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UNIVERSITY OF MARYLAND

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THE GRADUATE SCHOOL

ANNOUNCEMENTS

1937 - 1938

COLLEGE PARK, MARYLAND

THE UNIVERSITY
of
MARYLAND

THE GRADUATE SCHOOL
ANNOUNCEMENTS

FOR THE SESSIONS OF

1937-1938

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CALENDAR

1937-1938

First Semester

1937		
Sept. 13-15	Monday-Wednesday	Registration.
Sept. 16	Thursday, 8:20 a. m.	Instruction for first semester begins.
October 6	Wednesday	Modern language examinations for Ph. D. requirement.
		Last day to file applications for admission to candidacy for Doctor's degree at Commencement of 1938.
Nov. 24-29	Wednesday, 4:10 p. m.-Monday, 8:20 a. m.	Thanksgiving recess.
Dec. 21	Tuesday, 4:10 p. m.	Christmas recess begins.
1938		
Jan. 3	Monday, 8:20 a. m.	Christmas recess ends.
Jan. 19-26	Wednesday-Wednesday	First semester examinations.

Second Semester

Jan. 25-31	Tuesday-Monday	Registration for second semester.
Feb. 1	Tuesday, 8:20 a. m.	Instruction for second semester begins.
		Last day to file applications for admission to candidacy for the Master's degree at Commencement of 1938.
Feb. 2	Wednesday	Modern language examinations.
Feb. 22	Tuesday	Washington's Birthday. Holiday.
April 14-19	Thursday, 4:10 p. m.-Tuesday, 8:20 a. m.	Easter recess.
May 14	Saturday	Last day to deposit Doctor's thesis in office of Graduate School.
May 21	Saturday	Last day to deposit Master's thesis in office of Graduate School.
May 23-June 1	Monday-Wednesday	Second semester examinations.
May 29	Sunday, 11:00 a. m.	Baccalaureate sermon.
May 30	Monday	Memorial Day. Holiday.
June 1	Wednesday	Modern language examinations.
June 3	Friday	Class Day.
June 4	Saturday	Commencement.

Summer Term

June 22	Wednesday	Summer session begins.
Aug. 2	Tuesday	Summer session ends.

BOARD OF REGENTS

Term Expires

W. W. Skinner, Chairman.....1945
Kensington, Montgomery County

Mrs. John L. Whitehurst, Secretary.....1938
4101 Greenway, Baltimore

W. Calvin Chesnut.....1942
Post Office Building, Baltimore

William P. Cole, Jr.....1940
Towson, Baltimore County

Henry Holzapfel, Jr.....1943
Hagerstown, Washington County

Harry H. Nuttle.....1941
Denton, Caroline County

J. Milton Patterson.....1944
Cumberland, Allegany County

John E. Raine.....1939
Towson, Baltimore County

Clinton L. Riggs.....1942
903 North Charles Street, Baltimore

ADMINISTRATIVE OFFICERS

H. C. Byrd, LL. D. President of the University.

C. O. Appleman, Ph. D., Dean of the Graduate School.

Elsie Parrett, M. A., Secretary to the Dean.

W. S. Small, Ph. D., Director of the Summer School.

Adele Stamp, M. A., Dean of Women.

H. T. Casbarian, Comptroller.

W. M. Hillegeist, Director of Admissions.

Alma H. Preinkert, M. A., Registrar.

Grace Barnes, B. L. S., M. A., Librarian.

H. L. Crisp, M. M. E., Superintendent of Buildings and Grounds.

T. A. Hutton, B. A., Purchasing Agent and Manager of Students' Supply Store.

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H. C. House, Ph. D., Professor of English Language and Literature.

DeVoe Meade, Ph. D., Professor of Animal and Dairy Husbandry.

Marvin R. Thompson, Ph. C.,Ph. D., Emerson Professor of Pharmacology (Baltimore).

Eduard Uhlenhuth, Ph. D., Professor of Gross Anatomy (Baltimore).

GENERAL INFORMATION

HISTORY AND ORGANIZATION

In the earlier years of the institution the Master's degree was frequently conferred, but the work of the graduate students was in charge of the departments concerned, under the supervision of the general faculty. The Graduate School of the University of Maryland was established in 1918, and organized graduate instruction leading to both the Master's and the Doctor's degree was undertaken. The faculty of the Graduate School includes all members of the various faculties who give instruction in approved graduate courses. The general administrative functions of the graduate faculty are delegated to a Graduate Council, of which the Dean of the Graduate School is chairman.

LOCATION

The University of Maryland is located at College Park, in Prince George's County, Maryland, on the Baltimore and Ohio Railroad, eight miles from Washington and thirty-two miles from Baltimore. Washington, with its wealth of resources, is easily accessible by train, street car and bus.

The professional schools of Medicine, Nursing, Pharmacy, Dentistry and Law are located in Baltimore, at the corner of Lombard and Greene Streets.

LIBRARIES

In addition to the resources of the University library, the great libraries of the National Capital are easily available for reference work. Because of the proximity of these libraries to College Park they are a valuable asset to research and graduate work at the University of Maryland.

The library building at College Park contains a number of seminar rooms and other desirable facilities for graduate work.

GENERAL REGULATIONS

ADMISSION

Graduates from a recognized college regarded as standard by the institution and by regional or general accrediting agencies are admitted to the Graduate School. The applicant shall present an official transcript of his collegiate record which for unconditional admission shall show creditable completion of an undergraduate major in the subject chosen for specialization in the Graduate School. Any deficiencies may be made up in courses without credit toward a graduate degree.

Application blanks for admission to the Graduate School are obtained from the office of the Dean. After approval of the application, a matriculation card, signed by the Dean, is issued to the student. This card per-

mits one to register in the Graduate School. After payment of the fee, the matriculation card is stamped and returned. It is the student's certificate of membership in the Graduate School, and may be called for at any succeeding registration.

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

REGISTRATION

All students pursuing graduate work in the University, even though they are not candidates for higher degrees, are required to register in the Graduate School at the beginning of each semester. Students taking graduate work in the summer session are also required to register in the Graduate School at the beginning of each session. In no case will graduate credit be given unless the student matriculates and registers in the Graduate School. Registration for the first semester is held in the Gymnasium-Armory on the dates designated in the calendar. Students register for the second semester and for the summer session in the office of the Dean, T-214, Agriculture Building. The program of work for the semester or the summer session is arranged with the major department and entered upon two course cards, which are signed first by the professor in charge of the student's major subject and then by the Dean of the Graduate School. One card is retained by the Dean. The student takes the other card, and in case of a new student, also the matriculation card, to the Registrar's office, where the registration is completed. After fees have been paid, class cards are issued by the Registrar. Students will not be admitted to graduate courses without class cards. Course cards may be obtained at the Registrar's office or at the Dean's office. The heads of departments usually keep a supply of these cards in their respective offices.

GRADUATE COURSES

Graduate students must elect for credit in partial fulfillment of the requirements for higher degrees only courses designated *For Graduates* or *For Graduates and Advanced Undergraduates.* Graduate students may elect courses numbered from 1 to 99 in the general catalogue but graduate credit will not be allowed for these. Students with inadequate preparation may be obliged to take some of these courses as prerequisites for advanced courses. No credit toward graduate degrees may be obtained by correspondence or extension study.

PROGRAM OF WORK

The professor who is selected to direct a student's thesis work is the student's adviser in the formulation of a graduate program, including suitable minor work, which is arranged in cooperation with the instructors. To encourage thoroughness in scholarship through intensive application, graduate students in the regular sessions are limited to a program of thirty credit hours for the year, including thesis work, which is valued at not less than six hours.

SUMMER GRADUATE WORK

Graduate work in the summer session may be counted as residence toward an advanced degree. By carrying approximately six semester hours of graduate work for four summer sessions and upon submitting a satisfactory thesis, a student may be granted the degree of Master of Arts or Master of Science. In some instances a fifth summer may be required in order that a satisfactory thesis may be completed.

Upon recommendation by the head of the student's major department and with the approval of the Graduate Council, a maximum of six semester hours of graduate work done at other institutions of sufficiently high standing may be substituted for required work here; such substitution does not shorten the required residence period.

By special arrangement, graduate work may be pursued during the entire summer in some departments. Such students as graduate assistants, or others who may wish to supplement work done during the regular year, may satisfy one-third of an academic year's residence by full-time graduate work for eleven or twelve weeks, provided satisfactory supervision and facilities for summer work are available in their special fields.

The University publishes a special bulletin giving full information concerning the summer session and the graduate courses offered therein. The bulletin is available upon application to the Registrar of the University.

GRADUATE WORK IN PROFESSIONAL SCHOOLS AT BALTIMORE

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

The graduate courses in the professional schools are listed on pages 69-75.

GRADUATE WORK BY SENIORS IN THIS UNIVERSITY

Seniors who have completed all their undergraduate courses in this University by the end of the first semester, and who continue their residence in the University for the remainder of the year, are permitted to register in the Graduate School and secure the privileges of its membership, even though the bachelor's degree is not conferred until the close of the year.

A senior of this University who has nearly completed the requirements for the undergraduate degree may, with the approval of his undergraduate Dean and the Dean of the Graduate School, register in the undergraduate college for graduate courses, which may be transferred for graduate credit toward an advanced degree at this University, but the total of undergraduate and graduate courses must not exceed fifteen credits for the semester. Graduate credits earned during the senior year may not be used to shorten the residence period required for advanced degrees.

ADMISSION TO CANDIDACY FOR ADVANCED DEGREES

Application for admission to candidacy for either the Master's or the Doctor's degree is made on application blanks which are obtained at the

office of the Dean of the Graduate School. These are filled out in duplicate and after the required endorsements are obtained, the applications are acted upon by the Graduate Council. An official transcript of the candidate's undergraduate record and any graduate courses completed at other institutions must be filed in the Dean's office before the application can be considered.

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

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

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

Advancement to Candidacy. Each candidate for the Master's degree is required to make application for admission to candidacy not later than the date when instruction begins for the second semester of the academic year in which the degree is sought, but not until at least twelve semester course hours of graduate work have been completed. An average grade of "B" in all major and minor subjects is required.

Residence Requirements. Two semesters or four summer sessions may satisfy the residence requirements for the degree of Master of Arts or Master of Science. Inadequate preparation for the graduate courses the student wishes to pursue may make a longer period necessary.

Course Requirements. A minimum of twenty-four semester hours in courses approved for graduate credit is required for the Master's degree. If the student is inadequately prepared for the required graduate courses, either in the major or minor subjects, additional courses may be required to supplement the undergraduate work. Not less than twelve semester hours and not more than fifteen semester hours in graduate courses must be earned in the major subject. The remaining credits of the total of twenty-four hours required must be outside the major subject and must comprise a group of coherent courses intended to supplement and support the major work. Not less than one-half of the total required course credits for the Master's degree, or a minimum of twelve, must be selected from courses numbered 200 or above. The entire course of study must constitute a unified program approved by the student's major adviser and by the Dean of the Graduate School. No credits that are reported with a grade lower than "C" are acceptable for an advanced degree.

At least eighteen of the twenty-four semester course credits required for the Master's degree must be taken at this institution. In certain cases graduate work done in other graduate schools of sufficiently high standing may be substituted for the remaining required credits, but any such substitution of credits does not shorten the normal required residence at the University of Maryland. Part-time students are required to take the entire twenty-four semester course credits at this institution. The

Graduate Council, upon recommendation of the head of the major department, passes upon all graduate work done at other institutions. The final examination will cover all graduate work offered in fulfillment of the requirements for the degree.

Thesis. In addition to the twenty-four semester hours in graduate courses a satisfactory thesis is required of all candidates for the Master's degree. It must demonstrate the student's ability to do independent work and it must be acceptable in literary style and composition. It is assumed that the time devoted to thesis work will be not less than the equivalent of six semester hours earned in graduate courses. If the Master's thesis is based upon independent research the student may register in research courses in the amount prescribed by his department, but not more than four semester hours of these can be included in the twenty-four semester hours required in graduate courses for the Master's degree. With the approval of the student's major professor and the Dean of the Graduate School, the thesis in certain cases may be prepared *in absentia* under direction and supervision of a member of the faculty of this institution.

The original copy of the thesis must be deposited in the office of the Graduate School not later than two weeks before commencement. An abstract of the contents of the thesis, 200 to 250 words in length, must accompany it. A manual giving full directions for the physical make-up of the thesis is in the hands of each professor who directs thesis work, and should be consulted by the student before the typing of the manuscript is begun. Individual copies of this manual may be obtained at the Dean's office at nominal cost.

Final Examination. The final oral examination is conducted by a committee appointed by the Dean of the Graduate School. The student's adviser acts as the chairman of the committee. The other members of the committee are persons under whom the student has taken most of his major and minor courses. The chairman and the candidate are notified of the personnel of the examining committee at least one week prior to the period set for oral examinations. The chairman of the committee selects the exact time and place for the examination and notifies the other members of the committee and the candidate. The examination should be conducted within the dates specified and a report of the committee sent to the Dean as soon as possible after the examination. A special form for this purpose is supplied to the chairman of the committee. Such a report is the basis upon which recommendation is made to the faculty that the candidate be granted the degree sought. The period for the oral examination is usually one hour.

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

A student will not be admitted to final examination until all other requirements for the degree have been met.

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Advancement to Candidacy. Candidates for the Doctor's degree must be admitted to candidacy not later than one academic year prior to the

granting of the degree. Applications for admission to candidacy for the Doctor's degree must be deposited in the office of the Dean not later than the first Wednesday in October of the academic year in which the degree is sought. The applicant must have obtained from the head of the Modern Language Department a statement that he possesses a reading knowledge of French and German. Preliminary examinations or such other substantial tests as the departments may elect are also required for admission to candidacy.

Residence. Three years of full-time resident graduate study are required. The first two of the three years may be spent in other institutions offering standard graduate work. On a part-time basis the time needed will be correspondingly increased. The degree is not given merely as a certificate of residence and work, but is granted only upon sufficient evidence of high attainments in scholarship, and ability to carry on independent research in the special field in which the major work is done.

Major and Minor Subjects. The candidate must select a major and one or two closely related minor subjects. Thirty semester hours of minor work are required. The remainder of the required residence is devoted to intensive study and research in the major field. The amount of required course work in the major subject will vary with the department and the individual candidate.

Thesis. The ability to do independent research must be shown by a dissertation on some topic connected with the major subject. The original typewritten copy and one clear carbon copy of the thesis, together with an abstract of the contents, 200 to 250 words in length, must be deposited in the office of the Dean at least three weeks before commencement. One or two extra copies of the thesis should be provided for use of members of the examining committee prior to the date of the final examination. The thesis is later printed in such form as the committee and the Dean may approve, and fifty copies are deposited in the University library.

A manual giving full directions for the physical make-up of the thesis is in the hands of each professor who directs thesis work, and should be consulted by the student before typing of the thesis is begun. Students may obtain copies of this manual at the Dean's office, at nominal cost.

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

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

RULES GOVERNING LANGUAGE EXAMINATIONS FOR DOCTOR OF PHILOSOPHY CANDIDATES

1. A candidate for the Doctor's degree must show in a written examination that he possesses a reading knowledge of French and German. The passages to be translated will be taken from books and articles in his specialized field. Some 500 pages of text from which the applicant wishes to have his examination chosen should be submitted to the head of the Department of Modern Languages at least three days before the examination. It is not expected that the candidate recognize every word of the text but it is presumed that he will know sufficient grammar to distinguish inflectional forms and that he will have a large enough vocabulary to give a good translation without the aid of a dictionary.

2. Application for admission to these tests must be filed in the office of the Dean of the Graduate School at least three days in advance of the tests.

3. No penalty is attached to failure in the examination, and the unsuccessful candidate is free to try again at the next date set for these tests.

4. Examinations are held in the Seminar room, Library building, on the first Wednesdays in February, June, and October, at 2 p. m.

GRADUATE FEES

The fees paid by graduate students are as follows:

A matriculation fee of $10.00. This is paid once only, upon admission to the Graduate School.

A fixed charge, each semester, at the rate of $4.00 per semester credit hour.

A diploma fee (Master's degree), $10.00.

A graduation fee, including hood (Doctor's degree), $20.00.

FELLOWSHIPS AND ASSISTANTSHIPS

Fellowships. A number of fellowships have been established by the University. A few industrial fellowships are also available in certain departments. The stipend for the University fellows is $400 for the academic year and the remission of all graduate fees except the diploma fee.

Application blanks for University fellowships may be obtained from the office of the Graduate School. The application, with the necessary credentials, is sent by the applicant directly to the Dean of the Graduate School.

Fellows are required to render minor services prescribed by their major departments. The usual amount of service required does not exceed twelve clock hours per week. Fellows are permitted to carry a full graduate program, and they may satisfy the residence requirement for higher degrees in the normal time.

The selection of fellows is made by the departments to which the fellowships are assigned, with the approval of the Dean or director concerned,

but all applications must first be approved by the Dean of the Graduate School. The awards of University fellowships are on a competitive basis.

Graduate Assistantships. A number of teaching and research graduate assistantships are available in several departments. The compensation for these assistantships is $800 a year and the remission of all graduate fees except the diploma fee. Graduate assistants are appointed for one year and they are eligible to reappointment. The assistant in this class devotes one-half of his time to instruction or to research in connection with Experiment Station projects, and he is required to spend two years in residence for the Master's degree. If he continues in residence for the Doctor's degree, he is allowed two-thirds residence credit for each academic year at this University. The minimum residence requirement from the Bachelor's degree, therefore, may be satisfied in four academic years and one summer, or three academic years and three summer sessions of eleven or twelve weeks each.

Other Assistants. Assistants not in the regular $800 class are frequently allowed to take graduate courses if they are eligible for admission to the Graduate School. The stipend for these assistants varies with the services rendered, and it may or may not include the remission of graduate fees. The question of fees is decided in each individual case by the Dean or director concerned when the stipend is arranged. The amount of graduate work these assistants are permitted to carry is determined by the head of the department, with the approval of the Dean or director concerned. The Graduate Council, guided by the recommendation of the student's advisory committee, prescribes the required residence in each individual case at the time the student is admitted to candidacy.

Futher information regarding assistantships may be obtained from the department or college concerned.

