINISTRATION (See Education)

## SOCIAL ADMINISTRATION

Office, 112 Commerce Building

PROFESSORS STILLMAN, HAGERTY, NORTH, AND MARK, ASSOCIATE PROFESSOR DENUENE, ASSISTANT PROFESSOR JONES, MR. PATERSON, MR. MASON

## FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**619. Social Treatment of Dependents.** Three credit hours. Autumn Quarter. Miss Jones.

Principles and methods underlying public and private agencies in aiding needy families living in their own homes. Visits to state and other institutions.

Not open to students who have credit for Sociology 619.

**620. Social Treatment of the Child.** Three credit hours. Winter Quarter. Miss Jones.

Principles and methods of caring for dependent and neglected children in their own homes, in foster homes, and in institutions.

Not open to students who have credit for Sociology 620.

**626. Penology.** Three credit hours. Autumn Quarter. Prerequisite, Sociology 625. Mr. Hagerty.

The evolution of the methods of criminal procedure with an analysis and criticism of present-day methods. The organization and administration of penal institutions. As visits will be made to courts, jails, and prisons, students who take this course should be free to make these visits Saturday mornings.

Not open to students who have credit for Sociology 626.

**627. Penology.** Three credit hours. Winter Quarter. Prerequisite, Social Administration 626. Mr. Hagerty.

The Juvenile Court, its organization, and the legal procedure it introduces. The indeterminate sentence, probation and parole. The individual treatment of delinquents.

Not open to students who have credit for Sociology 627.

**638. Field Work in Social Investigations.** Five credit hours. One Quarter. Autumn and Spring. Three recitations and four hours in field or laboratory each week. Miss Mark.

Statistical investigation of some phase of social life of the city. Drafting and using of schedules. The statistical interview. Editorial processes. Drafting of tables.

Not open to students who have credit for Sociology 635 and 636 or 638.

**639. Social Statistics.** Five credit hours. Winter Quarter. Three recitations and two two-hour laboratory periods each week. Miss Mark.

The interpretation of statistical data. Averages and ratios, measures of dispersion, graphic presentation, statistical text. A study of the fields of population and vital statistics, statistics of dependency, delinquency, and standard of living.

Not open to students who have credit for Sociology 637 or 639.

**642. Case Recording.** Three credit hours. One Quarter. Winter and Spring. Open to graduate students by permission of the instructor. Miss Jones.

A study of case history writing and office methods of social case work agencies.

Not open to students who have credit for Sociology 642.

**646. Social Organization and Administration of Recreation Facilities.** Four credit hours. Winter Quarter. Prerequisite, Sociology 645. Mr. Mason.

Methods and means of control of commercialized recreation with special reference to American cities and towns. The promotion and organization of public and semi-public agencies. The administrative control of playgrounds, social centers, clubs, and other non-commercialized agencies. The coordination of the recreational facilities of the community.

Not open to students who have credit for Sociology 646.

**647. The Organization and Direction of Group Activities.** Three credit hours. Autumn Quarter. Lectures, readings, practical demonstrations, field

work. Open to Seniors in Social Administration and in Education, and graduate students. Prerequisite, Sociology 645. Mr. Mason.

A consideration of the problems and methods of directing boys' and girls' clubs and other similar groups. The use of story telling, group singing, social dramatics, games including demonstrations and instructing in the various techniques.

Not open to students who have credit for Sociology 647.

**649. Camping: Its Organization and Administration.** Three credit hours. Spring Quarter. Lectures, readings and field demonstrations. Three lectures each week. Occasional Saturday mornings will be scheduled for field trips. The course is given jointly by the Departments of Physical Education and Social Administration. Prerequisite for Social Administration students, Sociology 645. Prerequisite for Physical Education students, fundamental courses in Sociology and courses in the Theory and Practice of Physical Education. Mr. Mason, Mr. Metcalf, Miss Waterman.

The organization and direction of camps, particularly summer camps for boys and girls. Special attention is given to the social and educational program for adolescents. Designed for those preparing for the direction of boys' and girls' work. Practical demonstration in camping will be included.

This course is the same as Physical Education 649.

Not open to students who have credit for Sociology 649.

**\*650. Boys' Work Organization.** Four credit hours. Autumn Quarter. Prerequisite, Sociology 645 and Social Administration 646.

A study of the organization and methods of work of the principal agencies engaged in boys' work, such as the Boy Scouts, Young Men's Christian Association, Settlement Clubs for Boys. The principal part of the instruction will be given by specialists from the various agencies. Practical field work with some one of the agencies during the course will be required.

Not open to students who have credit for Sociology 650.

**651. Girls' Work Organization.** Five credit hours. Spring Quarter. Prerequisite, Sociology 645 and Social Administration 646. Mr. Mason.

A study of the plan of organization and methods of work of the principal agencies engaged in girls' work, such as the Girl Scouts, Camp Fire Girls, Young Women's Christian Association, Settlement Clubs for Girls. The principal part of the instruction will be given by specialists from the various agencies.

Not open to students who have credit for Sociology 651.

**\*657. Welfare Problems in Rural Communities.** Four credit hours. Winter Quarter. Mr. Denune.

A consideration of health, child welfare, dependency, defectiveness, delinquency, and recreation. This course is designed to give the rural teachers, ministers, and social workers a knowledge of the welfare problems which exist in rural communities and the methods by which they are being approached by rural workers.

Not open to students who have credit for Sociology 657.

**668. Community Organization.** Three credit hours. Spring Quarter. Three recitations each week. Mr. North.

An analysis of the social problems with which the local community has to deal, their interrelations and their sources in local conditions. Local community agencies and methods of coordinating their resources.

Not open to students who have credit for Sociology 668.

**670-†671. Community Health Organization.** Three credit hours. Winter and Spring Quarters. Mr. Paterson.

Methods of organization. Determination and development of programs and budgets. Administrative problems. Relation of voluntary and official health organizations.

Not open to students who have credit for Sociology 670-671.

**675. Field Work.** Six to fifteen credit hours. One Quarter. Autumn, Winter, Spring. Open by permission of the instructor. Case Work, Miss Jones; Social Research, Miss Mark; Recreation, Mr. Mason.

Practical work in the fields of family and child welfare, penology, health, industry, or recreation under the supervision of organizations in these fields and the instructor.

Not open to students who have credit for Sociology 675.

\* Not given in 1933-1934

† Not given during the academic year, 1933-1934.



695-696. **Social Case Work.** Three credit hours. 695, Autumn Quarter; 696, Winter Quarter. Open by permission of the instructor. Miss Jones.

A critical analysis of the technique and methods of social treatment, with particular reference to family service and dependent and neglected children.

Not open to students who have credit for Sociology 695-696.

697. **The Case Method in Group Work.** Three credit hours. Spring Quarter. Prerequisite, Social Administration 695, senior standing in Group Work. Mr. Mason.

The application of the case method to organized group work. The techniques of interviewing, recording, diagnosing, interpretation of data, and treatment, with particular reference to the needs of group work students. Lectures, discussions, and field work.

Not open to students who have credit for Sociology 697.

700. **Special Problems.** One to four credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, fundamental courses in Sociology, and permission of instructor.

Individual study in some field of social interest.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

813. **The Community Chest Movement.** Four credit hours. Autumn Quarter. Mr. Stillman.

Origin, development and present status. Its place in the field of welfare finance. The campaign method of money raising. Collecting and auditing subscriptions. The business end of a Community Chest. Study of and report upon the Columbus Community Fund campaign for funds. Analysis of paper organizations of Community Chests of other cities.

Not open to students who have credit for Sociology 813.

814. **Contemporary Social Work.** Four credit hours. Winter Quarter. Prerequisite, Social Administration 813. Mr. Stillman.

An analysis of programs as actually operative in American communities. Methods of coordination in social work. The Community Chest and Councils of Social Agencies. Making a community program. Functional groupings in the field of social work.

Not open to students who have credit for Sociology 814.

†815. **Interpretation of Social Work.** Four credit hours. Prerequisite, Social Administration 813 and 814. Mr. Stillman.

The place of education in a social work program. The message and the method of educational publicity.

Not open to students who have credit for Sociology 815.

835. **The Social Worker and Community Groups.** Three credit hours. Autumn Quarter. Mr. Stillman.

The social work executive as a specialist in the field of community planning.

Not open to students who have credit for Sociology 835.

836. **National Social Work Agencies and Local Programs.** Three credit hours. Winter Quarter. Prerequisite, Social Administration 813. Mr. Stillman.

Their historical development and influence. Contractual relations. Promotion. Education. Specialism. Standards.

Not open to students who have credit for Sociology 836.

†837. **Budgeting Community Social Work.** Three credit hours. Prerequisite, Social Administration 813 and 814. Mr. Stillman.

Principles and methods of budgeting. The budget in relation to money raising and social planning.

Not open to students who have credit for Sociology 837.

838. **Social Case Work.** Three credit hours. Autumn Quarter. Miss Jones. An analysis of present trends in family case work. Consideration of the techniques of diagnosis and treatment. The significance of present-day relief practices.

Not open to students who have credit for Sociology 838.

† Not given during the academic year, 1932-1934.

**840. Probation.** Two credit hours. Winter Quarter. Admission by consent of instructor. Mr. Hagerty.

The organization of juvenile and adult probation. The individual treatment of the delinquent. The practice of states having probation systems.

Not open to students who have credit for Sociology 628.

**845-846. Methods of Sociological Investigation.** Four credit hours. Autumn and Winter Quarters. Required for candidates for advanced degrees in sociology who have not had equivalent work. Miss Mark.

A course designed to prepare students to do independent social research. Students will undertake a class project involving the collection of data.

Not open to students who have credit for Sociology 635-636-637 or 685-686-687 or 845-846.

**847-848-849. Research in Penology.** One to four credit hours. Autumn, Winter, and Spring Quarters. Open on consent of the instructor. It is assumed that the student who takes this course shall have had one year's work in criminology and penology. Mr. Hagerty.

**950. Research in Social Administration.** Autumn, Winter, and Spring Quarters. Penology, Mr. Hagerty; social movements, their history, organization, methods, Mr. North; social statistics, Miss Mark; social work administration, Mr. Stillman; rural social institutions, Mr. Denune; social case work, Miss Jones; public health, Mr. Paterson; recreation or group work, Mr. Mason.