COMMENCEMENT

Attendance is required at the commencement at which the degree is conferred, unless the candidate is excused by the Dean of the Graduate School and the President of the University.

Application for diploma must be filed in the office of the Registrar before March 1 of the year in which the candidate expects to obtain a degree.

Academic costume is required of all candidates at commencement. Candidates who so desire may purchase or rent caps and gowns at the Students' Supply Store. Order must be filed before March 20, but may be cancelled later if the student finds himself unable to complete his work for the degree.

DESCRIPTION OF COURSES

For the convenience of students in making out schedules of studies, the subjects in the following Description of Courses are arranged alphabetically:

For convenience in identification, Courses for Graduates and Advanced Undergraduates are numbered 100 to 199; Courses for Graduates are numbered 200 and upward.

The letter following the number of the course indicates the semester in which the course is offered: Thus, 100f is offered the first semester; 101s, the second semester; 102y, the year.

The number of semester hours' credit is shown by the arabic numeral in parentheses after the title of the course. In year courses the number shown is the total for both semesters.

A separate schedule of courses is issued each semester, giving the hours, places of meeting, and other information required by the student in making out his schedule. Students will obtain these schedules when they register.

AGRICULTURAL ECONOMICS

Courses for Graduates and Advanced Undergraduates

A. E. 101 s. *Transportation of Farm Products* (3)—Two lectures; one laboratory. Not open to students who have taken or are taking Econ. 112s.

A study of the development of transportation in the United States and facilities for transporting farm products, with special attention to such problems as tariffs, rate structure, and the development of fast freight lines, refrigerator service, truck transportation of agricultural products; observation of transportation agencies in action. (Russell.)

A. E. 102 s. *Marketing of Farm Products* (3)—Three lectures. Prerequisite, Econ. 5 f or s.

A complete analysis of the present system of transporting, storing, and distributing farm products, and a basis for intelligent direction of effort in increasing the efficiency of marketing methods. (DeVault.)

A. E. 103 f. *Co-operation in Agriculture* (3)—Three lectures.

Historical and comparative development of farmers' co-operative organizations with some reference to farmer movements; reasons for failure, and essentials to success; commodity developments; the Federal Farm Board; banks for co-operatives; present trends. (Russell.)

A. E. 104 s. *Agricultural Finance* (3)—Three lectures.

Agricultural Credit requirements; development and volume of business of institutions financing agriculture; financing specific farm organizations and industries. *Farm Insurance*—fire, crop, livestock, and life insurance with especial reference to mutual developments—how provided, benefits, and needed extension. (Russell.)

A. E. 105 s. *Food Products Inspection* (3)—Two lectures; one laboratory.

This course, arranged by the Department of Agricultural Economics in co-operation with the State Department of Markets and the United States Department of Agriculture, is designed to give the students primary instruction in the grading, standardizing and inspection of fruits and vegetables, dairy products, poultry products, meats, and other food products. Theoretical instruction covering the fundamental principles will be given in the form of lectures, while the demonstrational and practical work will be conducted through laboratories and field trips to Washington, D. C., and Baltimore. (Staff.)

A. E. 106 s. *Prices* (3)—Two lectures; one laboratory.

A general course in prices, price relationships, and price analysis, with emphasis on prices of agricultural products. (Russell.)

A. E. 107 s. *Analysis of the Farm Business* (3)—One lecture; two laboratories.

A concise, practical course in the keeping, summarizing, and analyzing of farm accounts. (Hamilton.)

A. E. 108 f. *Farm Organization and Operation* (3)—Three lectures.

A study of the organization and operation of Maryland farms from the

standpoint of efficiency and profits. Students will be expected to make an analysis of the actual farm business and practices of different types of farms located in various parts of the State, and to make specific recommendations as to how these farms may be organized and operated as successful businesses. (Hamilton.)

A. E. 109 y. *Research Problems* (1-3).

With the permission of the instructor, students will work on any research problems in agricultural economics which they may choose, or a special list of subjects will be made up from which the students may select their research problems. There will be occasional class meetings for the purpose of making reports on progress of work, methods of approach, etc. (DeVault.)

A. E. 110 s. *Economics of Consumption* (2)—Two lectures.

Economic activity and organization viewed from the standpoint of the consumer. Covers among other subjects a study of consumption theory, including Engel's laws and demand curves; also practical information on standards of living; consumers' financial problems; grades of goods, brands and advertising; co-operative purchasing by consumers; and governmental consumer agencies. (Russell.)

Courses for Graduates

A. E. 201 y. *Special Problems in Agricultural Economics* (3).

An advanced course dealing more extensively with some of the economic problems affecting the farmer, such as land problems, agricultural finance, farm wealth, agricultural prices, transportation, and special problems in marketing and co-operation. (DeVault.)

A. E. 202 y. *Seminar* (1-2).

This course will consist of special reports by students on current economic subjects, and a discussion and criticism of the same by the members of the class and the instructor. (DeVault.)

A. E. 203 y. *Research* (8)—Students will be assigned research work in agricultural economics under the supervision of the instructor. The work will consist of original investigation in problems of agricultural economics, and the results will be presented in the form of a thesis. (DeVault.)

A. E. 210 s. *Taxation in Relation to Agriculture* (2)—Two lectures.

Principles and practices of taxation in their relation to agriculture, with special reference to the trends of tax levies, taxation in relation to land utilization, taxation in relation to ability to pay and benefits received; a comparison of the following taxes as they affect agriculture—general property tax, income tax, sales tax, gasoline and motor vehicle license taxes, inheritance tax, and special commodity taxes; possibilities of farm tax reduction through greater efficiency and economies in local government. (DeVault and Walker.)

A. E. 211 f. *Taxation in Theory and Practice* (3)—Two lectures; one laboratory.

Ideals in taxation; economic effects of taxation upon the welfare of society; theory of taxation: the general property tax, business and license

taxes, the income tax, the sales tax, special commodity taxes, inheritance and estate taxes; recent shifts in taxing methods and recent tax reforms: conflicts and duplication in taxation among governmental units; practical and current problems in taxation. (DeVault and Walker.)

A. E. 212 f. *Land Utilization and Agricultural Production* (3)—Two double lecture periods a week.

A presentation, by regions, of the basic physical conditions of the economic and social forces that have influenced agricultural settlement, and of the resultant utilization of the land and production of farm products; followed by a consideration of the regional trends and interregional shifts in land utilization and agricultural production, and the outlook for further changes in each region. (Baker.)

A. E. 213 s. *Consumption of Farm Products and Standards of Living* (3)—Two double lecture periods a week.

A presentation of the trends in population and migration for the nation and by states, of the trends in exports of farm products and their regional significance, of the trends in diet and in per capita consumption of non-food products; followed by a consideration of the factors that appear likely to influence these trends in the future, and of the outlook for commercial as contrasted with a more self-sufficing agriculture. (Baker.)

A. E. 214 f. *Advanced Co-operation* (2)—Two lectures.

Intensive studies of specific phases of agricultural co-operation. (Russell.)

AGRONOMY

Division of Crops

Courses for Graduates and Advanced Undergraduates

AGRON. 103 f. *Crop Breeding* (2)—One lecture; one laboratory. Prerequisite, Gen. 101.

The principles of breeding as applied to field crops and methods used in crop improvement. (Kemp.)

AGRON. 121 s. *Methods of Crop and Soil Investigation* (2)—One lecture; one laboratory.

A consideration of crop and soil investigation methods at the various experiment stations, and the standardization of such methods. (Metzger.)

Courses for Graduates

AGRON. 201 y. *Crop Breeding* (4-10)—Credits determined by work accomplished.

The content of this course is similar to that of Agron. 103 f, but will be adapted more to graduate students, and more of a range will be allowed in choice of materials to suit special cases. (Kemp.)

AGRON. 203 y. *Seminar* (2)—One report period each week.

The seminar is devoted largely to reports by students on current scientific publications dealing with problems in crops and soils.

AGRON. 209 y. *Research* (4-8)—Credits determined by work accomplished.

With the approval of the head of the department the student will be allowed to work on any problem in agronomy, or he will be given a list of suggested problems from which he may make a selection. (Staff.)

Division of Soils

Courses for Graduates

SOILS 201 y. *Special Problems and Research* (10-12).

Original investigation of problems in soils and fertilizers. (Staff.)

SOILS 202 y. *Soil Technology* (5 f, 2 s)—Two lectures, two laboratories, first semester; two lectures, one laboratory, second semester. Prerequisites, Geology 1, Soils 1, and Chemistry 1.

In the first semester chemical and physico-chemical study of soil problems as encountered in field, greenhouse, and laboratory. In the second semester physical and plant nutritional problems related to the soil. (Thomas.)

SOILS 204 s. *Soil Microbiology* (3)—Two lectures; one laboratory. Prerequisite, Bact. 1.

A study of the microörganisms of the soil in relation to fertility. It includes the study of the bacteria of the soil concerned in the decomposition of organic matter, nitrogen fixation, nitrification, and sulphur oxidation and reduction, and deals also with such organisms as fungi, algae, and protozoa. The course includes a critical study of the methods used by experiment stations in soil investigational work. (Thom.)

ANIMAL HUSBANDRY

Courses for Graduates and Advanced Undergraduates

A. H. 110 s. *Nutrition* (3)—Two lectures; one laboratory.

A study of digestion, assimilation, metabolism, and protein and energy requirements. Methods of investigation and studies in the utilization of feed and nutrients. (Meade.)

Courses for Graduates

A. H. 201 y. *Special Problems in Animal Husbandry* (4-6)—Credit given in proportion to amount and character of work completed.

Problems which relate specifically to the character of work the student is pursuing will be assigned. (Meade, Carmichael.)

A. H. 202 y. *Seminar* (2).

Students are required to prepare papers based upon current scientific publications relating to animal husbandry or upon their research work, for presentation before and discussion by the class. (Staff.)

A. H. 203 y. *Research*—Credit to be determined by the amount and character of work done.

With the approval of the head of the department, students will be required to pursue original research in some phase of animal husbandry, carry the same to completion, and report the results in the form of a thesis. (Meade, Carmichael.)

BACTERIOLOGY AND PATHOLOGY*

A. Bacteriology and Immunology
Courses for Graduates and Advanced Undergraduates

BACT. 101 f. *Dairy Bacteriology* (3)—One lecture; two laboratories. Prerequisite, Bact. 1. Registration limited.

Bacteria in milk, sources and development; milk fermentation; sanitary production; care and sterilization of equipment; care and preservation of milk and cream; pasteurization; public health requirements. Standard methods of milk analysis; practice in the bacteriological control of milk supplies and plant sanitation; occasional inspection trips. (Black.)

BACT. 102 s. *Dairy Bacteriology* (Continued) (3)—One lecture; two laboratories. Prerequisite, Bact. 101 f, or Bact. 1 and consent of instructor.

Relation of bacteria, yeasts and molds to cream, concentrated milks, starters, fermented milks, ice cream, butter, cheese, and other dairy products; sources of contamination. Microbiological analysis and control; occasional inspection trips. (Black.)

BACT. 111 f. *Food Bacteriology* (3)—One lecture; two laboratories. Prerequisite, Bact. 1 and consent of instructor. Alternates with Bact. 125 f. (Offered in 1937-1938.)

Bacteria, yeasts and molds in foods; relation to preservation and spoilage; food infections and intoxications; food control agencies and regulations. Microbiological examination of normal and spoiled foods; factors affecting preservation. (Bartram.)

BACT. 112 s. *Sanitary Bacteriology* (3)—One lecture; two laboratories. Prerequisite, Bact. 1. Registration limited.

Bacteriological and public health aspects of water supplies and water purification; swimming pool sanitation; sewage disposal; industrial wastes; disposal of garbage and refuse; municipal sanitation. Practice in standard methods for examination of water and sewage; differentiation and significance of the coli-aerogenes group; other bacteriological analysis. (Bartram.)

BACT. 115 f. *Serology* (4)—Two lectures; two laboratories. Prerequisite, Bact. 2 s, or consent of instructor. Registration limited.

Infection and resistance; agglutination, precipitation, lytic and complement fixation reactions; principles of immunity and hypersensitiveness. Preparation of necessary reagents; general immunologic technique; factors affecting reactions; applications in identification of bacteria and diagnosis of disease. (Faber.)

BACT. 116 s. *Epidemiology* (2)—Two lectures. Prerequisite, Bact. 1. Alternates with Bact. 126 s. (Offered in 1937-1938.)

Epidemiology of important infectious diseases, including history, characteristic features, methods of transmission, immunization and control; periodicity; principles of investigation; public health applications. (Faber.)

* One or more of the scheduled courses may also be given during the evening if a sufficient number of students register. A special fee is charged.

BACT. 121 f. *Research Methods* (1)—One lecture. Prerequisite, Bact. 1 and consent of instructor.

Methods of research; library practice; current literature; preparation of papers; research institutions, investigators; laboratory design, equipment and supplies; academic practices; professional aids. (Black.)

BACT. 122 f or s. *Advanced Methods* (2)—One lecture; one laboratory. Prerequisite, Bact. 1 and consent of instructor. Registration limited.

Microscopy, dark field and single cell technique, photomicrography; colorimetric and potentiometric determinations; oxidation-reduction; electrophoresis; surface tension; gas analysis; special culture methods; filtration; animal care; practice in media and reagent preparation. (Bartram.)

BACT. 123 f. *Bacteriological Problems* (2-3)—Laboratory. Prerequisites, Bact. 1 and any other courses needed for the project. Registration limited.

Subject matter suitable to the needs of the particular student, or problems as an introduction to research, will be arranged. The research is intended to develop the student's initiative and ability to carry on independent research. The problems are to be selected, outlined, and investigated in consultation with and under the supervision of a faculty member of the department. (Black.)

BACT. 124 s. *Bacteriological Problems* (Continued) (2-3)—Laboratory. Prerequisites, Bact. 1 and any other courses needed for the project. Registration limited. (Black, Bartram.)

BACT. 126 s. *Public Health* (1)—One lecture. Bact. 1 desirable. Alternates with Bact. 116 s. (Not offered in 1937-1938.)

A series of weekly lectures on public health and its administration by staff members of the Maryland State Department of Health, representing each of the bureaus and divisions. (James, in charge.)

BACT. 127 f. *Advanced Bacteriology* (2)—Two lectures. Prerequisite, Bact. 1 and consent of instructor.

History; genetic relationship; special morphology; bacterial variation; growth; chemical composition; action of chemical and physical agents; systematic bacteriology; classification, review of important genera. (Black.)

BACT. 128 s. *Bacterial Metabolism* (2)—Two lectures. Prerequisites, Bact. 1, Chem. 12 f, or equivalent, and consent of instructor. Alternates with Bact. 206 s. (Offered in 1937-1938.)

Oxygen relations; enzymes; bacterial metabolism and respiration; chemical activities of microörganisms; changes produced in inorganic and organic compounds; industrial fermentations. (Black.)

BACT. 131 f. *Journal Club* (1)—Prerequisites, Bact. 1 and at least one of the advanced courses.

Students will submit reports on current scientific literature or on individual problems in bacteriology, which will be discussed and criticized by members of the class and staff. (Black.)

BACT. 132 s. *Journal Club* (Continued) (1). Prerequisites, Bact. 1 and at least one of the advanced courses. (Black.)

Courses for Graduates

BACT. 201 f. *Advanced General Bacteriology* (3)—One lecture; two laboratories. Prerequisite, degree in biological science, and consent of instructor. Students with credits in an approved elementray course will not receive credit for this course. Minor credit will not be given for Bact. 201 f unless Bact 202 s is satisfactorily completed.

History; microscopy; morphology; classification; metabolism; relation to industries and to diseases. Media preparation; examination of bacteria; staining; cultivation and identification of bacteria. (Faber.)

BACT. 202 s. *Advanced Pathogenic Bacteriology* (3)—One lecture; two laboratories. Prerequisite, Bact. 1 or 201 f, or equivalent. Registration limited.

Infection and immunity; pathogenic microörganisms. Isolation, identification and effects of pathogens. (Faber.)

BACT. 206 s. *Physiology of Bacteria* (2)—Two lectures. Prerequisites, Bact., 10 hours, and Chem. 108 s or equivalent. Alternates with Bact. 128 s. (Not offered in 1937-1938.)

Growth; chemical composition; physical characteristics; energy relationships; influence of environmental conditions on growth and metabolism; disinfection; physiological interrelationships; changes occurring in media. (James.)

BACT. 207 f. *Special Topics* (1). Prerequisite, Bact., 10 hours.

Presentation and discussion of fundamental problems and special subjects. (Black.)

BACT. 208 s. *Special Topics* (Continued) (1). Prerequisite, Bact., 10 hours. (Black.)

BACT. 215 f or s. *Food Sanitation* (2)—Two lectures. Prerequisites, Bact. 1, Bact. 2, and Bact. 111, or their equivalent.

Principles of sanitation in food manufacture and distribution; methods of control of sanitation in commercial canning, pickling, bottling, preserving, refrigeration, dehydration, etc. (James.)

BACT. 221 f and 222 s. *Research* (1-6). Prerequisites, Bact. 1 and and other courses needed for the particular project. Credit will be determined by the amount and character of the work accomplished.

Properly qualified students will be admitted upon approval of the department head and with his approval the student may select the subject for research. The investigation is outlined in consultation with and pursued under supervision of a faculty member of the department. The results obtained by major students working towards an advanced degree are presented as a thesis, a copy of which must be filed with the department. (James, Black.)

BACT. 231 f. *Seminar* (1). Prerequisites, Bact., 10 hours, and consent of instructor.

Conferences and reports prepared by the student on current research and recent advances in bacteriology. (James.)

BACT. 232 s. *Seminar* (Continued) (1). Prerequisites, Bact., 10 hours, and consent of instructor. (James.)

B. Pathology

Courses for Graduates and Advanced Undergraduates

BACT. 103 f. *Hematology* (2)—Two laboratories. Bact. 1 desirable. Registration limited.

Procuring blood; estimating the amount of hemoglobin; color index; examination of red cells and leucocytes in fresh and stained preparations, numerical count of erythrocytes and leucocytes; differential count of leucocytes; sources and development of the formed elements of blood; pathological forms and counts. (Reed.)

BACT. 104 s. *Urinalysis* (2)—Two laboratories. Bact. 1 desirable.

Physiologic, pathologic and diagnostic significance; use of clinical methods and interpretation of results. (Reed.)

BACT. 105 s. *Comparative Anatomy and Physiology* (3)—Three lectures.

Structure of the animal body; abnormal as contrasted with normal; the inter-relationship between the various organs and parts as to structure and function. (Reed.)

BACT. 106 s. *Animal Hygiene* (3)—Three lectures or demonstrations.

Care and management of domestic animals, with special reference to maintenance of health and resistance to disease; prevention and early recognition of disease; general hygiene; sanitation; first aid. (Reed.)

BACT. 109 f. *Pathological Technique* (3)—Three laboratories. Bact. 1 desirable.

Examination of fresh materials; fixation; decalcification; sectioning by free hand and freezing methods; celloidin and paraffin imbedding and sectioning; general staining methods. (Reed.)

BACT. 110 s. *Pathological Technique* (Continued) (2-5)—Laboratory. Prerequisite, Bact. 109 f, or consent of instructor.

Special methods in pathological investigations and laboratory procedures which may be applied to clinical diagnosis. (Reed.)

BACT. 125 f. *Clinical Methods* (3)—One lecture; two laboratories. Prerequisites, Bact. 1 and consent of instructor. Alternates with Bact.111 f. (Not offered in 1937-1938.)

Clinical material, diagnostic features. Methods in the qualitative and quantitative determination of important constituents of gastric contents, blood, urine, feces, and exudates. (Bartram.)

Courses for Graduates

BACT. 203 f or s. *Animal Disease Problems* (2-6). Prerequisite, degree in veterinary medicine from an approved veterinary college, or consent of instructor. Laboratory and field work by assignment. (Reed.)

BACT. 204 y. *Animal Disease Research* (2-6). Prerequisite, degree in veterinary medicine from an approved veterinary college, or consent of instructor. (Reed.)

BOTANY

A. General Botany and Morphology

Courses for Graduates and Advanced Undergraduates

BOT. 101 f. *Plant Anatomy* (3)—One lecture; two laboratories. Prerequisite, Bot. 1.

The origin and development of the organs and tissue systems in the vascular plants, with special emphasis on the structures of roots, stems and leaves. Reports on current literature are required. (Bamford.)

BOT. 102 f. *Mycology* (4)—Two lectures; two laboratories.

An introductory study of the morphology, life histories, classification, and economics of the fungi. Methods of cultivating fungi and identification of plant pathogens constitute a part of the laboratory work. (Norton, Woods.)

BOT. 103 f. *Plant Taxonomy* (3)—One lecture; two laboratories. (Not given in 1937-1938.)

Classification of the vegetable kingdom, and the principles underlying it; the use of other sciences and all phases of botany as taxonomic foundations; methods of taxonomic research in field, garden, herbarium and library. Each student to work on a special problem during some of the laboratory time. (Norton.)

BOT. 104 s. *Advanced Plant Taxonomy* (3)—One lecture; two laboratories.

Principles and criteria of plant taxonomy. Reviews and criticisms of current taxonomic literature. Each student works on an original problem during the laboratory time. (Norton.)

BOT. 105 s. *Economic Plants* (2)—Two lectures. (Not given in 1937-1938.)

The names, taxonomic position, native and commercial geographic distribution, and use of the leading economic plants of the world are studied. By examination of plant products from markets, stores, factories, and gardens, students become familiar with the useful plants both in the natural form and as used by man. (Norton.)

BOT. 106 f. *History and Philosophy of Botany* (1)—One lecture.

Discussion of the development of ideas and knowledge about plants, also a survey of contemporary work in botanical science. (Norton.)

BOT. 107 f. *Methods in Plant Histology* (2)—Two laboratories.

Principles and methods involved in the preparation of permanent slides. (Bamford.)

Courses for Graduates

BOT. 201 s. *Cytology* (4)—Two lectures; two laboratories. Prerequisite, Bot. 1.

A detailed study of the cell during its metabolic and reproductive stages. The major portion is devoted to chromosomes in mitosis and meiosis, and the relation of these stages to current theories of heredity and evolution.

The laboratory involves the preparation, examination and illustration of cytological material by current methods. (Bamford.)

Bot. 203 f and s. *Seminar* (1).
The study of special topics in plant morphology, anatomy and cytology. (Bamford.)

Bot. 204. *Research*. Credit according to work done. (Norton, Bamford.)

B. Plant Pathology

Courses for Graduates and Advanced Undergraduates

Plt. Path. 101 s. *Diseases of Fruits* (2-4)—Two lectures; laboratory according to credit desired. Prerequisite, Plt. Path. 1 f.
An intensive study intended to give a rather thorough knowledge of the subject matter, such as is needed by those who expect to become advisers in fruit production, as well as those who expect to become specialists in plant pathology. (Woods.)

Plt. Path. 102 s. *Diseases of Garden and Field Crops* (2-4)—Two lectures; laboratory according to credit desired. Prerequisite, Plt. Path. 1 f.
The diseases of garden crops, truck crops, cereal and forage crops. Intended for students of vegetable culture, agronomy, and plant pathology, and for those preparing for county agent work. (Temple.)

Plt. Path. 103 s. *Research Methods* (2)—One conference and five hours of laboratory and library work. Prerequisite, Plt. Path. 1 f or equivalent.
Technique of plant disease investigation: sterilization, culture media, isolation of pathogens, inoculation methods, single-spore methods, disinfectants, fungicides, photography, preparation of manuscripts, and the literature in the scientific journals and bulletins on these subjects. (Woods.)

Plt. Path. 104 f and s. *Minor Investigations* (1-3)—Credit according to work done. A laboratory course with individual conferences. Prerequisite, Plt. Path. 1 f.
In this course, only minor problems or special phases of major investigations may be undertaken. Their solution may include a survey of the literature on the problem under investigation and both laboratory and field work. (Norton, Temple, Woods.)

Plt. Path. 105 s. *Diseases of Ornamentals* (2)—One lecture; one laboratory.
The most important diseases of plants growing in greenhouse, flower garden, and landscape, including shrubs and shade trees. (Temple.)

Plt. Path. 106 y. *Seminar* (1).
Conferences and reports on plant pathological literature and on recent investigations. (Temple, Norton.)

Plt. Path. 107 f. *Plant Disease Control* (3)—Two lectures; one laboratory. Prerequisite, Plt. Path. 1 f.
An advanced course dealing with the theory and practice of plant disease control; the preparation of sprays and other fungicides and the test-

ing of their toxicity in greenhouse and laboratory; demonstration and other extension methods adapted to county agent work and to the teaching of agriculture in high schools. (Temple.)

Courses for Graduates

PLT. PATH. 201 f. *Virus Diseases* (2)—Two lectures.

An advanced course, including a study of the current literature on the subject and the working of a problem in the greenhouse. (Temple.)

PLT. PATH. 203 s. *Non-Parasitic Diseases* (3)—Two lectures; one laboratory. (Not given in 1937-1938.)

Effects of maladjustment of plants to their environment; injuries due to climate, soil, gases; dust and sprays; fertilizers; improper treatment and other detrimental conditions. (Norton.)

PLT. PATH. 205 y. *Research*—Credit according to work done.
(Norton, Temple, Woods.)

C. Plant Physiology

Courses for Graduates and Advanced Undergraduates

PLT. PHYS. 101 f. *Plant Physiology* (4)—Two lectures; two laboratories. Prerequisite, Bot. 1 f or s.

A summary view of the general physiological activities of plants. The aim in this course is to stress principles rather than factual details.
(Brown.)

PLT. PHYS. 102 s. *Plant Ecology* (3)—Two lectures; one laboratory. Prerequisite, Bot. 1 f or s.

The study of plants in relation to their environments. Plant formations and successions in various parts of the country are briefly treated. Much of the work, especially the practical, must be carried on in the field, and for this purpose type regions adjacent to the University are selected.
(Brown.)

Courses for Graduates

PLT. PHYS. 201 s. *Plant Biochemistry* (4)—Two lectures; two laboratories. Prerequisite, an elementary knowledge of plant physiology and organic chemistry.

An advanced course in plant physiology in which the chemical aspects are specially emphasized. It deals with the important substances in the composition of the plant body and with the important processes in plant life. (Appleman, Shirk.)

PLT. PHYS. 202A f. *Plant Biophysics* (2)—Two lectures. Prerequisites, Bot. 1f or s, and Plt. Phys. 101f, or equivalents. An elementary knowledge of physics or physical chemistry is highly desirable.

An advanced course dealing with the operation of physical forces in plant life processes. (Brown.)

PLT. PHYS. 202B f. *Biophysical Methods* (2).

A laboratory course to accompany Plt. Phys. 202A f.
(Appleman, Shirk.)

PLT. PHYS. 203 s. *Plant Microchemistry* (2)—One lecture; one laboratory. Prerequisites, Bot. 1 f or s, Chem. 1 y, or equivalents.

The isolation, identification, and localization of organic and inorganic substances found in plant tissues by micro-technical methods. The use of these methods in the study of metabolism in plants is emphasized. (Brown.)

PLT. PHYS. 204 f. *Growth and Development* (2). (Not given in 1937-1938.) (Appleman.)

PLT. PHYS. 205 f and s. *Seminar* (1).

Students are required to prepare reports of papers in the current literature. These are discussed in connection with the recent advances in the subject. (Appleman.)

PLT. PHYS. 206 y. *Research*—Credit according to work done.

Students must be specially qualified by previous work to pursue with profit the research to be undertaken. (Appleman, duBuy, Brown.)

CHEMISTRY

A. General Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 104 f. *Advanced Inorganic Chemistry* (4)—Two lectures; two laboratories. Prerequisite, Chem. 2 y. Lectures may be taken without laboratory.

This course is an advanced study of the general principles of inorganic chemistry. Special emphasis is given to the reactions and the more unusual properties of the common elements. Laboratory experiments are selected which involve important theoretical considerations. (White.)

Courses for Graduates

CHEM. 200 Ay. *Chemistry of the Rarer Elements* (4)—Two lectures. Prerequisite, Chem. 2y.

The course is devoted to a study of the elements not usually considered in the elementary course. (White.)

CHEM. 200 By. *Advanced Inorganic Laboratory* (4)—Two laboratories. Prerequisite, consent of instructor.

A laboratory study of the analyses and the compounds of elements considered in Chem. 200 Ay. (White.)

CHEM. 201 f or s. *An Introduction to Spectrographic Analysis* (1).

This is a laboratory course designed to give the student the fundamental principles of spectrographic analysis. (White.)

B. Analytical Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 101 y. *Advanced Quantitative Analysis* (10)—Two lectures; three laboratories. Prerequisite, Chem. 6 y or equivalent.

A broad survey of the field of inorganic quantitative analysis. In the first semester mineral analysis will be given. Included in this will be

analysis of silicates, carbonates, etc. In the second semester the analysis of steel and iron will be taken up; however, the student will be given wide latitude as to the type of quantitative analysis he wishes to pursue during the second semester. (Wiley.)

C. Organic Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 116 y. *Advanced Organic Chemistry* (4)—Two lectures. Prerequisite, Chem. 8 Ay and 8 By, or equivalent.

This course is devoted to a more advanced study of the compounds of carbon than is undertaken in Chem. 8 Ay. Graduate students who desire an accompanying laboratory course should elect Chem. 210 y. (Drake.)

CHEM. 117 y. *Organic Laboratory* (2).

This course is devoted to an elementary study of organic qualitative analysis. The work includes the identification of unknown organic compounds, and corresponds to the more extended course, Chem. 207. (Drake.)

CHEM. 118 y. *Advanced Organic Laboratory* (2).

A study of organic quantitative analysis and the preparation of organic compounds. Quantitative determinations of carbon and hydrogen, nitrogen and halogen are carried out, and syntheses more difficult than those of Chem. 8 By are studied. (Drake.)

Courses for Graduates

CHEM. 203 f and s. *Special Topics in Organic Chemistry* (2-4-6). (A lecture course which will be given any half-year when there is sufficient demand.)

The course will be devoted to an advanced study of topics which are too specialized to be considered in Chem. 116 y. Topics that may be covered are dyes, drugs, carbohydrates, plant pigments, etc. The subject matter will be varied to suit best the needs of the particular group enrolled. (Drake.)

CHEM. 205 f and s. *Organic Preparations* (4).

A laboratory course, devoted to the synthesis of various organic compounds. This course is designed to fit the needs of those students whose laboratory experience has been insufficient for research in organic chemistry. (Drake.)

CHEM. 206 f and s. *Organic Microanalysis* (4).

A laboratory study of the methods of Pregl for the quantitative determination of halogen, nitrogen, carbon, hydrogen, methoxyl, etc., in very small quantities of material. The course is open only to properly qualified graduate students, and the consent of the instructor is necessary before enrollment. (Drake.)

CHEM. 207 f or s. *Organic Qualitative Analysis* (variable credit to suit students, 2 to 6). Laboratory work devoted to the identification of pure organic substances and of mixtures. The text used is Kamm's "Qualitative Organic Analysis."

This course should be taken by students seeking a higher degree whose

major is organic chemistry. The work is an excellent preparation for the problems of identification likely to be encountered while conducting research. (Drake.)

CHEM. 210 y. *Advanced Organic Laboratory* (4 to 6). Students electing this course should elect Chem. 116 y. (Drake.)

D. Physical Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 102 Ay. *Physical Chemistry* (6)—Three lectures. Prerequisites, Chem. 6 y; Phys. 2 y; Math. 5 y. Graduate students who take laboratory will elect Chem. 219 f and s (4).

This course aims to furnish the student with a thorough background in the laws of theories of chemistry. The gas laws, kinetic theory, liquids, solutions, elementary thermodynamics, thermochemistry, equilibrium, chemical kinetics, etc., will be discussed. (Haring.)

Courses for Graduates

NOTE: Chem. 102 Ay and 219 f and s, or their equivalent, are prerequisites for all advanced courses in physical chemistry.

CHEM. 212 Af and s. *Colloid Chemistry* (4)—Two lectures.

This is a thorough course in the chemistry of matter associated with surface energy. First semester, theory; second semester, practical applications. (Haring.)

CHEM. 212 Bf and s. *Colloid Chemistry Laboratory* (4)—Two laboratories which must accompany or be preceded by Chem. 212 Af and s. (Haring.)

CHEM. 213 f. *Phase Rule* (2)—Two lectures. (Not given in 1937-1938.)

A systematic study of heterogeneous equilibria. One, two, and three component systems will be considered, with practical applications of each. (Haring.)

CHEM. 214 s. *Structure of Matter* (2)—Two lectures.

Subjects considered are radioactivity, isotopes, the Bohr and Lewis-Langmuir theories of atomic structure, and allied topics. (Haring.)

CHEM. 215 s. *Catalysis* (2)—Two lectures. (Not given in 1937-1938.)

This course consists of lectures on the theory and application of catalysis. (Haring.)

CHEM. 217 Af and s. *Electrochemistry* (4)—Two lectures. (Not given in 1937-1938.)

A study of the principles and some of the practical applications of electrochemistry. First semester, theory; second semester, practical applications. (Haring.)

CHEM. 217 Bf and s. *Electrochemistry Laboratory* (4)—Two laboratories which must accompany or be preceded by Chem. 217 Bf and s. (Not given in 1937-1938.) (Haring.)

CHEM. 218 y. *Chemical Thermodynamics* (4)—Two lectures.

A study of the methods of approaching chemical problems through the laws of energy. (Haring.)

CHEM. 219 f and s. *Physical Chemistry Laboratory* (4 or 6)—Two laboratories and one conference. Students taking this course may elect 6 credits of lectures in Chem. 102 Ay to replace the conference. (Haring.)

E. Agricultural Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 106 f or s. *Dairy Chemistry* (4)—One lecture; three laboratories. Prerequisites, Chem. 12 Ay and 12 Bf or s.

Lectures and assigned reading on the constituents of dairy products. This course is designed to give the student a working knowledge and laboratory practice in dairy chemistry and analysis. Practice is given in examining dairy products for confirmation under the food laws, detection of watering, detection of preservatives and added colors, and detection of adulterants. Students showing sufficient progress may take the second semester's work, and elect to isolate and make complete analysis of the fat or protein of milk. (McDonnell.)

CHEM. 108 s. *General Physiological Chemistry* (4)—Two lectures; two laboratories. Prerequisites, Chem. 12 Ay and 12 Bf or s, or equivalent.

This course is a study of the fundamental principles of human nutrition, the chemistry of foods, digestion, absorption, assimilation, tissue composition and excretion. The laboratory work consists of experiments in food analysis; salivary, gastric, pancreatic and intestinal digestion; and respiration. (Broughton.)

CHEM. 115 f or s. *Organic Analysis* (4)—One lecture; three laboratories. Prerequisites, Chem. 4 f or s, or Chem. 12 Ay and 12 Bf or s.

This course gives a connected introductory training in organic analysis, especially as applied to plant and animal substances and their manufactured products. The greater part of the course is devoted to quantitative methods for food materials and related substances. Standard works and the publicatons of the Association of Official Agricultural Chemists are used freely as references. (Broughton, Supplee.)

Courses for Graduates

CHEM. 208 s. *Biological Analysis* (2)—Two laboratories.

A course in analytical methods of special value to students majoring in the biological sciences. The work is varied to suit the needs or interests of the individual when possible. (Broughton, Supplee.)

CHEM. 221 f or s. *Tissue Analysis* (3)—Three laboratories. Prerequisites, Chem. 12 Ay and 12 By or equivalent.

A discussion and the application of the analytical methods used in determining the inorganic and organic constituents of plant and animal tissue. (Broughton.)

CHEM. 223 Af and s. *Physiological Chemistry* (4)—Two lectures. Prerequisites, Chem. 12 Ay and Chem. 12 By or equivalent.

An advanced course in physiological chemistry. For the first semester the course will consist of lectures and assigned reading on the constitution and reactions of proteins, fats, carbohydrates and allied compounds of biological importance. The second semester will deal with enzyme action, digestion, absorption, metabolism and excretion. (Broughton.)