Individual projects selected and prosecuted in consultation with the instructor.

## SOCIOLOGY

Office, 111 Commerce Building

PROFESSORS LUMLEY, HAGERTY, NORTH, AND MARK, ASSOCIATE PROFESSOR DENUNE, MISS SPAETH, MR. MASON, MR. COOK

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**601. The Family.** Four credit hours. One Quarter. Autumn and Spring. Miss Spaeth.

A survey of types of family organization from primitive times to the present; an analysis of the factors that entered into their development; the modern family and an analysis of modern family problems.

**605. The Immigrant.** Four credit hours. Winter Quarter. Mr. Cook.

Allen migration to and within the United States; racial make-up and cultural heritages; trends and processes of adjustment; immigrant attitudes and institutions; unsolved problems of acculturation.

**607. Race Relations Outside the United States.** Four credit hours. Spring Quarter. Mr. Cook.

Survey of contemporary race contacts and cultural conflicts arising from the spread of the Euro-American mode of life over the less advanced areas of the world.

**608. The Negro in American Life.** Four credit hours. Autumn Quarter. Mr. Cook.

A study of the conflict situations, attitudes, and progress of the Negro and methods of dealing with interracial problems.

**610. The Standard of Living.** Three credit hours. Spring Quarter. Three recitations each week. Miss Mark.

A consideration of the content of the various standards of living in American society, their economic and social significance. Problems in family budget and retail buying.

Not open to students who have credit for Economics 644.

**\*612. Primitive Social Organization.** Three credit hours. Spring Quarter. Textbook, lectures, papers, and discussions. Miss Spaeth.

A study and analysis of types of social organization of primitive man, such as class, family, political organization, religion, etc.

Not open to students who have credit for Sociology 412.

**618. Poverty.** Three credit hours. Winter Quarter. Mr. Hagerty.

Extent, nature, and causes of poverty. Outlines of a program of prevention. The relation of the standard of living to social welfare. The relation of minimum wage laws to poverty.

**625. The Criminal.** Three credit hours. Spring Quarter. Mr. Hagerty.

The social, economic, and physiological causes of crime. The changing character of crime as modified by the legal code. Types of criminals, the instinctive, habitual, professional, etc. The classical and positive schools of criminology. The relation of feeble-mindedness and degeneracy to crime. Juvenile crime, its causes and prevention.

**645. Leisure and Recreation.** Four credit hours. Autumn Quarter. Mr. Mason.

The sources of leisure in early and modern society. The social significance and uses of leisure. The social functions of play. Historical aspects of play. The recreation problem of modern communities from the standpoint of control and of public provision.

**656. Rural Social Institutions.** Four credit hours. Autumn Quarter. Mr. Denune.

The problems of health, recreation, social intercourse, housing, child welfare, dependency, defectiveness, and delinquency in American rural communities and small towns. The agencies and organizations dealing with these problems.

**665. Social Order and Social Control.** Three credit hours. Autumn Quarter. Textbooks, lectures, papers, and discussions. Mr. Lumley.

A study of the various features of social control and the social order; the chief control devices or methods; agents, both private and public; institutional pressures; disruptive factors; the nature of social order. Additional readings for graduate credit.

**666. Social Evolution.** Three credit hours. Winter Quarter. Textbooks, lectures, papers, and discussions. Mr. Lumley.

A systematic study of the methods of social evolution such as variation, selection, transmission, adaptation. Additional readings for graduate credit.

**667. Social Progress.** Three credit hours. Spring Quarter. Textbooks, lectures, papers, and discussions. Mr. Hagerty.

A study of the various theories and the criteria of social progress. Extra readings for graduate credit.

**700. Special Problems.** One to four credit hours. Autumn, Winter, and Spring Quarters.

Individual study in some field of social interest.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

All candidates for degrees are required to register for Social Administration 845-846. All graduate students are required to attend and make occasional reports at a non-credit discussion meeting of faculty and students held every two weeks.

**801-802-803. History of Sociological Thought.** Two credit hours. Autumn, Winter, and Spring Quarters. One session each week. Readings, reports, lectures, and discussions. Mr. Lumley.

A survey of the most important literature of sociological theory, preceded by an examination of the writings of the Utopians, the philosophers of history and the social reformers.

**805-806-807. American Sociological Theory.** Two credit hours. Autumn, Winter, and Spring Quarters. One session each week. Readings, reports, lectures, and discussions. Mr. Hagerty.

An intensive study of the theories concerning the origin, development, forms and nature of society, advanced by the leading American sociologists.

**\*820. Seminary in Anthropology.** Two credit hours.

**\*827. Nationality and Nationalism.** Four credit hours. Autumn Quarter.

A survey of the religious, economic, political, and social backgrounds which underlie the contemporary development of national attitudes.

\* Not given in 1933-1934.

**\*828. Social Classes.** Four credit hours. Winter Quarter.

A study of the basis of individual and group differentiation and the development of cooperation and conflict growing out of contemporary situations.

**\*829. Social Changes through Crisis.** Four credit hours. Spring Quarter.

A study of the cause, method, and consequences of social changes, by revolution, war, and economic, political, and scientific innovations.

**856. Social Planning.** Four credit hours. Autumn Quarter. Mr. North.

A consideration of the relation of culture to human needs. The purposive adaptation of culture to needs. The methods and goals of social effort.

**857. The Reconstruction of Western Culture.** Four credit hours. Winter Quarter. Mr. North.

A critical examination of modern Western civilization in its bearing on human welfare. Chief attention is given to the various proposals for modifying economic policy, mores, religion, education, international and race relations.

**858. Modern Social Movements.** Four credit hours. Spring Quarter. Mr. North.

A consideration of the more important modern movements for social amelioration. Their historical development, their underlying social philosophy and the methods employed. Governmental and voluntary agencies for social welfare.

**860. Seminary in Sociology.** Four credit hours. Autumn, Winter, and Spring Quarters. Mr. North.

Social planning and social reconstruction.

**900. Contemporary Sociological Literature.** One to four credit hours. Autumn Quarter, Mr. North; Winter Quarter, Mr. Denune; Spring Quarter, Mr. Lumley.

**950. Research in Sociology.** Autumn, Winter, and Spring Quarters. Criminology, Mr. Hagerty; social movements, their history, organization, methods, Mr. North; history of sociological thought, social control, social evolution, Mr. Lumley; human migration and race problems, Mr. Cook; rural social institutions, Mr. Denune; anthropology and the family, Miss Spaeth.

Individual projects selected and prosecuted in consultation with the instructor.

**SOILS**

(See Agronomy)

**SPANISH**

(See Romance Languages and Literatures)

**SPECIAL EDUCATION**

(See Bureau of Special Education)

**SURVEY COURSES**

PROFESSORS HENDERSON, LEIGHTON, SPIEKER, AND ODEGARD, ASSOCIATE PROFESSOR ZORBAUGH, DEAN GAW

**FOR ADVANCED UNDERGRADUATES AND GRADUATES**

**600 and 700 Courses.** Prerequisite, permission of the instructor in charge who will decide in each individual case whether the student has had the necessary training to profit from the course.

**605. Foundations of Contemporary Civilization.** Five credit hours. One Quarter. Autumn and Winter. Five meetings each week. Mr. Leighton, Mr. Odegard.

This course is designed for all students majoring in subjects falling within the fields of biological and inorganic sciences, mathematics and psychology. It is elective to other students

\* Not given in 1933-1934.

and may be taken in the second Quarter of the Junior year. It is designed to afford the mature student some insight into the progress of thought in a great province of life to which he has given relatively little attention during his course. The course deals with the changes of thought in religion, ethics, social and political philosophy in relation to the general intellectual and social changes of modern civilization. It concludes with a brief discussion of the chief problems of our present civilization.

**608. Development of Modern Science.** Five credit hours. One Quarter. Autumn and Winter. Five meetings each week. Mr. Henderson, Mr. Spieker.

This course is designed especially for students who have not majored in science. Its purpose is to give the non-science student a general view of the historical development of scientific ideas, and to dwell upon the nature and validity of scientific hypotheses and theories from a scientific point of view.

**664. Student Economic Problems and the Adviser.** Three credit hours. One Quarter. Autumn and Spring. Prerequisite, an elementary course in economics or the consent of the instructor. Miss Zorbaugh.

This course is for advisers of students in colleges, universities, and high schools and is open to both men and women.

An economic approach to the functions of an adviser. A study will be made of university students' economic problems, among them being problems relating to the outlay of income, to use of time and energy, and to vocational adjustment. Provision is made for actual experience in counseling students under provision of the instructor.

It is advisable to supplement this course by Survey 665.

Not open to students who have credit for Psychology 664.

**665. Principles of Psychology for Advisers.** Three credit hours. One Quarter. Autumn and Winter. Prerequisite, fundamental courses in psychology or the consent of the instructor. Mrs. Gaw.

This course is for advisers of women in colleges, universities, and high schools.

Students may have actual experience in advising younger students under the supervision of the Dean of Women. They will be taught how to advise concerning the scholastic and social orientation of students, and the use and interpretation of records and scholarship as bearing on the personality of the student.

It is advisable to supplement this course by Survey 664.

Not open to students who have credit for Psychology 665.

## VETERINARY MEDICINE

Office, 103 Veterinary Laboratory

PROFESSORS BRUMLEY, GROSSMAN, GUARD, SCHALK, AND HOBBS, ASSOCIATE  
PROFESSORS EDGINGTON AND REBRASSIER, MR. DELAPLANE

### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 84.

**620. Histologic Technique.** Two to five credit hours. One Quarter. Autumn, Winter, Spring. Laboratory work, three hours for each credit hour. Mr. Grossman.

The course deals with the examination of the tissues with the aid of microscope. The important methods in the preparatory steps required in collecting specimens, fixation, embedding, sectioning, staining, and mounting are considered.

**621. Pathology Technique.** Two or five credit hours. One Quarter. Autumn, Winter, Spring. Laboratory work, three hours for each credit hour. Mr. Goss, Mr. Delaplane.