CHEM. 223 Bf. *Physiological Chemistry Laboratory* (2)—Prerequisites, Chem. 4 f or s, and Chem. 12 Ay and 12 By.

A laboratory course to accompany Chemistry 223 Af. Qualitative and quantitative analysis of foods; salivary, gastric, pancreatic, and intestinal digestion, and respiration. (Broughton, Supplee.)

CHEM. 224 f or s. *Special Problems* (4 to 8)—Total of eight credit hours may be obtained in this course by continuing the course for two semesters. Laboratory, library, and conference work amounting to a minimum of ten hours each week. Prerequisites, Chem. 223 Af and s, and consent of instructor.

This course consists of studies of special methods, such as the separation of the fatty acid from a selected fat, the preparation of carbohydrates or amino acids, and the determination of the distribution of nitrogen in a protein. The students will choose, with the advice of the instructor, the particular problem to be studied. (Broughton.)

CHEM. 226 f or s. *Toxicology* (3)—One lecture; two laboratories.

Theory and practice of the detection and estimation of toxic substances. The laboratory work includes alkaloids, toxic gases and inorganic poisons. (McDonnell.)

F. Industrial Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 110 y. *Industrial Chemistry* (6)—Three lectures. Prerequisites, Chem. 6 y and 8 y.

A study of the principal chemical industries; plant inspection, trips, and reports; the preparation of a report on some chemical industry. (Machwart.)

CHEM. 111 f. *Engineering Chemistry* (2 or 3)—Two lectures; one laboratory. This course may be taken with or without laboratory.

A study of the chemistry of engineering materials. (Machwart.)

CHEM. 113 y. *Advanced Industrial Chemistry* (6)—One lecture; two laboratories. Prerequisite, Chem. 110 y.

Unit operations typical of industrial practices, fluid flow, heat transfer, distillation, etc. Examination of materials. Plant design. Application of unit operations to a complete chemical process. (Machwart.)

CHEM. 120 f. *Elements of Chemical Engineering* (4)—Three lectures; one laboratory.

A theoretical discussion of heat transfer, pyrometry, liquid flow, humidity, air-conditioning, refrigeration, etc. (Machwart.)

Courses for Graduates

CHEM. 222 y. *Unit Operations* (6)—Three lectures. Prerequisite, consent of instructor.

A theoretical discussion of evaporation, distillation, filtration, etc. Problems. (Machwart.)

CHEM. 225 s. *Gas Analysis* (3)—One lecture; two laboratories. Prerequisite, consent of instructor.

Quantitative determination of common gases. Flue gas and water gas analysis, including calorific determinations of the latter. Problems. (Machwart.)

G. History of Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 121 y. *The History of Chemistry* (2)—One lecture. Prerequisites, Chem. 1 y and Chem. 8 y or equivalent. (Not given in 1937-1938.)

The development of chemical knowledge and especially the general doctrines of chemistry which have been gradually evolved, from their earliest beginnings up to the present day. (Broughton.)

H. Chemistry Seminar and Research

Courses for Graduates

CHEM. 228 f and s. *Seminar* (2)—Required of all graduate students in chemistry. The students are required to prepare reports on papers in the current literature. These are discussed in connection with the recent advances in the subject. (Chemistry Staff.)

CHEM. 229 f or s. *Research in Chemistry.* The investigation of special problems and the preparation of a thesis towards an advanced degree. (Chemistry Staff.)

COMPARATIVE LITERATURE

Courses for Graduates and Advanced Undergraduates

The work in Comparative Literature is offered jointly by the faculties of the Department of English and the Department of Modern Languages.

A minor only may be taken in Comparative Literature. English 113 f and 114 s may be counted as Comparative Literature by students who have had Comparative Literature 105 f and 106 s.

COMP. LIT. 101 f. *Introduction to Comparative Literature* (3)—Three lectures.

Survey of the background of European literature through study in English translations of Greek and Latin literature. Special emphasis is laid on the development of the epic, tragedy, comedy, and other typical forms of literary expression. The debt of modern literature to the ancients is discussed and illustrated. (Prahl.)

COMP. LIT. 102 s. *Introduction to Comparative Literature* (3)—Three lectures.

Continuation of Comp. Lit. 101 f; study of medieval and modern Continental literature. (Prahl.)

COMP. LIT. 103 s. *Types of English Literature* (2)—Two lectures.
An historical and critical survey of the principal types of English literature, with special attention to the influence of classical myth and legend and of classical literary ideals upon English and American writers. (Harman.)

COMP. LIT. 104 f. *The Old Testament as Literature* (2)—Two lectures.
A study of the sources, development, and literary types. (Hale.)

COMP. LIT. 105 f. *Romanticism in France* (3)—Three lectures.
Introduction to the chief authors of the Romantic movement in France. Lectures on the thought currents and literary movements of the late eighteenth and early nineteenth centuries. The reading in this course is done in English translations. (Wilcox.)

COMP. LIT. 106 s. *Romanticism in Germany* (3)—Three lectures.
Continuation of Comp. Lit. 105 f. German literature from Buerger to Heine. The reading is done in English translations. (Prahl.)

COMP. LIT. 110 y. *The Modern Continental Drama* (2)—Two lectures. (Not given in 1937-1938.)
The Continental drama of the last fifty years (the English drama not included) will be studied as an expression of modern thought and as an art form. (Prahl.)

DAIRY HUSBANDRY

Courses for Graduates and Advanced Undergraduates

D. H. 103 s. *Advanced Study of Dairy Breeds* (2)—One lecture; one laboratory.
A study of the historical background, characteristics, noted individuals and families, and the more important blood lines in the Holstein, Guernsey, Ayrshire, and Jersey breeds. (Ingham.)

D. H. 107 s. *Analysis of Dairy Products* (3)—One lecture; one four-hour laboratory (consecutive). Prerequisites, D. H. 2 f, Chem. 4, Bact. 1.
The application of chemical and bacteriological methods to commercial dairy practice; analysis by standard chemical, bacteriological, and factory methods; standardization and composition control; tests for adulterants and preservatives. (England.)

Courses for Graduates

D. H. 201 f. *Advanced Dairy Production* (3).
A study of the newer discoveries in animal nutrition, breeding, and management. Readings and assignments. (Ingham.)

D. H. 202 f. *Dairy Technology* (2)—Two lectures.
A consideraton of milk and dairy products from the physio-chemical point of view. (England.)

D. H. 203 s. *Milk Products* (2)—Two lectures.
An advanced consideration of the scientific and technical aspects of milk products. (England.)

D. H. 204 y. *Special Problems in Dairying* (4-6).

Special problems which relate specifically to the work the student is pursuing will be assigned. Credit will be given in accordance with the amount and character of work done. (Staff.)

D. H. 205 y. *Seminar* (2).

Students are required to prepare papers based upon current scientific publications relating to dairying or upon their research work, for presentation before and discussion by the class. (Staff.)

D. H. 206 y. *Research*—Credit to be determined by the amount and quality of work done.

The student will be required to pursue, with the approval of the head of the department, an original investigation in some phase of dairy husbandry, and report results in the form of a thesis.

(Meade, Ingham, England.)

ECONOMICS AND BUSINESS ADMINISTRATION

Courses for Graduates and Advanced Undergraduates

ECON. 101 f. *Money and Banking* (2)—Two lectures. Prerequisite, Econ. 3y or consent of the instructor.

A study of the origin, nature, and functions of money, monetary systems, credit and credit instruments, prices, interest rates, and exchanges. (Norris.)

ECON. 102 s. *Money and Banking* (2)—Two lectures. Prerequisite, Econ. 101 f.

Principles and practices of banking in relation to business. Special emphasis upon the Federal Reserve System. (Norris.)

ECON. 103 f. *Corporation Finance* (2)—Two lectures. Prerequisite, Econ. 3 y.

Principles of financing, the corporation and its status before the law, basis of capitalization, sources of capital funds, sinking funds, distribution of surplus, causes of failures, reorganizations, and receiverships. (Layton.)

*A. & F. 104 s. *Investments* (3)—Three lectures. Prerequisite, Econ. 3 y.

Principles of investment, analyzing reports, price determination, taxation of securities, corporation bonds, civil obligations, real estate securities, miscellaneous investments. Lectures, library assignments, and chart studies. (Wedeberg.)

ECON. 105 f. *Insurance* (2)—Two lectures. Prerequisite, Econ. 3 y.

A survey of the major principles and practices of life and property insurance with special reference to its relationship to our social and economic life. (Daniels.)

A. & F. 107 y. *Business Law* (6)—Three lectures.

Legal aspects of business relationships, contracts, negotiable instruments, agencies, partnerships, corporations, real and personal property, and sales. (Layton.)

* A. & F.—Accounting and Finance.

ECON. 109 f. *Labor Problems* (2)—Two lectures. Prerequisite, Econ. 3 y or Soc. 1 f.

The background of labor problems; labor organizations; labor legislation; unemployment and its remedies; wages, working conditions, and standards of living; agencies and programs for the promotion of industrial peace. (Reid.)

A. & F. 110 y. *Advanced Accounting* (6)—Three lectures. Prerequisite, A. & F. 9 y.

A continuation of A. & F. 9y, with emphasis on the theory of accounting. Special phases of corporation accounting are studied. The introduction of accounting systems for manufacturing, commercial, and financial institutions. (Wedeberg.)

ECON. 112 s. *Inland Transporation* (3)—Three lectures. Prerequisite, Econ. 3 y or Econ. 5 f or s.

The development of inland means of transportation in the United States. This course is devoted largely to a survey of railway transportation. Some study is given to other transportation agencies. (Daniels.)

ECON. 113 f. *Public Utilities* (2)—Two lectures. Prerequisite, Econ. 3 y.

The development of public utilities in the United States, economic and legal characteristics, regulatory agencies, valuation, rate of return, and public ownership. (Layton.)

ECON. 114 s. *Public Finance* (3)—Three lectures. Prerequisite, Econ. 3 y.

The nature of public expenditures; sources of revenue; taxation and budget. Special emphasis on the practical, social and economic problems involved. (Layton.)

ECON. 116 s. *Principles of Foreign Trade* (3)—Three lectures. Prerequisites, Econ. 3 y, Econ. 1 f, and Econ. 2 s, or their equivalent.

The basic principles of import and export trade, as influenced by the differences in methods of conducting domestic and foreign commerce. (Daniels.)

ECON. 119 f. *Advanced Economics* (2)—Two lectures. Prerequisite, Econ. 3 y.

An analysis of the theories of contemporary economists. Special attention is given to the problems of value and distribution. (Nichol.)

ECON. 120 s. *Applied Economics* (2)—Two lectures. Prerequisite, Econ. 119 f or consent of instructor.

Current economic problems are studied from the viewpoint of the economist. Lectures and class discussions based on assigned readings. (Nichol.)

A. & F. 121 f. *Cost Accounting* (2)—Two lectures. Prerequisite, Econ. 109 y and consent of instructor.

Process cost accounting; specific order cost accounting; manufacturing expense; application of accounting theory; preparation of analytical statements. (Cissel.)

A. & F. 122 s. *Cost Accounting* (2)—Two lectures. Prerequisite, A. & F. 121 f.

A continuation of A. & F. 121 f. (Wedeberg.)

A. & F. 123 f. *Income Tax Accounting* (3)—Three lectures. Prerequisite, A. & F. 110 y or consent of instructor.

Selected cases illustrating the definition of taxable income of individuals, corporations and partnerships. (Wedeberg.)

A. & F. 126 s. *Auditing* (2)—Two lectures. Prerequisite, A. & F. 110 y or consent of instructor.

Principles of auditing, including a study of different kinds of audits, the preparation of reports, and illustrative cases or problems.

(Cissel, Wedeberg.)

Courses for Graduates

ECON. 201 y. *Research* (4-6)—Credit proportioned to work accomplished. (Staff.)

ECON. 203 f and s. *Seminar* (4)—Prerequisite, consent of instructor.

Discussion of major problems in the field of economic theory, accounting or business. Presentation of reports based upon original investigations. Designed for students in the Department of Economics and Business Administration. (Staff.)

ECON. 205 y. *History of Economic Doctrines* (4).

Development from classical antiquity, with discussions of the different schools of economics. Extensive readings, with student reports. (Nichol.)

ECON. 207 y. *The Economics of Alfred Marshall* (6).

A study of the life work of the greatest English economist of the past generation. (Nichol.)

ECON. 209 y. *Mathematical Economics* (6). (Not given in 1937-1938.)

Applications of geometry, algebra, and calculus to economic theory.

(Nichol.)

EDUCATION

A. History and Principles

Courses for Graduates and Advanced Undergraduates

ED. 101 f. *History of Education: Greco-Roman, Medieval, and Early Modern Education* (2).

A survey of the evolution in Europe of educational theory, institutions, and practices from the Greco-Roman era to 1750. (Long.)

ED. 102 s. *History of Modern Education* (2)—Continuation of Ed. 101f.

The survey of the modern period is directed to the creators of modern education and the bases on which modern educational systems have been founded in various countries. (Long.)

ED. 103 s. *Principles of Secondary Education* (3)—Prerequisites, Ed. Psych. 1 f, Ed. 5 s.

Evolution of the high school; European secondary education; articulation of the high school with the elementary school, college, and technical

school, and with the community and the home; the junior high school; high school pupils; programs of study and the reconstruction of curricula; teaching staff; student activities. (Brechbill.)

Ed. 105 f. *Educational Sociology I* (3).—Three lectures.
A study of education as social control and emergent life, with special emphasis upon the application of the recently developed concepts in modern school procedures. (Cotterman.)

Ed. 107 f. *Comparative Education (Europe)* (2).
The forces that cause different systems of education, and the characteristic differences in the educational policies and practices in various countries are studied in this course. The major emphasis is upon the principal European countries. (Long.)

Ed. 108 s. *Comparative Education (Latin America)* (2).
The method of this course is similar to that of Ed. 107 f, the content being the education of the Latin area of the New World. (Long.)

Ed. 110 f. *The Junior High School* (2).
This course considers the functions of the junior high school in the American public school system. Its development, present organization, curricula, and relation to upper and lower grades will be emphasized. (Long.)

Ed. 111 f. *Lives of Scientists* (2).
A study of the major achievements and interesting incidents in the lives of the pioneers of science. Though designed especially to provide enrichment material for the use of high school teachers, the course is of general cultural value. (Brechbill.)

R. Ed. 104 s. *Rural Life and Education* (3). (See Rural Life and Agricultural Education.)

Courses for Graduates

Ed. 200 f. *Organization and Administration of Public Education* (3).
This course deals objectively with the organization, administration, curricula, and present status of public education in the United States. (Small.)

Ed. 201 s. *Educational Interpretations* (3).
In this course a study is made of the social, economic, political, and cultural environment in which American educational institutions and policies have developed; and of the function of education in environmental change. (Small.)

Ed. 202 s. *College Teaching* (3).—Three lectures.
Analysis of the work of the college teacher; objectives; organization of subject matter; nature of learning; characteristics of college students; methods of college teachers; measuring results; extra course duties; problems, investigations, reports. (Cotterman.)

Ed. 204 s. *High School Administration and Supervision* (2).
This course will consider the principal's duties in relation to organization for operation, administration, and supervision of instruction, and community relationships. (Long.)

Ed. 205 s. *Educational Sociology II* (3)—Three lectures.

This course deals with education as social adjustment through an analytical consideration of the objectives in the American program of education, methods of determining educational objectives, and a brief survey of the ways in which education has been used as social adjustment in foreign countries. (Cotterman.)

Ed. 206 s. *History of American Education to 1840* (2).

The development of the public school in America prior to 1840. (Long.)

Ed. 250 y. *Seminar in Education* (2-4).

Required of all candidates for the Master's degree whose majors are in the field of education. (Staff.)

(For additional courses see Rural Life and Agricultural Education.)

B. Educational Psychology

Courses for Graduates and Advanced Undergraduates

Ed. Psych. 101s. *Advanced Educational Psychology* (3)—Prerequisites, Ed. Psych. 1 f, Ed. 5 s. The latter may be taken concurrently with Ed. Psych. 101 s. (Not given in 1937-1938.)

Principles of genetic psychology; nature and development of the human organism; development and control of instincts. Methods of testing intelligence; group and individual differences and their relation to educational practice. Methods of measuring rate of learning; study of typical learning experiments.

Ed. Psych. 102 f. *Educational Measurements* (3)—Prerequisites, Ed. Psych. 1f, Ed. 5 s.

A study of typical educational problems involving educational scales and standard tests. Nature of tests, methods of use, analysis of results, and practical applications in educational procedure. Emphasis will be upon tests for high school subjects. (Brechbill.)

Psych. 106 s. *Mental Hygiene* (3). (See Psychology.)

Courses for Graduates

Ed. Psych. 200 f. *Systematic Educational Psychology* (3).

An advanced course for teachers and prospective teachers. It deals with the major contributions of psychology to educational theory from Herbart to the present time. (Sprowls.)

Ed. Psych. 250 y. *Seminar.*

C. Methods in High School Subjects

Courses for Graduates and Advanced Undergraduates

Graduate credit for courses in this section will be given only by special permission of the Department of Education.

Ed. 120 s. *English in the High School* (2)—Prerequisite, Ed. Psych. 1f.

Objectives in English in the different types of high schools; selection and organization of subject-matter in terms of modern practice and group

needs; evaluation of texts and references; bibliographies; methods of procedure and types of lessons; the use of auxiliary materials; lesson plans; measuring results. (Smith.)

Ed. 122 s. *The Social Studies in the High School* (2)—Prerequisite, Ed. Psych. 1f.

Selection and organization of subject-matter in relation to the objectives and present trends in the social studies; texts and bibliographies; methods of procedure and types of lessons; the use of auxiliary materials; lesson plans; measuring results. (Long.)

Ed. 124 s. *Modern Language in the High School* (2)—Prerequisite, Ed. Psych. 1f.

Objectives of modern language teaching in the high school; selection and organization of subject-matter in relation to modern practices and group needs; evaluation of texts and references; bibliographies; methods of procedure and types of lessons; lesson plans; special devices; measuring results.

Ed. 126 s. *Science in the High School* (2)—Prerequisite, Ed. Psych. 1f.