Practice in the methods of laboratory diagnosis, consisting of collecting the specimens, their fixation and embedding, and the sectioning of such tissues, together with practice in laboratory diagnosis and the recognition of disease processes in tissues.

Not open to students who have credit for Veterinary Medicine 821.

**622. Advanced Special Pathology.** Two or five credit hours. One Quarter. Autumn, Winter, Spring. Laboratory work, three hours for each credit hour. Prerequisite, Veterinary Medicine 621. Mr. Goss.

An advanced course in the pathology of infectious diseases with special reference to anatomical and microscopical lesions and methods of diagnosis together with detailed studies of the lesions of specified diseases under consideration.

623. Special Problems in Parasitology. Two or five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Rebrassier.

624. Special Problems in Veterinary Surgery. One to five credit hours. Spring Quarter. Mr. Guard.

Advanced work in surgery or sterility.

625. Advanced Veterinary Anatomy. Three or five credit hours. One Quarter. Autumn, Winter, Spring. Prerequisite, a course in the topographic anatomy of domestic animals. Mr. Grossman.

626. Special Problems in Veterinary Medicine. Two or five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Brumley, Mr. Schalk, Mr. Hobbs, Mr. Edgington.

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

810-811-812. Special Problems in Clinics. Three to ten credit hours. One, two, or three Quarters. Autumn, Winter, Spring. Mr. Guard and clinical staff. A course intended to give the student more intensive clinical experience.

822. Special Anatomical Pathology. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Goss.

Special problems in gross and microscopic pathology with regard to the accommodation of the course to particular projects which may be given due consideration.

823. Special Bovine Pathology. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Goss.

This is to accommodate those students doing graduate work in some special fields of bovine pathology. The selection of projects is quite variable, allowing for special problems in this field.

825. Special Poultry Pathology. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Goss.

This course allows for the study of poultry diseases with specialization in any pathological processes concerned with poultry diseases.

826. Special Parasitology Problems. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Rebrassier.

830. Advanced Clinical Technique. Three to ten credit hours. Autumn, Winter, and Spring Quarters. Mr. Guard and clinical staff.

A course intended to give the student more intensive clinical experience.

950. Research in Veterinary Medicine. Autumn, Winter, and Spring Quarters.

Research work in veterinary anatomy will be conducted under the direction of Mr. Grossman; in veterinary surgery under Mr. Guard; in veterinary medicine under Mr. Brumley, Mr. Schalk, Mr. Hobbs, Mr. Edgington; and in veterinary pathology under Mr. Goss.

### VOCATIONAL EDUCATION

(See Education)

### ZOOLOGY AND ENTOMOLOGY

Office, 101 Botany and Zoology Building

PROFESSORS OSBURN, OSBORN (RESEARCH), BARROWS, DeLONG, AND PETERSON, ASSOCIATE PROFESSORS KENNEDY AND SNYDER, ASSISTANT PROFESSORS KOSTIR, D. F. MILLER, AND PRICE, MR. DUNHAM

#### ZOOLOGY

##### FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

For courses 601, 605, 607, permission of the instructor is required for admission to the course in addition to the general prerequisites.

**601. Advanced Genetics.** Three credit hours. One Quarter. Autumn and Winter. One lecture and two laboratory periods each week. Mr. Snyder.

This is largely a study of human inheritance, with especial emphasis on the methods of research in this branch of genetics. The mathematical analysis of human pedigrees is intensively studied.

**605. Animal Behavior.** Three credit hours. Autumn Quarter. One lecture each week, the remainder laboratory work. Given in alternate years. Permission of instructor is required. Mr. Barrows.

This course is devoted to the study of the functions of the various parts of the nervous system of the invertebrates, with emphasis on the mechanics of adjustment to heat, light, chemical, and mechanical stimulation. Considerable time will be spent on experiments with living worms and insects.

**606. Animal Behavior.** Three credit hours. Winter Quarter. One lecture each week, the remainder laboratory work. Given in alternate years. Permission of the instructor is required. Mr. D. F. Miller.

This course is devoted to the study of the responses of insects to the stimulating factors of their environment. These studies are directed toward the types of behavior which are important in insect control.

**609. Animal Microtechnic.** Three or five credit hours. Autumn Quarter. A laboratory course. Laboratory work, assigned readings, and conferences. This course is designed for students intending to major in one of the biological sciences. The class is limited to twelve students and permission of the instructor must be obtained before registering for the course. Mr. Kostir.

Theory and practice of microscopic methods, including fixing, embedding, sectioning, and staining of animal tissues, making permanent preparations, and special manipulation of the microscope and its accessories.

Not open to students who have credit for Zoology 407.

**617. Cellular Biology I.** Five credit hours. Winter Quarter. Three lectures and two two-hour laboratory periods each week. Permission of the instructor must be obtained before registering for this course. Mr. Kostir.

A study of the organization of living cells and the fundamental phenomena of life.

**618. Cellular Biology II.** Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. Prerequisite, a course in heredity. Zoology 617 is desirable, but not essential. Mr. Kostir.

A study of the physical basis of heredity, variation, and evolution.

**620. Advanced Zoology of Vertebrates.** Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. Prerequisite, elementary courses in zoology. A course in evolution and one Quarter in comparative anatomy are also desirable. Mr. Price.

A study of the various vertebrate groups, emphasizing their origin, phylogeny, classification, life histories, habits, distribution, and economic importance. Laboratory, museum and field work. Especially recommended for students specializing in biological science.

**625. Advanced Zoology of Invertebrates I. The Protozoa.** Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Prerequisite, elementary courses in zoology. Mr. Kostir.

Zoology 625, 626, and 627 are fundamental courses designed to give the student a general knowledge of the structure, life histories, habits, and relationships of the invertebrate animals. While it is preferable that these courses be taken in the order given, this is not essential, and any one of the three may be elected independently of the others. Course 625 deals with the Protozoa, including both free-living and parasitic forms.

Not open to students who have credit for Zoology 615.

**626. Advanced Zoology of Invertebrates II.** Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. Prerequisite, elementary courses in zoology. Mr. Kostir.

A study of the structure, life histories, habits and relationships of sponges, coelenterates, worms, and arthropods, together with the consideration of important biological principles illustrated by these groups. Note statement under Zoology 625.

Not open to students who have credit for Zoology 616.

**627. Advanced Zoology of Invertebrates III.** Five credit hours. Spring Quarter. Two lectures and three two-hour laboratory periods each week. Prerequisite, elementary courses in zoology. Mr. Kostir.

A study of the structure, life histories, habits and relationships of molluscs, echinoderms, brachiopods, and bryozoa, together with the consideration of important biological principles illustrated by these groups. Note statement under Zoology 625.

**701. Special Problems.** Three or five credit hours each Quarter. Autumn, Winter, Spring. A student may enter at the beginning of any Quarter. Prerequisite, Zoology 625-626-627 or an acceptable course in economic entomology or equivalent, and permission of the instructor.

After conference with the professor in charge, the subject for investigation may be selected in one of the following: animal reactions, arachnology (Mr. Barrows); protozoology, cellular biology (Mr. Kostir); ichthyology (Mr. Osburn); genetics (Mr. Snyder; apiculture (Mr. Dunham); life history development, morphology, classification or some other phase of zoological study (various professors).

**NOTE: TEACHING COURSES.** For the Teaching Course in this department see the Department of Education, Course 683.

#### FOR GRADUATES

**800 and 900 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

These prerequisites include an adequate knowledge not only of zoology but also of related sciences. It is desirable that the student should have a reading knowledge of French and German.

**801-802-803. Seminary in Zoology.** One credit hour. Autumn, Winter, and Spring Quarters. Mr. Osburn.

Discussion of assigned subjects, reports on research work, current literature, etc. All graduate students in the department are expected to register in this course as long as they are in residence.

**805-806-807. Invertebrate Zoology.** Five credit hours. Autumn, Winter, and Spring Quarters. Mr. Osburn.

A detailed study of invertebrate groups with special reference to morphologic features and discussions of their significance in adaptation, phylogeny, and taxonomy.

**\*808-809. Invertebrate Embryology.** Three or five credit hours. Autumn and Winter Quarters. Lectures, reading, and laboratory. Prerequisite, the equivalent of Entomology 651-652, or Zoology 805-806-807. Mr. Osburn.

**950. Research in Zoology.** Autumn, Winter, and Spring Quarters. Mr. Osburn, Mr. Osborn, Mr. Barrows, Mr. DeLong, Mr. Peterson, Mr. Kennedy, Mr. Kostir, Mr. Snyder.

Problems in development, life history, morphology, ecology, genetics, animal behavior, parasitology, taxonomy, or other zoological or entomological subjects may be undertaken. For some of these the opportunities are particularly good at the Biological Laboratory. Students interested should send for the Franz Theodore Stone Laboratory Bulletin.

#### ENTOMOLOGY

##### FOR ADVANCED UNDERGRADUATES AND GRADUATES

**600 and 700 Courses.** A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**651-652. Advanced Entomology.** Five credit hours. Autumn and Winter Quarters. Two lectures and three two-hour laboratory periods each week. Mr. Kennedy.

Advanced entomology for those wishing to investigate some special group of insects or to fit themselves for professional work in entomology.

Entomology 651 deals with the comparative external morphology, the evolutionary history and classification of insects; laboratory work is systematic and material will be furnished, but it will be preferable if the student collects and pins material for himself during the summer preceding.

Entomology 652 deals with insect behavior, life histories, and particularly with ecological principles governing occurrence and distribution of insect species, and the principles underlying insect control.

The laboratory work is systematic. The two Quarters cover all the insect orders.



**653-654. Insect Control.** Five credit hours. Autumn and Spring Quarters. Two lectures and three laboratory periods each week. Mr. DeLong.

Principles of economic entomology, circumvention and exclusion, cultural methods, traps and trap crops, heat, animal dips, insecticides, insecticide machinery, and accessories, and practical work in fumigation, spraying, inspecting, preparing an entomological exhibit and a collection of economic insects, rearing and insectary methods. Practical course intended to anticipate, so far as possible, the requirements and difficulties which the student will encounter in state or federal entomological work.