Objectives of science teaching; their relation to the general objectives of secondary education; application of the principles of psychology and of teaching to the science class room situation; selection and organization of subject-matter; history, trends, and status; textbooks, reference works, and laboratory equipment. Technique of class room and laboratory; measurement, standardized tests; professional organizations and literature; observation and criticism. (Brechbill.)

Ed. 128 s. *Mathematics in the High School* (2)—Prerequisite, Ed. Psych. 1f.

Objectives; the place of mathematics in secondary education; content and construction of courses; recent trends; textbooks and equipment; methods of instruction, measurements and standardized tests; professional organizations and literature; observation and criticism. (Brechbill.)

Ed. 130 f. *High School Course of Study—Composition* (2).

Content and organization of the materials of written and oral composition in the several high school grades. (Smith.)

Ed. 131 s. *High School Course of Study—Literature* (2).

Content and organization of the literature course in the several high school grades. (Smith.)

Ed. 135 f. *High School Course of Study—Geometry* (2).

Content and organization of intuitive and demonstrative geometry. Methods of analysis and problem solving. (Brechbill.)

Ed. 136 f. *High School Course of Study—Biology* (2).

Content and organization of biology. (Brechbill.)

Ed. 137 s. *High School Course of Study—Physical Science* (2).

Content and organization of physics. Some consideration is given to content of chemistry. (Brechbill.)

Ed. 139 f or s. *Supervised Teaching of High School Subjects* (2). Observation and supervised teaching. A minimum of 20 teaching periods. (Staff.)

D. Home Economics Education

Courses for Graduates and Advanced Undergraduates

H. E. Ed. 105 f or s. *Special Problems, Child Study* (5). (McNaughton.)

Courses for Graduates

H. E. Ed. 201 f or s. *Advanced Methods of Teaching Home Economics* (2-4).

Study of social trends as applied to the teaching of home economics.

H. E. Ed. 250 y. *Seminar in Home Economics Education* (2-4). (See Ed. 250 y.) (McNaughton.)

ENGLISH LANGUAGE AND LITERATURE

Courses for Graduates and Advanced Undergraduates

Eng. 100 f and s. *Advanced Composition* (2)—Two lectures. Prerequisites, Eng 1 y and Eng. 2 y. Course complete in one semester, but may be taken a second semester for credit.

Theory and practice in the larger forms, the types to be varied each semester at the election of the class. (Staff.)

Eng. 101 f. *College Grammar* (3)—Three lectures. Prerequisite, Eng. 1 y.

Studies in the descriptive grammar of modern English. (Harman.)

Eng. 102 s. *History of the English Language* (3)—Three lectures. Prerequisite, Eng. 101 f.

An historical survey of the English language; its nature, origin, and development, with special stress upon structural and phonetic changes in English speech and upon the rules which govern modern usage. (Harman.)

Eng. 103 y. *Anglo-Saxon* (6)—Three lectures. Prerequisite, Eng. 1 y.

A study of Anglo-Saxon (Old English) grammar and literature. Lectures on the principles of phonetics and comparative philology. (House.)

Eng. 104 y. *Chaucer and Other Poetry of the 14th Century* (4)—Two lectures. Prerequisites, Eng. 1 y and Eng 2 y.

A study of the principal poets and poems of England in the 14th century, including Chaucer, Langland, *Gawaine and the Green Knight, The Pearl*, and early poems about Arthur. Chaucer and Langland will be read in the original; other works in modernized versions. (Hale.)

Eng. 105 f. *Medieval Drama in England* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

A study of the development of medieval English drama from its beginnings to 1540. Class discussion of significant plays, outside reading, reports. (Fitzhugh.)

ENG. 106 s. *Elizabethan Drama* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

A study of the change in spirit and form of English drama from 1540 to 1640, as seen in the works of the important dramatists other than Shakespeare. Class discussion of significant plays, outside reading, reports. (Fitzhugh.)

ENG. 107 f. *Elizabethan Non-Dramatic Literature* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y. (Not given in 1937-1938.)

Survey of the non-dramatic poetry and prose from 1557 to 1600, with emphasis upon the sonnet cycle, the epic, and the beginnings of fiction. (Warfel.)

ENG. 108 f. *Milton* (3)—Three lectures. Prerequisites, Eng. 1 y and 2 y.

A study of the poetry and the chief prose works. (Murphy.)

ENG. 109 f. *Literature of the Seventeenth Century to 1660* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng 2 y.

A study of the chief prose writers and of the Metaphysical and Cavalier traditions in poetry. (Murphy.)

ENG. 110 s. *The Age of Dryden* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

This course emphasizes the relation of literature to the philosophical movements of the age. (Murphy.)

ENG. 111 f. *Literature of the Eighteenth Century* (2)—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 y. (Not given in 1937-1938.)

Readings in the period dominated by Defoe, Swift, Addison, Steele, and Pope. (Fitzhugh.)

ENG. 112 s. *Literature of the Eighteenth Century* (2)—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 y. (Not given in 1937-1938.)

A continuation of Eng. 111 f. Dr. Johnson and his Circle; the Rise of Romanticism; the Letter Writers. (Fitzhugh.)

*ENG. 113 f. *Prose and Poetry of the Romantic Age* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

A study of the development of the Romantic movement in England as exemplified by the prose and poetry of Wordsworth, Coleridge, Lamb, De Quincey, Hazlitt, Landor, and others. (Hale.)

*ENG. 114 s. *Prose and Poetry of the Romantic Age* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

A study of the late Romantic writers, including Byron, Shelley, Keats, Moore, Scott, and others.

ENG. 115 f. *Scottish Poetry* (2)—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 y. No knowledge of the Scottish dialect required.

Readings in the Scottish Chaucerians; Drummond of Hawthornden; song and ballad literature; poets of the vernacular revival: Ramsay, Ferguson, and Burns. Papers and reports. (Fitzhugh.)

* Eng. 113 f and Eng. 114 s may be counted as Comparative Literature by students who have had Comp. Lit. 105 f and Comp. Lit. 106 s.

ENG. 116 f. *Tennyson* (2)—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

Wide reading of the poems, with detailed study of *The Princess.* (House.)

ENG. 117 s. *Browning* (2)—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

Study of selections from Browning other than the dramas.

ENG. 119 f. *The Letter as a Literary Type* (2)—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

Beginning with the Paston letters, the course is designed as a study of English and American letters, with special attention to use and changes in prose style. (Lemon.)

ENG. 120 f. *The Novel* (2)—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

Lectures on the principles of narrative structure and style. Class reviews of selected novels, chiefly from English and American sources. (House.)

ENG. 121 s. *The Novel* (2)—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

Continuation of Eng. 120 f.

ENG. 122 f. *English and American Essays* (2)—Two lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

A study of the philosophical, critical, and familiar essays of England and America. Bacon, Lamb, Macaulay, Emerson, Chesterton, and others. (House.)

ENG. 123 f. *Modern Drama* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y. (Not given in 1937-1938.)

A survey of English drama during the two centures from 1660 to 1860. Class discussion of significant plays, outside reading, reports. (Fitzhugh.)

ENG. 124 s. *Contemporary Drama* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y. (Not given in 1937-1938.)

A study of significant European and American dramatists from Ibsen to O'Neill. Class discussion of significant plays, outside reading, reports. (Fitzhugh.)

ENG. 125 f. *Emerson and American Transcendentalism* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

Study of the writings of the Concord group: Emerson, Thoreau, Hawthorne, Parker, Alcott, and Margaret Fuller. (Warfel.)

ENG. 126 s. *Whitman, Twain, and the Rise of Realism* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y.

Intensive study of the writings of Whitman, Twain, the local colorists, and the early realists. (Warfel.)

ENG. 127 f. *Contemporary American Poetry and Prose* (3)—Three lectures. Prerequisites, Eng. 1 y and Eng. 2 y. (Not given in 1937-1938.)

Tendencies and forms in non-dramatic literature since 1920. (Warfel.)

Courses for Graduates

ENG. 201. *Research* (2-4)—Credit proportioned to the amount of work and ends accomplished.

Original research and the preparation of dissertations looking towards advanced degrees. (Staff.)

ENG. 202 y. *Beowulf* (4)—Two lectures. Prerequisite, Eng. 103 y. (Not given in 1937-1938.)

Critical study of grammar and versification, with some account of the legendary lore. (Harman.)

ENG. 203 f. *Middle English* (2)—Two lectures. Prerequisite, Eng. 103 y.

A study of readings of the Middle English period, with reference to etymology and syntax. (House.)

ENG. 204 s. *Gothic* (2)—Two lectures. Prerequisite, Eng. 103 y.

A study of the forms and syntax, with readings from the Ulfilas Bible. Correlation of Gothic speech sounds with those of Old English. (House.)

ENG. 205 s. *Browning's Dramas* (2)—Two lectures.

Luria, The Return of the Druses, Pippa Passes, Colombe's Birthday, A Blot in the 'Scutcheon, and others. (Not given in 1937-1938.) (House.)

ENG. 206 f. *Shakespeare Seminar* (2)—Two lectures. Prerequisites, Eng. 11 f and Eng. 12 s.

A survey of Shakespeare's complete works, with special attention to major problems in Shakespeare. (Harman.)

ENG. 207 y. *Medieval Romance in England* (4)—Two lectures. (Not given in 1937-1938.)

Lectures and readings in the cyclical and non-cyclical romances in medieval England and their sources, including translations from the Old French. (Hale.)

ENG. 208 f. *Seminar in Eighteenth Century Literature* (2)—Two sessions.

Intensive study of one man's work or of one important movement of the century. (Fitzhugh.)

ENG. 209 y. *Seminar in American Literature* (4)—Two sessions.

Critical and biographical problems in nineteenth-century American literature. (Warfel.)

ENG. 210 y. *Seminar in the Romantic Period* (4)—One discussion period of two hours. Prerequisites, Eng. 115 f and Eng. 116 s or an equivalent satisfactory to the instructor.

Special studies of problems or persons associated with the Romantic movement. The subject-matter of the course will vary with the interests of the class. (Hale.)

ENG. 211 s. *Victorian Prose* (2)—Two lectures.

English prose from about 1830. Study devoted chiefly to Carlyle, Mill, Arnold, Ruskin. (House.)

ENTOMOLOGY

Courses for Graduates and Advanced Undergraduates

ENT. 101 y. *Economic Entomology* (4)—Two lectures. (Not offered in 1937-1938.)

An intensive study of the problems of applied entomology, including life history, ecology, behavior, distribution, parasitism, and control. (Cory.)

ENT. 102 y. *Economic Entomology* (4)—Two laboratories. (Not offered in 1937-1938.)

Expansion of Ent. 101 y to include laboratory and field work in economic entomology. (Cory.)

ENT. 103 y. *Seminar* (2).

Presentation of original work, book reviews, and abstracts of the more important literature. (Cory, Knight.)

ENT. 104 y. *Insect Pests of Special Groups* (6)—Two lectures; one laboratory. Prerequisite, Ent. 1 f or s.

A study of the principal insect pests of one or more of the following groups, founded upon food preferences and habitat. The course is intended to give the general student a comprehensive view of the insects that are of importance in his major field of interest, and detailed information to the student specializing in entomology.

Insect Pests of: 1, Fruit; 2, Vegetables; 3, Flowers, both in the open and under glass; 4, Ornamental and shade trees; 5, Forests; 6, Field crops; 7, Stored products; 8, Live stock; 9, The household. (Cory.)

ENT. 105 f. *Medical Entomology* (2)—Two lectures. Prerequisite, Ent. 1 f or s, and consent of instructor.

The relation of insects to diseases of man, directly and as carriers of pathogenic organisms. Control of pests of man. The fundamentals of parasitology. (Knight.)

ENT. 106 f or s. *Insect Taxonomy* (3)—Two lectures; one laboratory.

An advanced course dealing with the principles and practices underlying modern systematic entomology. (Hyslop.)

ENT. 107 s. *Theory of Insecticides* (2)—Two lectures.

The development and use of contact and stomach poisons, with regard to their chemistry, toxic action, compatability, and foliage injury. Recent work with insecticides will be especially emphasized. (Ditman.)

ENT. 109 s. *Insect Physiology* (2)—Two lectures; occasional demonstrations. Enrollment subject to consent of instructor.

The functioning of the insect body with particular reference to blood, circulation, digestion, absoption, respiration, reflex action and the nervous system, metabolism, and excretion. (Yeager.)

ENT. 111 s. *Coccidology* (2)—Two laboratories.

A study of morphology, taxonomy, and biology of the higher groups of the scale insects. The technique of preparation and microscopy are emphasized. Laboratory studies are supplemented by occasional lectures. (McConnell.)

Courses for Graduates

ENT. 201. *Advanced Entomology* (1-3).

Studies of minor problems in morphology, taxonomy, and applied entomology, with particular reference to preparation for individual research. (Cory.)

ENT. 202 y. *Research in Entomology.*

Advanced students having sufficient preparation, with approval of the head of the department, may undertake supervised research in morphology, taxonomy, or biology and control of insects. Frequently the students may be allowed to work on Station or State Horticultural Department projects. The student's work may form a part of the final report on the project and be published in bulletin form. A dissertation, suitable for publication, must be submitted at the close of the studies as a part of the requirements for an advanced degree. (Cory.)

ENT. 203 f. *Insect Morphology* (2-4)—Two lectures, and laboratory work by special arrangement, to suit individual needs.

Insect anatomy with special relation to function. Given particularly in preparation for work in physiology and other advanced studies. (Snodgrass.)

ENT. 204 y. *Economic Entomology* (6)—Three lectures.

Studies of the principles underlying applied entomology, and the most significant advances in all phases of entomology. (Cory.)

ENT. 205 s. *Insect Ecology* (2)—One lecture; one laboratory.

A study of the fundamental factors involved in the relationship of insects to their environment. Emphasis is placed on the insect as a dynamic organism adjusted to the environment. (Langford.)

GENETICS AND STATISTICS

Courses for Graduates and Advanced Undergraduates

GEN. 101 f. *Genetics* (3)—Three lectures.

A general course designed to give an insight into the principles of genetics or of heredity, and also to prepare students for later courses in the breeding of animals or of plants. (Kemp.)

GEN. 102 s. *Advanced Genetics* (2)—Two lectures. Prerequisite, Gen. 101 f. Alternate year course.

A consideration of chromosome irregularities and other mutations, identity of the gene, inter-species crosses, genetic equilibrium, and the evolutionary aspects of genetics. (Kemp.)

GEN. 111 f. *Statistics* (2)—Two lectures.

A study of the collection, analysis, interpretation, and presentation of statistics. The course includes a study of expressions of type, variability, correlation and regression, error and significance of differences. (Kemp.)

GEN. 112 s. *Advanced Statistics* (2)—Two lectures. Prerequisite, Gen. 111 f or its equivalent.

A study of the theory of error, measures of relationship, multiple and partial correlation, predictive formulas, curve fitting and an introduction to analysis of variance. (Kemp.)

GEN. 114 s. *Elements of Statistics* (3)—Three lectures.

A study of the fundamental principles used in statistical investigation. The course includes a study of expressions of type, variability, correlation, regression, and error, together with the making of diagrams, graphs, charts, and tables. (Kemp.)

Courses for Graduates

GEN. 201 y. *Crop Breeding*—Credit determined by work accomplished. (Kemp.)

GEN. 209 y. *Research*—Credit determined by work accomplished. (Kemp.)

HISTORY

Courses for Graduates and Advanced Undergraduates

H. 101 y. *American Colonial History* (6)—Three lectures. Prerequisite, H. 2 y.

A study of the political, social, and economic development of the American people from the discovery of America through the formation of the Constitution. (Crothers.)

H. 102 y. *Recent American History* (6)—Three lectures. Prerequisite, H. 2 y.

The history of national development from the close of the Civil War to the present time. (Thatcher.)

H. 104 f. *Social and Economic History of the United States* (3)—Three lectures. Prerequisite, H. 2 y.

An advanced course giving a synthesis of American life from 1607 to 1790. (Crothers.)

H. 105 s. *Social and Economic History of the United States* (3)—Three lectures. Prerequisite, H. 2 y.

This course is similar to H. 104 f, and covers the period from 1790 to 1860. (Crothers.)

H. 106 s. *Diplomatic History of the United States* (2)—Two lectures. Prerequisite, H. 2 y.

A study of American foreign policy. (Thatcher.)

H. 107 s. *Diplomatic History of the United States* (2)—Two lectures. Prerequisite, H. 2y.

A continuation of H. 106 f. (Thatcher.)

H. 108 f. *Constitutional History of the United States* (3)—Three lectures. Prerequisite, H. 2 y.

A study of the historical forces resulting in the formation of the Constitution and of the development of American constitutionalism in theory and practice thereafter. (Thatcher.)

H. 109 s. *Constitutional History of the United States* (3)—Three lectures. Prerequisite, H. 2 y.

A continuation of H. 108 f. (Thatcher.)

H. 110 f. *History of the United States, 1790-1865* (2)—Two lectures. Prerequisite, H. 2 y.

The history of national development to the end of the Civil War. (Thatcher.)

H. 111 s. *History of the United States, 1790-1865* (2)—Two lectures. Prerequisite, H. 2 y.

A continuation of H. 110 f. (Thatcher.)

H. 115 y. *Medieval Civilization* (4)—Two lectures. Prerequisite, H. 1 y.

The cultural, institutional, economic, and political development of Europe from the decline of the Roman Empire to the opening of the fourteenth century. (Vollbrecht.)

H. 117 f. *Renaissance and Reformation* (2)—Two lectures. Prerequisite, H. 1 y.

A detailed study of movements and leaders as vital factors in the transition from medieval to modern times. (Vollbrecht.)

H. 118 s. *Renaissance and Reformation* (2)—Two lectures. Prerequisite, H. 1 y.

A continuation of H. 117 f. (Vollbrecht.)

H. 119 f. *Revolutionary and Napoleonic Europe* (2). Prerequisite, H. 1 y.

The course deals with the French Revolution and the relations of revolutionary France with the rest of Europe. (Silver.)

H. 120 s. *Revolutionary and Napoleonic Europe* (2). Prerequisite, H. 1 y.

A continuation of H. 119 f. (Silver.)