**655. Medical and Veterinary Entomology.** Five credit hours. Winter Quarter. Three lectures and two laboratory periods each week. Given biennially. Mr. DeLong.

The insects, mites, and ticks which cause or transmit diseases of man and domestic animals; the sources of infection, methods of transmission and interrelation with pathogenic bacteria and protozoa; the relations of the subjects to parasitology, bacteriology, veterinary medicine, sanitary engineering and public health; field observations of unsanitary conditions, practice in feeding, breeding and handling experimental insects, and practical problems in the control of parasites and insect-borne diseases.

The student is advised if possible to take Zoology 504 (Animal Parasites) before electing this course.

**660. Entomological Literature and Principles of Taxonomy.** Five credit hours. Winter Quarter. Mr. Kennedy.

Lectures on the development of entomological writing, studies of Government and Experiment Station bulletins and other publications, assigned readings, and preparation by each student of a report or review upon some publication. Intended to familiarize the student with past and current publications and give him command of the published records in his field of study.

A study of the principles of classification with lectures on taxonomic systems, codes of nomenclature, etc. Practical work in the classification of a selected group or groups of insects or other animals.

Not open to students who have credit for Entomology 456.

**701. Special Problems.** Three or five credit hours each Quarter. Autumn, Winter, Spring. A student may enter at the beginning of any Quarter. Prerequisite, Zoology 615-616 or 625-626-627 or an acceptable course in economic entomology or equivalent, and permission of the instructor.

A conference with the professor in charge of the subject for investigation may be selected in one of the following: insect reaction, arachnology (Mr. Barrows); apiculture (Mr. Dunham); life history development, morphology, taxonomy of various orders, or some other phase of entomological study (various professors).

#### FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 34.

**801-802-803. Seminary in Entomology.** One credit hour. Autumn, Winter, and Spring Quarters. Mr. Osborn, Mr. Peterson, Mr. Kennedy.

Discussion of assigned subjects, reports on research work, current literature, etc. All graduate students in the department are expected to register in this course as long as they are in residence.

**814-815. Biological Control of Insect Pests.** Five credit hours. Autumn and Winter Quarters. Three lectures and two two-hour laboratory periods each week. Each Quarter is a unit in itself and may be taken independently of the other. Open to graduate students in entomology with the consent of the instructor. Mr. Peterson.

An advanced course dealing with the biological agents which bring about a balance or control among insects. During the Autumn Quarter diseases of insects, chiefly bacterial and fungus, and vertebrate and invertebrate predators of insects will be considered. During the Winter Quarter parasites of insects, chiefly parasitic insects, will be considered. The laboratory work will consist largely of special assigned problems.

**816. Research Methods: Living Insects.** Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. Open to graduate students in entomology with the consent of the instructor. Mr. Peterson.

A course designed for the purpose of introducing students to methods and equipment employed today in the field by research entomologists. Various topics will be considered, namely:

insectary construction, rearing cages and containers, temperature, moisture and light control equipment, traps and barriers, estimating insect populations, methods of taking notes, compiling data and manner of presentation and other useful information for entomologists now in or expecting to enter field research work. The laboratory work will consist largely of special assigned problems.

**817. Morphology and Development of Insects.** Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Mr. Kennedy.

An advanced comprehensive course on the internal structures of insects, together with what is known of their functions, morphology, histology, embryology, and metamorphosis. The laboratory is handled as an individual research problem for each student and may be continued in succeeding Quarters as research.

The success of this work depends on the material collected and preserved by the student preceding the course. Methods for collecting and preserving material should be taken up with the instructor in charge at the end of the Spring Quarter preceding. Students coming from other institutions are expected to write for instructions.

Not open to students who have credit for Entomology 656.

**950. Research in Entomology.** Autumn, Winter, and Spring Quarters. Mr. Osburn, Mr. Osborn, Mr. Barrows, Mr. Peterson, Mr. DeLong, Mr. Kennedy, Mr. D. F. Miller.

Problems in development, life history, morphology, ecology, genetics, animal behavior, parasitology, taxonomy, or other zoological or entomological subjects may be undertaken. For some of these the opportunities are particularly good at the Biological Laboratory. Students interested should send for the Franz Theodore Stone Laboratory Bulletin.

## BULLETINS ISSUED ANNUALLY BY OHIO STATE UNIVERSITY

Graduate School  
College of Agriculture  
School of Home Economics  
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College of Dentistry  
College of Education  
College of Engineering  
College of Law  
College of Medicine  
School of Nursing  
College of Pharmacy  
College of Veterinary Medicine  
Applied Optics  
Announcement of Commencement Week  
Annual Report  
Franz Theodore Stone Laboratory (Formerly Lake Laboratory)  
General Catalog Number\*  
General Information  
Publications of the Teaching Staff (issued biennially)  
Summer Quarter  
Time Schedule  
University Directory\*  
Short Courses in Agriculture

\* The General Catalog Number and the University Directory are distributed without charge for official purposes. To individuals, the price of the General Catalog Number is 50 cents a copy and the University Directory 25 cents.