H. 121 f. *Expansion of Europe* (3)—Three lectures. Prerequisite, H. 1 y.

A treatment of European history from the Crusades to the present, emphasizing especially the expansion of national states. (Silver.)

H. 122 s. *Expansion of Europe* (3)—Three lectures. Prerequisite, H. 1 y.

A continuation of H. 121 f. (Silver.)

H. 123 f. *Diplomatic History of Europe since 1871* (3)—Three lectures. Prerequisite, H. 1 y.

A study of European alliances and alignments. World politics and imperialism in the pre-World War period, and developments since the World War. (Vollbrecht.)

H. 124 s. *Diplomatic History of Europe since 1871* (3)—Three lectures. Prerequisite, H. 1 y.

A continuation of H. 123 f. (Vollbrecht.)

H. 125 f. *Constitutional History of England* (3)—Three lectures. Prerequisite, H. 1 y or H. 3 y.

This course traces the historical development of English political institutions. (Silver.)

H. 126 s. *Constitutional History of England* (3)—Three lectures. Prerequisite, H. 1 y or H. 3 y.
A continuation of H. 125 f. (Silver.)

H. 127 f. *Europe since 1815* (3)—Three lectures. Prerequisite, H. 1 y. (Not given in 1937-1938.)
An intensive course in European history from 1815 to the present time. (Vollbrecht.)

H. 128 s. *Europe since 1815* (3)—Three lectures and assignments. Prerequisite, H. 1 y. (Not given in 1937-1938.)
A continuation of H. 127 f. (Vollbrecht.)

Courses for Graduates

H. 200. *Research* (2-4). Credit proportioned to the amount of work. (Staff.)
H. 201 y. *Seminar in American History* (4)—Conferences and reports on related topics. (Crothers.)

H. 202 y. *Bibliography and Historical Criticism* (4). (Staff.)

HOME ECONOMICS

A. Foods and Nutrition

Courses for Graduates and Advanced Undergraduates

H. E. 131 f. *Nutrition* (3)—Three recitations. Prerequisites, H. E. 31 y and Elements of Organic Chemistry (Chem. 12 Ay.)
Nutritive value, digestion and assimilation of foods. (Welsh.)

H. E. 132 s. *Nutrition* (3)—Two recitations; one laboratory. Prerequisite, H. E. 131 f.
Selection of food to promote health; special diets. (Welsh.)

H. E. 133 f. *Demonstrations* (2)—Two laboratories.
Practice in demonstrations. (Welsh.)

H. E. 134 s. *Advanced Foods* (3)—One recitation; two laboratories. Prerequisite, H. E. 31 y.
Advanced study of manipulation of food material. (Welsh.)

H. E. 135 f. *Problems and Practice in Foods* (5).
Experimental foods. (Welsh.)

H. E. 136 s. *Child Nutrition* (2)—Two recitations.
Lectures, discussions and field trips relating to the principles of child nutrition. (Welsh.)

Courses for Graduates

H. E. 201 f or s. *Seminar in Nutrition* (3).
Oral and written reports on assigned readings in the current literature of nutrition. Preparation and presentation of reports on special topics. (Staff.)

H. E. 202 f or s. *Research.* Credits to be determined by amount and quality of work done.

With the approval of the head of the department, students may pursue an original investigation in some phase of foods. The results may form the basis of a thesis for an advanced degree. (Welsh.)

H. E. 203 f or s. *Advanced Experimental Foods* (3)—One recitation; two laboratories. (Welsh.)

B. Textiles and Clothing

Courses for Graduates and Advanced Undergraduates

H. E. 112 s. *Special Clothing Problems* (3)—One recitation; two laboratories. Prerequisite, H. E. 111 f.

Each student selects an individual clothing study. (Westney.)

H. E. 113 f. *Problems and Practice in Textiles and Clothing* (5)—Prerequisite, H. E. 111 f.

Opportunity for experience and study in laboratories or museums. (McFarland.)

H. E. 114 f or s. *Advanced Textiles* (3)—Two recitations; one laboratory.

Advanced study of textiles; historic textiles; economic phases of the textile industry which affect the consumer. (Westney.)

C. Art

Courses for Graduates and Advanced Undergraduates

H. E. 121 y. *History of Architecture and Interior Decoration* (6)—Two recitations; one laboratory. Prerequisite, H. E. 21 f.

Study of historic styles of achitecture and period furniture; their adaptation and use in modern architecture and furniture.

Historic designs of rugs, tapestries, draperies, etc.; their use in interior decoration and influence upon modern textile design. Application of the principles of design, line-proportion, color, harmony, balance, rhythm, emphasis, to interior decoration. (Murphy.)

H. E. 122 s. *Applied Art* (1)—One laboratory.

Application of the principles of design and color to practical problems. (Murphy.)

D. Home Economics Seminar

Courses for Graduates and Advanced Undergraduates

H. E. 161 s. *Seminar* (3)—Three recitations.

Book reviews and abstracts from scientific papers and bulletins relating to Home Economics, together with criticisms and discussions of the work presented. (Staff.)

HORTICULTURE

Courses for Graduates and Advanced Undergraduates

HORT. 101 f. *Commercial Fruit Growing* (3)—Two lectures; one laboratory. Prerequisite, Hort. 1 f. Given in alternate years. (Not given in 1938-1939.)

The proper management of commercial orchards in Maryland. Advanced work is taken up on the subject of orchard culture, orchard fertilization, pollination, pruning, thinning, spraying, spray removal, picking, packing, marketing and storing of fruits; orchard by-products; orchard heating and orchard economics. (Schrader.)

HORT. 102 f. *Economic Fruits of the World* (2)—Two lectures. Prerequisite, Hort. 1 f. Given in alternate years. (Not given in 1938-1939.)

A study is made of the botanical, ecological, and physiological characteristics of all species of fruit-bearing plants of economic importance, such as the date, pineapple, fig, olive, banana, nut-bearing trees, citrus fruits and newly introduced fruits, with special references to their cultural requirements in certain parts of the United States and the insular possessions. All fruits are discussed in this course which have not been discussed in a previous course. (Haut.)

HORT. 103 f. *Tuber and Root Crops* (2)—One lecture; one laboratory. Prerequisites, Hort. 11 s and 12 f. Given in alternate years. (Not given in 1938-1939.)

A study of white potatoes and sweet potatoes, considering seed varieties, propagation, soils, fertilizers, planting, cultivation, spraying, harvesting, storing and marketing. (Frazier.)

HORT. 104 s. *Advanced Truck Crop Production* (1). Prerequisites, Hort. 11 s, 12 f, and 13 s. Given in alternate years. (Not given in 1938-1939.)

A detailed study of some of the more important problems encountered in the commercial production of truck crops. A thorough study is made of recent literature pertaining to such problems as soil acidity, soil organic matter relationships, new developments in insect and disease control, plant production and transplanting, etc. (Frazier.)

HORT. 105 f. *Systematic Olericulture* (3)—Two lectures; one laboratory. Prerequisites, Hort. 11 s and 103 f. Given in alternate years. (Not given in 1937-1938.)

A study of the classification and nomenclature of vegetables. Description of varieties and adaptation of varieties to different environmental conditions. (Frazier.)

HORT. 106 y. *Plant Materials* (5)—One lecture; one or two laboratories. Given in alternate years. (Not given in 1938-1939.)

A field and laboratory study of trees, shrubs, and vines used in ornamental planting. (Thurston.)

HORT. 107 f. *Systematic Pomology* (3)—Two lectures; one laboratory. Given in alternate years. (Not given in 1937-1938.)

The history, botany, and classification of fruits and their adaptation

to Maryland conditions. Exercises are given in describing and identifying the leading commercial varieties of fruits. (Haut.)

Courses for Graduates

HORT. 201 y. *Experimental Pomology* (6)—Three lectures.

A systematic study of the sources of knowledge and opinion as to practices in pomology; methods and difficulties in experimental work in pomology and results of experiments that have been or are being conducted in all experiment stations in this and other countries. (Schrader.)

HORT. 202 y. *Experimental Olericulture* (6)—Three lectures.

A systematic study of the sources of knowledge and opinion as to practices in vegetable growing; methods and difficulties in experimental work in vegetable production and results of experiments that have been or are being conducted in all experiment stations in this and other countries. (Frazier.)

HORT. 204 s. *Methods of Research* (2)—One lecture; one laboratory.

Special drill will be given in the making of briefs and outlines of research problems, in methods of procedure in conducting investigational work, and in the preparation of bulletins and reports. A study of the origin, development, and growth of horticultural research is taken up. A study of the research problems being conducted by the Department of Horticulture will be made, and students will be required to take notes on some of the experimental work in the field and become familiar with the manner of filing and cataloging all experimental work. (Staff.)

HORT. 205 y. *Advanced Horticultural Research* (4, 6 or 8).

Graduate students will be required to select problems for original research in pomology, vegetable gardening, floriculture, or landscape gardening. These problems will be continued until completed, and final results will be published in the form of a thesis. (Staff.)

HORT. 206 y. *Advanced Horticultural Seminar* (2).

This course will be required of all graduate students. Students will be required to give reports either on special topics assigned them, or on the progress of their work being done in courses. Members of the departmental staff will report special research work from time to time. (Staff.)

MATHEMATICS

Courses for Graduates and Advanced Undergraduates

(Courses Math. 101 s, 111 s, 112 s, 114 f, 115 f, and 140 y are taught every year; all other courses are given in alternate years.)

MATH. 101 f. *Mathematical Theory of Investment* (3)—Three lectures. Prerequisite, Math. 11 f or 8 f.

Application of mathematics to financial transactions; compound interest and discount; construction and use of interest tables; sinking funds; annuities; depreciation, valuation, and amortization of securities; building and loan associations; life insurance, etc. (Spann.)

MATH. 111 f. *Elementary Mathematics from an Advanced Standpoint* (2)—Two lectures.

A survey course in high school mathematics intended for workers in biological and social sciences, and for prospective teachers of mathematics and physics. (Dantzig.)

MATH. 112 s. *College Mathematics* (2)—Two lectures. Prerequisite, Math. 111 f or 8 f, or equivalent high school courses.

A survey course of algebra, trigonometry, analytic geometry, and the calculus, intended for workers in the biological sciences and for prospective teachers of mathematics and physics. (Dantzig.)

MATH. 114 f. *Differential Equations for Engineers* (3)—Three lectures.

This course is conducted in close cooperation with the College of Engineering, and deals with aspects of mathematics which arise in engineering theory and practice. Among the topics treated are the following: linear differential equations; advanced methods in kinematics and dynamics; applications of analysis to electrical circuits, to aero-dynamics, bridge-design, etc. (Martin.)

MATH. 115 s. *Applied Calculus for Chemists* (3)—Three lectures. Prerequisite, Math. 16 y.

This course is conducted in close co-operation with the Chemistry Department, and deals with the aspects of mathematics which arise in the theory and practice of chemistry. Among the topics treated are the following: partial and total derivatives; applications of mathematical analysis to thermo-dynamics, to molecular and atomic phenomena, and to physical chemistry. (Yates.)

MATH. 121 s. *Fundamental Concepts of Mathematics* (2)—Two lectures. (Not given in 1937-1938.)

Foundations of arithmetic, algebra, geometry, and analysis. The evolution of such concepts as number, limit, continuity, and infinity; the axioms of geometry; spatial forms and measurement; the concepts of space, time, and matter, leading up to the theory of relativity. (Martin.)

MATH. 122 s. *History of Mathematics* (2)—Two lectures.

History of arithmetic, algebra, geometry, the calculus, and the theory of functions, from the period of classical Greece to modern times. (Dantzig.)

MATH. 123 f. *Theory of Equations* (2)—Two lectures. Prerequisite, Math. 16 y.

Symmetric functions; eliminations; the fundamental theorem of algebra; algebraic solution of equations; the Galois theory; asymptotic solutions of equations. (Taliaferro.)

MATH. 124 s. *Theory of Numbers* (2)—Two lectures. Prerequisite, Math. 16 y.

Linear congruences, continued fractions and diophantine equations; criteria of primality; quadratic residues; higher congruences; the Problem of Fermat. (Dantzig.)

MATH. 125 f. *Plane Curves* (2)—Two lectures. Prerequisite, Math. 16 y. (Not given in 1937-1938.)

Infinitesimal properties of plane curves; contact and osculation; asymptotes and singular points; algebraic curves; polarity; the Plucker characters of a curve; cubic and quartic curves. (Alrich.)

MATH. 126 s. *Analytical Geometry in Space* (2)—Two lectures. Prerequisite, Math. 16 y.

Point, plane, and line; line geometry; quadratic surfaces; twisted cubics; algebraic curves and surfaces; many-dimensional geometry. (Alrich.)

MATH. 127 f. *Advanced Topics in Calculus* (2)—Two lectures. Prerequisite, Math. 16 y. (Not given in 1937-1938.)

Evaluation of definite integrals; expansion into series; line and surface integrals; the theorems of Green and Stokes; differential equations, existence theorems. (Martin.)

MATH. 128 s. *Advanced Differential Equations* (2)—Two lectures. Prerequisite, Math. 16 y. (Not given in 1937-1938.)

Existence theorems; integration in series; asymptotic solutions; general theory of linear equations; ordinary differential equations of the second order; singular solutions; elements of partial differential equations. (Martin.)

MATH. 129 f. *Non-Euclidean Geometry* (2)—Two lectures. Prerequisite, Math. 16 y. (Not given in 1937-1938.)

Evolution of geometrical ideas; the axioms of geometry; theory of parallels; projective approach to geometrics of Lobachevsky and Riemann; the Cayley-Klein theory; the problem of space and the theory of relativity. (Dantzig.)

MATH. 130 f. *Modern Algebra* (2)—Two lectures. Prerequisite, Math. 16 y.

Sets, groups, and extension of groups; polynomials; rings and fields; general theory of ideals; polynomial ideals; elements of algebraic geometry. (Dantzig.)

MATH. 131 s. *Analytical Mechanics* (2)—Two lectures. Prerequisite, Math. 16 y and Math. 126 s.

Kinematics; the dynamics of a particle; statics; the principles of D'Alembert; the dynamics of a system; the equations of Lagrange and Jacoby; the principle of Hamilton. (Yates.)

MATH. 132 s. *Theory of Probabilities* (2)—Two lectures. Prerequisite, Math. 16 y.

Frequency and probability; the concept of "equally likely"; combinatorial analysis; addition and multiplication theorems; frequency of distribution; continuous probabilities; applications to statistics, theories of errors and correlations, and to molecular theories. (Yates.)

MATH. 133 y. *Famous Mathematical Problems* (2)—One lecture. Prerequisites, Math. 16 y and Math. 17 y. (Not given in 1937-1938.)

Prime numbers; the problem of Fermat; trisection of angles; regular polygons and kindred problems; squaring the circle; transcendentality of pi and e; famous integrals; maxima and minima; probability problems; the three-body problem. (Dantzig.)

MATH. 134 y. *Advanced Algebra* (2)—One lecture. Prerequisites, Math. 16 y and Math. 17 y.

Determinants. Theory of elimination. Inequalities. Continued fractions. Combinatorial analysis. Algebraic solution of equations. Expansions and summations. (Dantzig.)

MATH. 135 s. *College Geometry* (2)—Two lectures. Prerequisites, Math. 15 s and Math 18 y.

Geometry of the triangle. Systems of circles. Ruler-compass construction. Linkages. Rollers and roulettes projection. General theory of conics. Properties of plane cubics and quartics. Twisted cubics. (Yates.)

Courses for Graduates

(With the exception of the Graduate Seminar, Math. 240 y, all the courses listed below are taught in alternate years.)

MATH. 221 f. *Theory of Functions of a Complex Variable* (2)—Two lectures. Prerequisite, Math. 127 f. (Not given in 1937-1938.)

Cauchy-Riemann conditions; power series and infinite products; conformal mapping; the Cauchy integral theory; residues and periods; uniform functions; analytical continuation. (Martin.)

MATH. 221 s. *Theory of Functions of a Real Variable* (2)—Two lectures. Prerequisites, Math. 16 y and Math. 121 s.

Logical development of the concept of number; aggregates, point-sets; convergence, limit; continuous and discontinuous functions; differentiation and generalized integration. (Martin.)

MATH. 223 s. *Vectors and Matrices* (2)—Two lectures. Prerequisite, Math. 123 f.

Scalars, vectors, matrices, and determinants; transformations; linear dependence; canonical forms; elementary divisors; applications to geometry and quantum theory. (Dantzig.)

MATH. 224 f. *Algebraic Geometry* (2)—Two lectures. Prerequisites, Math. 16 y and Math. 125 f.

Bi-rational transformations; invariants of algebraic curves and surfaces; residuation; genus. (Alrich.)

MATH. 225 f. *Projective Geometry* (2)—Two lectures. Prerequisites, Math. 125 f and Math. 126 s.

The postulates of geometry; metric and descriptive properties; the principle of duality; the group of collineations; projective equivalence; projective theory of curves; projective differential geomtery; non-Euclidean geometry. (Dantzig.)

MATH. 226 s. *Infinitesimal Geometry* (2)—Two lectures. Prerequisites, Math. 16 y, Math. 125 f, and Math. 126 s. (Not given in 1937-1938.)

Principles of vector analysis; skew curves and surfaces; curvature, asymptotic lines and geodesics; triple orthogonal systems; the problem of space structure. (Dantzig.)

MATH. 227 f. *Infinite Processes* (2)—Two lectures. Prerequisites, Math. 127 f and Math. 128 s. (Not given in 1937-1938.)

Criteria of convergence for series and products; continued fractions; trigonometric series; series of polynomials; orthogonal functions; functions defined by power series. (Martin.)

MATH. 228 s. *Elliptic Functions* (2)—Two lectures. Prerequisite, Math. 221 f.

The theories of Legendre and Jacoby; the Weierstrass theory; doubly periodic functions; elliptic integrals; applications to algebra, geometry, and mechanics. (Yates.)

MATH. 229 f. *Calculus of Variations* (2)—Two lectures. Prerequisites, Math. 127 f and Math. 128 s.

Classical problems; the conditions of Euler; the Weierstrass theory; strong and weak minima; case of extremals with variable endpoints; extension of multiple integrals. (Martin.)