The first part of the book is devoted to a general history of the United States, from the discovery of the continent to the present time. The second part is a history of the individual states, and the third part is a history of the federal government. The author has endeavored to give a full and accurate account of the events which have shaped the history of the United States, and to show the causes and consequences of the various revolutions and changes which have taken place. The book is written in a plain and simple style, and is intended for the use of the general reader. It is a valuable work, and one which every citizen of the United States should possess.

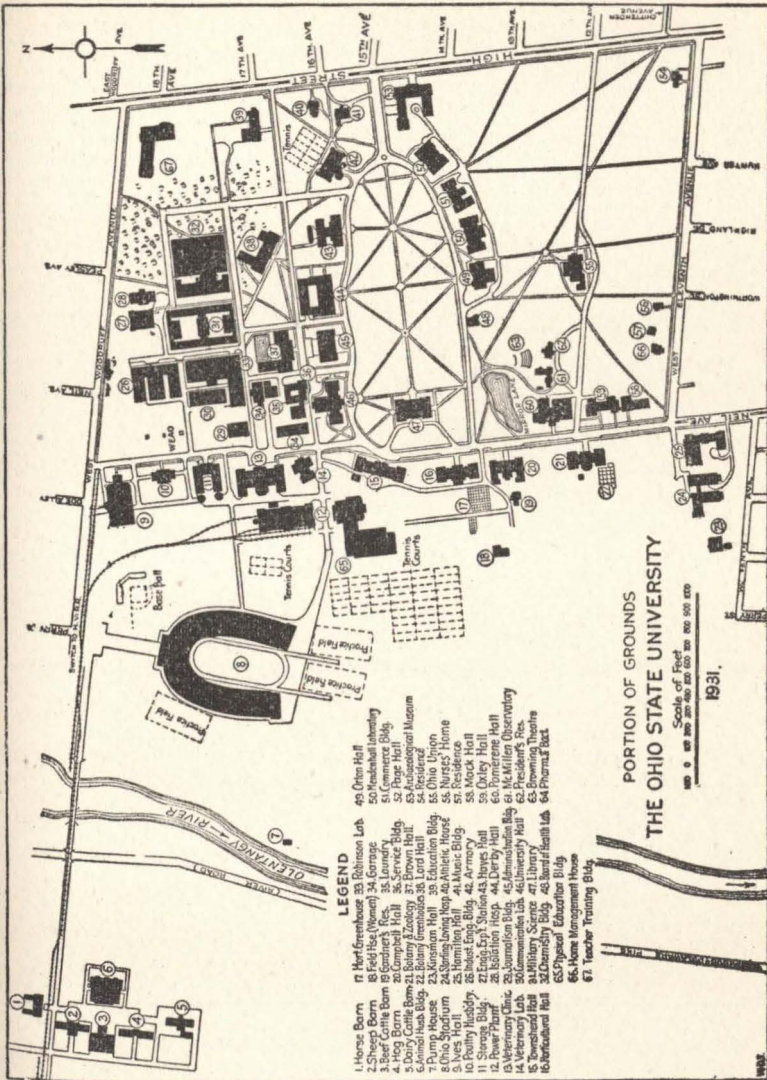












**LEGEND**

- 1 Horse Barn
- 2 Sheep Barn
- 3 Suet Cattle Barn
- 4 Hog Barn
- 5 Dairy Cattle Barn
- 6 Dairy Cattle Barn
- 7 Dairy Cattle Barn
- 8 Ohio Stadium
- 9 Jives Hall
- 10 Polity Building
- 11 Police Station
- 12 Power Plant
- 13 Veterinary Clinic
- 14 Veterinary Lab
- 15 Trenchard Hall
- 16 Recreation Hall
- 17 Hot freshwater bath
- 18 Fickler (Nelson)
- 19 Spangler's Res.
- 20 Campbell Hall
- 21 Duffell Hall
- 22 Pump House
- 23 Kowarsan Hall
- 24 Stone Living Hqs.
- 25 Hamilton Hall
- 26 Black Ledge Bldg.
- 27 Black Ledge Bldg.
- 28 Black Ledge Bldg.
- 29 Black Ledge Bldg.
- 30 Black Ledge Bldg.
- 31 Black Ledge Bldg.
- 32 Black Ledge Bldg.
- 33 Black Ledge Bldg.
- 34 Laundry
- 35 Service Bldg.
- 36 Service Bldg.
- 37 Brown Hall
- 38 Education Bldg.
- 39 Education Bldg.
- 40 Athletic House
- 41 Music Bldg.
- 42 Armory
- 43 Armory
- 44 Derby Hall
- 45 Memorial Bldg.
- 46 Memorial Bldg.
- 47 Library
- 48 University Hall
- 49 University Hall
- 50 University Hall
- 51 University Hall
- 52 University Hall
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- 55 University Hall
- 56 University Hall
- 57 University Hall
- 58 University Hall
- 59 University Hall
- 60 University Hall
- 61 McMillan Observatory
- 62 President's Res.
- 63 Browning Theatre
- 64 Pharmacy Bldg.
- 65 Pharmacy Bldg.
- 66 Pharmacy Bldg.
- 67 Teacher Training Bldg.

**PORTION OF GROUNDS  
THE OHIO STATE UNIVERSITY**

Scale of Feet  
0 100 200 300 400 500 600 700 800 900 1000  
1931.