MATH. 230 s. *Continuous Groups of Transformations* (2)—Two lectures. Prerequisites, Math. 126 s and Math. 223 s.

Correspondence; transformation; semi-groups and groups; invariants; the Lie theory of groups; infinitesimal transformations; contact transformations; applications to differential equations and to geometry. (Dantzig.)

MATH. 231 s. *Partial Differential Equations with Applications to Mathematical Physics* (2)—Two lectures. Prerequisites, Math. 127 f and Math. 128 s. (Not given in 1937-1938.)

Partial differential equations of the first and second order; linear equations; total differential equations; equations of the Monge-Ampere type; the Laplace equation; harmonics; applications to electricity, heat, elasticity, and hydrodynamics; potential theory. (Yates.)

MATH. 232 s. *The Theory of Relativity* (2)—Two lectures. Prerequisites, Math. 226 s and Math. 131 f.

History of the problem of relativity; the Maxwell equations; special theory of relativity; elements of tensor analysis; the general theory of relativity. (Dantzig.)

MATH. 233 s. *Analytical Dynamics* (2)—Two lectures. Prerequisites, Math. 131 s and 221 f.

Classical problems in celestial mechanics; the potential; stability of orbits; the restricted problems of three bodies. Textbook: Whittaker, Analytical Dynamics. (Martin.)

MATH. 240 y. *Graduate Seminar* (2)—One session.

Required for all graduate students. Intended as a clearing house of problems arising in the graduate courses. Reports on progress on dissertations and critical discussion of results achieved. (Dantzig, Yates, Martin.)

MODERN LANGUAGES

A. French

Courses for Graduates and Advanced Undergraduates

FRENCH 102 y. *French Literature of the Seventeenth Century* (4)—Two lectures. (Not given in 1937-1938.) (Wilcox.)

FRENCH. 103 y. *French Literature of the Eighteenth Century* (4)—Two lectures. (Falls.)

FRENCH. 104 y. *French Literature of the Nineteenth Century* (4)—Two lectures. (Wilcox.)

FRENCH 105 y. *French Literature of the Twentieth Century* (4)—Two lectures. (Not given in 1937-1938.) (Liotard.)

FRENCH 110 y. *Advanced Composition* (6)—Three lectures. Prerequisite, French 9 y. (Falls.)

FRENCH 120. *Conference Course in Reading* (2-4).

This course proposes: (1) to fix the attention of the student upon his field of concentration as a whole rather than upon the detailed knowledge of the subject-matter of such courses as he has taken in the field; (2) to develop in the student the ability to read independently. Conferences with qualified members of the department take the place of formal lectures.

Courses for Graduates

FRENCH 201 y. *Research.* Credits determined by work accomplished.

FRENCH 202 y. *Diderot and the Encyclopaedists* (4)—Two lectures. (Not given in 1937-1938.) (Falls.)

FRENCH 203 y. *Aspects and Conceptions of Nature in French Literature of the Eighteenth Century* (4)—Two lectures. (Not given in 1937-1938.) (Falls.)

FRENCH 204 y. *Georges Duhamel, Poet Dramatist, Novelist* (4)—Two lectures. (Falls.)

FRENCH 205 y. *French Literature of the Middle Ages and the Renaissance* (4)—Two lectures. (Not given in 1937-1938.) (Darby.)

FRENCH 210 y. *Seminar* (2-4)—One meeting weekly. Required of all graduate students in French.

Attention is also called to Comparative Literature 105 f, *Romanticism in France.*

B. German

Courses for Graduates and Advanced Undergraduates

GERMAN 101 f. *German Literature of the Eighteenth Century* (3)—Three lectures.

The earlier classical literature. (Prahl.)

GERMAN 102 s. *German Literature of the Eighteenth Century* (3)—Three lectures.

The later classical literature. (Prahl.)

GERMAN 103 f. *German Literature of the Nineteenth Century* (3)—Three lectures. (Not given in 1937-1938.)

Romanticism in Young Germany. (Prahl.)

GERMAN 104 s. *German Literature of the Nineteenth Century* (3)—Three lectures. (Not given in 1937-1938.)

The literature of the Empire. (Prahl.)

GERMAN 120. *Conference Course in Reading* (2-4).

This course proposes: (1) to fix the attention of the student upon his field of concentration as a whole rather than upon the detailed knowledge of the subject-matter of such courses as he has taken in the field; (2) to develop in the student the ability to read independently. Conferences with qualified members of the departement take the place of formal lectures.

Courses for Graduates

GERMAN 201 y. *Research.* Credits determined by work accomplished.

GERMAN 202 y. *The Modern German Drama* (4)—Two lectures.

Study of the naturalistic, neo-romantic, and expressionistic drama against the background of Ibsen and other international figures. (Prahl.)

GERMAN 203 y. *Schiller* (4)—Two lectures. (Not given in 1937-1938.)

Study of the life and works of Schiller with special emphasis on the history of his dramas. (Prahl.)

GERMAN 210 y. *Seminar* (2-4)—One meeting weekly. Required of all graduate students in German.

Attention is called to Comparative Literature 106 s, *Romanticism in Germany.*

C. Spanish

Courses for Graduates and Advanced Undergraduates

SPANISH 101 f. *Spanish Poetry* (3)—Three lectures. (Not given in 1937-1938.)

The epic, the ballad and popular poetry, early lyrics, poetry of the Golden Age. (Darby.)

SPANISH 102 s. *Spanish Poetry* (3)—Three lectures. (Not given in 1937-1938.)

Continuation of Spanish 101 f. Poetry of the 18th, 19th, and 20th centuries. (Darby.)

SPANISH 103 f. *The Spanish Drama* (3)—Three lectures. (Not given in 1937-1938.)

The drama of the Golden Age. (Darby.)

SPANISH 104 s. *The Spanish Drama* (3)—Three lectures. (Not given in 1937-1938.)

Contiuation of Spanish 103 f. The drama since Calderon. (Darby.)

SPANISH 107 f. *The Spanish Novel* (3)—Three lectures.
Somewhat simplified, edited texts of classical novels and short stories of the Golden Age will be used. (Darby.)

SPANISH 108 s. *The Spanish Novel* (3)—Three lectures.
Continuation of Spanish 107 f. Reading of some modern novels. (Darby.)

SPANISH 120. *Conference Course in Reading* (2-4).
This course proposes: (1) to fix the attention of the student upon his field of concentration as a whole rather than upon the detailed knowledge of the subject-matter of such courses as he has taken in the field; (2) to develop in the student the ability to read independently. Conferences with qualified members of the department take the place of formal lectures.

Courses for Graduates

SPANISH 201 y. *Research* Credits determined by work accomplished.

SPANISH 202 y. *The Golden Age in Spanish Literature* (6)—Three lectures.
Detailed study of the classical authors. (Darby.)

SPANISH 203 y. *Cervantes* (6)—Three lectures. (Not given in 1937-1938.)
The life and times of Cervantes; principal prose works. (Darby.)

SPANISH 210 y. *Seminar* (2-4)—One meeting weekly. Required of all graduate students in Spanish.

PHILOSOPHY

Courses for Graduates and Advanced Undergraduates

PHIL. 101 f. *Systems of Philosophy* (3)—Three hours. Lectures, reports and discussions. Prerequisite, two courses in philosophy, and the permission of the instructor. (Not given in 1937-1938.)
The system of one philosopher. or the development of one movement, will be studied throughout the semester. The topic will be changed from semester to semester, although after three or four semesters the same system may be chosen again. Not more than nine credits allowed to any one student. (Marti.)

PHIL. 102 s. *Systems of Philosophy* (3)—Three hours of lectures, student reports, and discussion. Prerequisite, two courses in philosophy and the permission of the instructor. (Not given in 1937-1938.)
Continuation of Phil. 101 f. (Marti.)

PHIL. 103 f. *Systems of Philosophy—F. W. J. Schelling, 1775-1854* (3)—Three hours of lectures, student reports, and discussion. Prerequisite, two courses in philosophy and the permission of the instructor. Continuation of Phil. 101 f. (Marti.)

PHIL. 104 s. *Systems of Philosophy—Charles Sanders Pierce, 1839-1914* (3)—Three hours of lectures, student reports, and discussion. Prerequisite, two courses in philosophy and the permission of the instructor. Continuation of Phil. 101 f. (Marti.)

PHYSICS

Courses for Graduates and Advanced Undergraduates

PHYS. 101 f. *Precision of Measurements* (3)—Three lectures. Prerequisites, Phys. 1 y or 2 y and Math. 5 y or 6 y.

A discussion of the principles underlying the treatment of experimental data, as to precision of observations, errors, interpolation, curve analysis, etc., with special emphasis on the planning of investigations involving measurements. The course is intended as an introduction to quantitative experimental work. (Eichlin.)

PHYS. 102 s. *Quantitative Physical Measurements* (3)—Two lectures; one laboratory. Prerequisite, Phys. 101 f.

This course, supplementing Phys. 101 f, is designed to familiarize the student with the manipulaton of various types of apparatus used in experimentation in physical problems, and the adaptation and analysis of data so obtained. (Eichlin.)

PHYS. 103 y. *Advanced Physics* (6)—Three lectures. Prerequisite, Phys. 1 y.

This course, supplementing Phys. 1 y, is an advanced study of physical phenomena in optics, spectroscopy, conduction of electricity through gases, photoelectricity, etc., with a comprehensive review of basic principles involved. It is intended to familiarize the student in a general survey with some of the recent developments in physics. (Dickinson.)

PHYS. 104 y. *Advanced Experiments* (6)—One lecture; two laboratories. Prerequisite, Phys. 103 y.

This course, supplementing Phys. 1 y, is intended to provide the student with experience in experimental physics. (Dickinson.)

PHYS. 105 f. *Heat and Thermodynamics* (3)—Two lectures; one laboratory. Prerequisite, Phys. 2 y.

The classical phenomena of heat and radiation are developed on the basis of the kinetic molecular theory and the quantum theory. The first and second laws of the thermodynamics are applied to physical processes. (Dickinson.)

PHYS. 106 s. *Theoretical Mechanics* (3)—Two lectures; one laboratory. Prerequisite, Phys. 2 y.

An analytical treatment of the fundamental principles of kinematics and dynamics is presented with problems and laboratory exercises to illustrate these principles. The use of generalized coordinates is illustrated. The equations of Lagrange are applied to selected topics in the field of dynamics. (Dickinson.)

PHYS. 107 f. *Optics* (3)—Two lectures; one laboratory. Prerequisite, Phys. 2 y.

A study is made of selected topics in the refraction, reflection, interference, diffraction and polarization of light. The principles are employed on a detailed study of optical systems of telescope, microscope, spectroscope and interferometer. (Dickinson.)

PHYS. 108 s. *Electricity and Magnetism* (3)—Two lectures; one laboratory. Prerequisite, Phys. 2 y.

A study is made of elementary and mathematical theory of electrostatics, magnetostatics, magnetism, electrical currents, etc.

An experimental study of electrical instruments and their use in physical measurements is included. (Dickinson.)

PHYS. 109 y. *Electric Discharge* (3)—Two lectures; one laboratory. Prerequisites, at least two courses of the 105 f-108 s group. (Not given in 1937-1938.)

The discrete nature of matter, electricity and radiation is emphasized from an empirical point of view. The determination of the fundamental electronic and molecular constants is treated in detail. The process of electrical discharge through gas and vacuum is ramified to include discussion of radioactivity, photoelectricity, thermionics and atomic structure.

Courses for Graduates

PHYS. 201 f. *Atomic Structure* (3)—Three lectures.

Development of theories on the structure of the atom through discussion of optical and X-ray spectra, atomic models as applied to the periodic table, and related topics. (Eichlin.)

PHYS. 202 s. *Advanced Spectroscopy* (3)—Three lectures. Prerequisite, 201 f.

A continuation of Physics 201 f. (Eichlin.)

PHYS. 203 f. *Quantum Theory* (3)—Three lectures.

Discussion of the application of the principles of the quantum theory to black body radiation, spectroscopy, collision processes, valence, etc. (Eichlin.)

PHYS. 204 s. *Nuclear Physics* (3)—Three lectures.

Discussion of the constitution of the nucleus, natural radioactivity disintegration processes, neutron, position, nuclear energy states, artificial disintegration, etc. (Eichlin.)

PHYS. 205 f and 206 s. *Fundamental Concepts of Modern Physics* (6)—Three lectures. (Not given in 1937-1938.)

Comprehensive surveys of the history of physics; the electromagnetic theory of radiation; interaction of radiation and matter; introduction to the quantum mechanics.

PHYS. 207 f. *Electrodynamics* (3)—Three lectures. (Not given in 1937-1938.)

A mathematical study of electrostatics and electromagnetics with application to diffraction, dispersion, electro- and magneto-optics.

PHYS. 208 s. *Physical Optics* (3)—Three lectures.

A mathematical study of the electromagnetic theory of light with applications to interference, diffraction, dispersion, polarization.

PHYS. 209 y. *Seminar* (2).

Presentation of reports and discussion of current developments in physics and of original investigations on special problems. (Staff.)

PHYS. 210 y. *Research.*
The investigation of special problems in physics. (Staff.)

POLITICAL SCIENCE

Courses for Graduates and Advanced Undergraduates

POL. SCI. 101 f. *International Law* (3)—Three lectures.
A study of the principles governing international intercourse in time of peace as well as war, as illustrated in texts and cases. (Steinmeyer.)

POL. SCI. 102 s. *International Relations* (3)—Three lectures.
A study of the nature and importance of international relations; underlying problems; agencies of control; development of international organizations. (Steinmeyer.)

POL. SCI. 103 f. *Current Problems in Government* (2)—Two lectures.
This course deals with the governmental problems of international character, such as the causes of war, neutrality, propaganda, etc. Course is conducted by lectures and discussion method, with students required to report on readings from current literature. (Steinmeyer.)

POL. SCI. 104 s. *Current Problems in Government* (2)—Two lectures.
This course is conducted along lines similar to Pol. Sci. 103 f. Course deals with domestic problems of the government of the United States. (Lasson.)

POL. SCI. 105 f. *Constitutional Law* (3)—Three lectures. Prerequisite, Pol. Sci. 1 f or s.
A study of constitutional law in the United States as interpreted by the Supreme Court. Special attention is given to the American federal system, the amending clause, the powers of the President, Congress, and the National Judiciary. (Lasson.)

POL. SCI. 107 f. *Political Parties and Public Opinion* (2)—Two lectures. Prerequisite, Pol. Sci. 1 f or s.
The political party as a part of the political machinery; party organization; party activities; campaign methods; public opinion and party leadership; the true function of parties.

POL. SCI. 109 f. *Early Political Theory* (2)—Two lectures.
A survey of the principal political theorists who have influenced political thought and development. This course covers the various theories from Plato to the middle of the nineteenth century. (Oatman.)

POL. SCI. 110 s. *Recent Political Thought* (2)—Two lectures.
A study of the political schools of thought from the middle of the nineteenth century to the present time. Special reference will be made to such recent developments as Socialism, Communism, Fascism, Nazism, etc. (Steinmeyer.)

PSYCHOLOGY

Courses for Graduates and Advanced Undergraduates

PSYCH. 106 s. *Mental Hygiene* (3)—Two lectures and one clinic at St. Elizabeth's Hospital each week. Prerequisite, Ed. Psych. 1 or Psych. 1 f or 1 s.

A study of mental disorders in terms of personal and social adaptation. Problems of adjustment in social relations; obsessions, fears, conflicts, inhibitions, and compensations. (Sprowls.)

Courses for Graduates

ED. PSYCH. 200 f. *Systematic Educational Psychology* (3).

An advanced course for teachers and prospective teachers. Deals with the major contributions of psychology to educational theory from Herbart to the present time. (Sprowls.)

RURAL LIFE AND AGRICULTURAL EDUCATION

Courses for Graduates and Advanced Undergraduates

R. ED. 104 s. *Rural Life and Education* (3)—Three lectures.

An intensive study of the educational agencies at work in rural communities, stressing particularly an analysis of school patronage areas, the possibilities of normal life in rural areas, early beginnings in rural education, and the conditioning effects of economic differences. The course is designed especially for persons who expect to be called upon to assist in shaping educational and other community programs for rural people. (Cotterman.)

R. ED. 105 f. *Project Organizations and Cost Accounting* (2)—Two lectures.

The development of project programs in terms of placement opportunities; project forecasting as a form of motivation; project estimating; systems of project cost accounting; practice in project accounting. (Worthington.)

R. ED. 107 f. *Observation and Analysis of Teaching for Agricultural Students* (3)—Two lectures; one laboratory. Prerequisite, Ed. Psych. 1 f.

This course deals with an analysis of pupil learning in class groups. (Cotterman.)

R. ED. 109 f. *Teaching Secondary Vocational Agriculture* (3)—Three lectures. Prerequisites, R. Ed. 107 f, 105 f; A. H. 1, 2; D. H. 1; Poultry 1; Soils 1; Agron. 1, 2; Hort. 1, 11; F. Mech. 101, 104; A. E. 2, 102; F. M. 2.

A comprehensive course in the work of high school departments of vocational agriculture. It emphasizes particularly placement, supervised farming programs, the organization and administration of Future Farmer work, and objectives and methods in all-day, continuation, and adult instruction. (Cotterman.)

R. ED. 112 s. *Departmental Organization and Administration* (2)—Two lectures. Prerequisites, R. Ed. 107 f, 105 f, 109 f.

The work of this course is based upon the construction and analysis

of administrative programs for high school departments of vocational agriculture. As a project, each student prepares and analyzes in detail an administrative program for a specific school. Investigations and reports. (Worthington.)

R. Ed. 114 s. *Teaching Farm Shop in Secondary Schools* (1)—One lecture.

Objectives in the teaching of farm shop; contemporary developments; determination of projects; shop management; shop programs; methods of teaching; equipment; materials of instruction; special projects. (Carpenter.)

R. Ed. 120 f or s. *Practice Teaching* (2)—Prerequisites, R. Ed. 105 f, 107 f, 109 f.

Under the immediate direction of a critic teacher the student in this course is required to analyze and prepare special units of subject-matter, plan lessons, and teach in co-operation with the critic teacher, exclusive of observation, not less than twenty periods of vocational agriculture. (Cotterman, Worthington.)

Ed. 105 f. *Educational Sociology* (3)—See Education.

Courses for Graduates

R. Ed. 201 f and 202 s. *Rural Life and Education* (3, 3)—Prerequisite, R. Ed. 104 s, or equivalent.

A sociological approach to rural education as a movement for a good life in rural communities. It embraces a study of the organization, administration and supervision of the several agencies of public education as component parts of this movement and as forms of social economy and human development. Discussions, assigned readings and major term papers in the field of the student's special interest. (Cotterman.)

R. Ed. 207 f and 208 s. *Problems in Vocational Agriculture, Related Science and Shop* (1-2, each semester).

In this course special emphasis is placed upon the current problems facing teachers of vocational agriculture. It is designed especially for persons who have had several years of teaching experience in this field. The three phases of the vocational teacher's program—all day, part-time, and adult work—receive attention. Discussions, surveys, investigations and reports. (Cotterman.)

R. Ed. 250 y. *Seminar in Rural Education* (2-4).

Problems in the organization, administration and supervision of the several agencies of rural education. Investigation, papers and reports. (Cotterman.)

R. Ed. 251 y. *Research* (2-4)—Credit hours according to work done. Students must be specially qualified by previous work to pursue with profit the research to be undertaken. (Cotterman.)

SOCIOLOGY

Courses for Graduates and Advanced Undergraduates

Soc. 101 f. *Rural Sociology* (2)—Two lectures. Graduate students will be required to prepare an extra term paper.

The structure and functions of rural communities, ancient and modern; the evolution of rural culture; rural institutions and their problems; the psychology of rural life; composition and characteristics of rural population; relation of rural life to the major social processes; the social aspects of rural planning. (Manny.)

Soc. 102 s. *Urban Sociology* (2)—Two lectures. Graduate students will be required to prepare an extra term paper.

The origin and growth of cities; composition and characteristics of city populations; the nature and significance of urbanization; the social structure and functions of the city; urban personalities and groups; cultural conflicts arising out of the impact of the urban environment. (Joslyn.)

Soc. 103 f. *Criminology and Penology* (3)—Three lectures. Prerequisite, Soc. Sci. 1 y or Soc. 1.

The nature, extent, and cost of crime. Causative factors. Historical methods of dealing with criminals. Apprehension of alleged criminals. The machinery of justice. Penal institutions. Other means of caring for convicted persons. The prevention of crime. (Jacobi.)

Soc. 104 s. *Social Psychology* (3)—Three discussions.

The development of human nature and personality as products of social experience and interaction; the behavior of public audiences, groups, crowds, and mobs; the development and functioning of such psychosocial forces as imitation, styles, fads, leadership, public opinion, propaganda, nationalism, etc. (Manny.)

Soc. 105 f. *Social Organization* (2)—Two lectures. Prerequisite, Soc. 1 f. (Not offered in 1937-1938.)

Social groupings above the family in size as found among primitives and modern civilizations including neighborhoods, communities, special interest organizations, etc.; leadership and followership in organization activities; interorganizational conflict and co-operation. (Joslyn.)

Soc. 107 s. *Social Pathology* (3)—Three lectures. Prerequisite, Soc. 1 f, or consent of instructor.

Causative factors and social complications in individual and group pathological conditions; historic methods of dealing with the dependent, defective, and delinquent classes. (Joslyn.)

Soc. 109 f. *Introduction to Social Work* (3)—Three lectures. Prerequisite, Soc. 107 s or consent of instructor.

Brief historical review of the evolution of social work. Present-day types of social work, institutional treatment, public and private agencies; the theory and technique of social case work; recent development arising out of the depression; visits to representative social agencies. This course is intended primarily for persons intending to take advanced professional training in this field. (Joslyn.)

Soc. 110 s. *The Family* (2)—Two lectures. Prerequisite, Soc. 1 f.

Anthropological and historical backgrounds; biological, economic, psychological, and sociological bases of the family; the role of the family in personality development; family and society; family disorganization; family adjustment and social change. (Jacobi.)

Soc. 111 f. *Recent Social Thought* (2)—Two lectures. Prerequisites, Soc. 1 f and consent of instructor. Intended mainly for sociology majors and minors.

Critical study of the leading schools of sociological thought in various countries since 1900. (Joslyn.)

Soc. 113 f. *Dynamics of Population* (2)—Two lectures. Prerequisites, Soc. 1 f and Gen. 111 f or consent of instructor. (Not offered in 1937-1938.)

Causes of population growth and decline; major population migrations; population pressure and international problems; eugenic factors; statistical analyses of population trends in the United States. (Joslyn.)

Soc. 115 f. *The Village* (2)—Two lectures. An extra term paper will be required of graduate students.

The evolution of the American village; present day social structure and functions of the village; an analysis of village population; the relationship of the village to urban and open-country areas; village planning. (Manny.)

Courses for Graduates

Soc. 201 f or s. *Sociological Research* (2-4)—Credit proportional to work accomplished.

Individual research projects involving either field work or analysis of compiled data. (Staff.)

Soc. 202 f or s. *Seminar in Sociological Theories* (2).

Assigned topics for discussion dealing primarily with major sociological theories and problems. Designed for major students in the Department of Sociology. (Staff.)

SOCIAL WORK

Note: The following courses are offered in Baltimore under the joint auspices of the University of Maryland and the Baltimore Council of Social Agencies. Until further notice, enrollment in these courses is restricted to currently employed personnel of Maryland social agencies and constitutes part of the "in-service" training program of these agencies. To obtain graduate credit from the University of Maryland, students must meet all requirements for admission to the Graduate School of the University. For further details, see special circular.

Social Work 201 f or s. *Introduction to Social Casework I* (2)—Two lectures.

A discussion of case material to give the student a general introduction to the basic processes of social casework with special emphasis on the individual and his social situation. (Barbee or Carter.)

Social Work 202 s. *Social Casework II* (2)—Two lectures. Prerequisite, Social Work 201 or a similar introductory casework course.

A further analytical study of casework methods. (Barbee.)

SOCIAL WORK 205 s. *Diagnosis as a Part of Casework Treatment* (2)—Two lectures. Prerequisite, completion of one year's work in a graduate school of social work, or its equivalent.

Case material illustrating various types of treatment will be used. Emphasis will be placed upon a study of the early period in treatment so that the student may develop an ability to establish and to understand the relationship with the client, to bring out and evaluate material important for diagnosis, and to meet the real and psychological needs of the client which must be met prior to diagnosis. (Halloway.)

SOCIAL WORK 220 f or s. *A Dynamic Approach to the Problems of Human Behavior* (2)—Two lectures.

The course includes such topics as behavior, its motivation, factors modifying behavior, the structure of the personality and of the psyche, the modification of the personality in various developmental phases, the evidence of maladjustment and an effort to relate maladjustments to experiences and personality patterns. Special reference will be made to the implications of the foregoing for social work in its theory and practice. (Hill.)

SOCIAL WORK 250 s. *Public Welfare Administration* (2)—Two lectures. Open to senior workers, supervisors, and executives who have had some formal training in social work.

The history, function, organization, and administration of local, state, and federal public welfare associations. (Van Driel.)

ZOOLOGY

Courses for Graduates and Advanced Undergraduates

ZOOL. 101 f, 102 s. *Mammalian Anatomy* (2-6)—Laboratory. Registration limited. Permission of the instructor must be obtained before registration.

A course in the dissection of the cat or other mammal. Recommended for pre-medical students, for those whose major is zoology, and for prospective teachers of science in high schools. (Pierson.)

ZOOL 103 f, 104 s. *General Animal Physiology* (3, 3)—Two lectures; one laboratory. Prerequisites, one year of chemistry and one course in vertebrate anatomy. Registration limited to twelve, and permission of instructor must be obtained before registration.

The first semester's work deals with the principles of cellular and general physiology; the second semester is devoted to an application of these principles to the higher animals. (Phillips.)

ZOOL. 105 y. *Aquiculture* (4)—One lecture; one laboratory. Prerequisite, one course in zoology.

A comprehensive consideration of the properties of natural waters which render them suitable for animal environments. (Truitt.)

ZOOL. 106 f, 107 s. *Journal Club* (1, 1).

Reviews, reports, and discussions of current literature. Required of all students whose major is zoology. (Staff.)

ZOOL. 108 f, 109 s. *Faunistic Zoology* (3, 3)—Two lectures; one laboratory. Prerequisite, a knowledge of invertebrate and vertebrate morphology.

Classification, distribution, and habit studies of animals in which local forms are stressed for purpose of illustration. (Newcombe.)

ZOOL. 111 f, 112 s. *Human Osteology* (2-6)—A laboratory course. Registration limited. Permission of the instructor must be obtained before registration. (Not given in 1937-1938.)

A descriptive study of the human skeleton. (Pierson.)

ZOOL. 120 s. *Animal Genetics* (3)—Two lectures; one laboratory. Permission of the instructor must be obtained before registration.

The fundamental principles of heredity and variation. While primarily of interest to students of biology, this course will be of value to those interested in the humanities. Required of students whose major is zoology and who do not have credit for Genetics 101 f. (Burhoe.)

Courses for Graduates

ZOOL. 200 y. *Marine Zoology* (6)—One lecture; two laboratories.

Problems in salt water animal life of the higher phyla. (Truitt.)

ZOOL. 201 y. *Advanced Vertebrate Morphology* (6)—One lecture; two laboratories.

Comparative morphology of selected organ systems of the important vertebrate classes. (Pierson.)

ZOOL. 203 y. *Advanced Embryology* (6)—One lecture; two laboratories.

Mechanics of fertilization and growth. A review of the important contributions in the field of experimental embryology and development of animals. Opportunity will be given for individual research. (Burhoe.)

ZOOL. 204 y. *Advanced Animal Physiology* (6)—One lecture; two laboratories.

The principles of general and cellular physiology as found in animal life. (Phillips.)

ZOOL. 205 y. *Biology of Marine Organisms* (6)—One lecture; two laboratories.

Biotic, physical, and chemical factors of the marine environment, including certain fundamental principles of oceanography. Special reference is made to the Chesapeake Bay region. (Newcombe.)

ZOOL. 206 y. *Research*—Credit to be arranged. (Staff.)

CHESAPEAKE BIOLOGICAL LABORATORY

This laboratory, located in the center of the Chesapeake Bay country, is on Solomons Island, Maryland. It is sponsored by the University in co-operation with the Maryland Conservation Commission, Goucher College, Washington College, Johns Hopkins University, Western Maryland College, and the Carnegie Institution of Washington, in order to afford a center for research and study where facts tending toward a fuller

appreciation of nature may be gathered and disseminated. The program projects a comprehensive survey of the biota of the Chesapeake region.

The laboratory is open from June until September, inclusive; and during the summer of 1937, courses will be offered in the following subjects: Algology, Experimental Zoology, Physiology, Diatoms, Economic Zoology, Invertebrate Zoology, Biological Problems.

These courses, of three credit hours each, are for advanced undergraduates and graduates. They cover a period of six weeks. Not more than two courses may be taken by a student, who must meet the requirement of the Department of Zoology as well as those of the Laboratory before matriculation. Each class is limited to five matriculants. Students working on special research problems may establish residence for the entire summer period.

Laboratory facilities, boats of various types fully equipped (pumps, nets, dredges, and other apparatus), and shallow water collecting devices are available for the work without extra cost to the student.

For full information consult special announcement, which may be obtained upon request from Dr. R. V. Truitt, Director, College Park, Maryland.

GRADUATE COURSES IN THE PROFESSIONAL SCHOOLS AT BALTIMORE

SCHOOL OF MEDICINE

ANATOMY

Minors

The courses recorded under "Minors" are acceptable as graduate courses only if they are taken to satisfy minor requirements in a major subject.

ANAT. 101 s. *Human Gross Anatomy* (10)—Total number of hours 288. Five lectures; fifteen laboratory hours per week throughout the first semester.

A complete dissection of the human body (exclusive of the central nervous system). (Uhlenhuth, Aycock and Figge.)

ANAT. 102 f. *Mammalian Histology* (6)—Two lectures; ten laboratory hours per week.

A general survey of the histological structure of the organs of mammals and man. Opportunity is offered for examining and studying a complete collection of microscopical sections. (Davis, Lutz.)

ANAT. 103 s. *Human Neurology* (4)—Two lectures and four laboratory hours per week for thirteen weeks of the first semester. Prerequisite, Anat. 102 or equivalent.

This course provides a general survey of the structure of the human central nervous system, being mainly directed toward the fiber tracts and nuclei contained therein. It includes a brief study of the special senses. The laboratory work is based on a dissection of the human brain, together with the study of prepared microscopic sections of the brain stem. (Davis, Lutz.)

Majors

ANAT. 202 f and s. *For work leading to a Ph. D. in Anatomy.*

A study of the neurological problems based on 103 s. Only students who have had the preceding course in neurology are eligible for this work. (Davis.)

Courses 203, 204 and 205 are offered throughout the year, including the summer time. Time and credit are adjusted in personal conference between student and instructor.

ANAT. 203. *Advanced Gross Anatomy.*

The study of human anatomy by gross anatomical methods, especially by dissection of specialized structures and limited regions of the human body. The exact nature of this course will depend on the requirements of the applicant. It may be taken by students of anatomy, medicine and biology as well as by physicians desiring graduate work.

(Uhlenhuth, Figge.)

ANAT. 204. *Experimental Anatomy of the Endocrine Glands.*

This course is intended to impart broad familiarity with the subject and to provide, through the medium of laboratory work, a knowledge

of the methods of its investigation. Intimate contact with the instructor, frequent informal discussions and properly selected reading take the place of formal lectures. (Uhlenhuth.)

ANAT. 205. *Problems in the Experimental Anatomy of the Endocrines.* This course is a continuation of the previous one, but on an advanced level. It may be used conveniently for the preparation of a Doctor's thesis and leads to a Ph. D degree. (Uhlenhuth.)

PHARMACOLOGY

All students majoring in pharmacology with a view to securing the degree of Master of Science or Doctor of Philosophy should secure special training in anatomy, mammalian physiology, organic chemistry, and Physical Chemistry 10 y or, preferably, Chemistry 102 y.

Minors

PHARMACOLOGY 101 f and s. *General Pharmacology* (7)—Three lectures; one laboratory. This course consists of 75 lectures and 30 laboratory periods of 3 hours each; offered each year, September to May inclusive, at the Medical School.

Pharmacology as applied to medicine and the fundamental principles of pharmacologic technique are taught in this course, hence it is a prerequisite for all other advanced courses in this subject.

(Krantz, Evans, Musser, Harne, Carr, Johnson.)

Majors

PHARMACOLOGY 202 f. *Chemotherapy.* Credit in accordance with the amount of work accomplished.

The action of new synthetic compounds from a pharmacodynamic point of view. (Krantz.)

PHARMACOLOGY 203 f. *Carbohydrate Metabolism.* Credit in accordance with the amount of work accomplished.

A systematic study of the relationship between chemical constitution and the fate of carbohydrates and carbohydrate-like substances in the animal body. (Krantz and Carr.)

PHARMACOLOGY 204 f. *Research.* Credit in accordance with the amount of work accomplished.

Properly guided research problems in pharmacology and related fields. Open to students majoring in pharmacology. (Krantz, Carr.)

PHYSIOLOGY

Minors

PHYSIOLOGY 101. *The Principles of Physiology* (8)—Three lectures and two laboratory periods a week, supplemented by conferences and demonstrations. February to May, inclusive.

The fundamental concepts of physiology are presented in lectures and illustrated by laboratory experiments. Attention is given especially to those phases of physiology which are essential for a medical training.

(Gregersen and Staff.)

Majors

PHYSIOLOGY 201. *Experimental Mammalian Physiology.* Time and credit by arrangement.

Open to properly qualified graduate students. The work will consist of selected experiments and informal discussions involving the original literature. (Gregersen, Root.)

PHYSIOLOGY 202. *Physiological Effects of Radiation* (1). Lectures and conferences Monday afternoons at four o'clock during November and December. Open only to students with an adequate training in physics. A thesis will be required.

The purpose is to review the general principles and problems concerned in the use of radiation in medicine. (Oster.)

PHYSIOLOGY 203. *Seminar.* Credit according to work done.

Intensive study of the literature in selected fields of physiology as a preparation for research. (Gregersen.)

PHYSIOLOGY 204. *Research.* By arrangement with the head of the department. (Staff.)

BACTERIOLOGY

Minors

BACT. 101 f. Sixteen lectures and 104 laboratory hours (5).

The course includes the preparation and sterilization of culture media and the study of pathogenic bacteria and the more important protozoa. The principles of general bacteriology are discussed in lectures.

BACT. 102 s. Sixteen lectures and 56 laboratory hours (4).

Principles of immunology are discussed in the lectures. Experiments to demonstrate the action of various antibodies are performed by the students.

Majors

BACT. 201. Time and credit are subject to special arrangement. A laboratory course on selected problems of bacteriology. The lectures are supplemented by personal contact with the instructor, discussions of the various phases of the work and by reading.

BACT. 202. *Research.* Time and credit are subject to special arrangement.

BIOCHEMISTRY

Minors

BIOCHEM. 101 s. *Fundamental Principles of Biochemistry* (6)—Six lectures and conferences, and two three-hour laboratory periods per week for sixteen weeks, from February to May, inclusive.

This course is designed to present the fundamental concepts of biological chemistry. The principal constituents and phenomena of living matter are discussed in the lectures and conferences and are examined in the laboratory. Training is afforded in the routine biochemical methods of investigation. This course is a prerequisite for advanced work in this sub-

ject. Graduate students who take this course as a minor toward a higher degree are required to supplement it by extra-curricular work.

(Wylie, Schmidt, Ogden.)

Majors

BIOCHEM. 201 f and s. A course in specialized fields of biochemistry designed to prepare the student for advanced research work. Prerequisite, Biochem. 101 s. The particular phases of biochemistry taken up in this course will vary with the requirements and interests of the student. The course is limited to students working toward a Ph. D. degree in biochemistry and in other biological subjects. Credit is allotted in keeping with the extent and quality of work accomplished. (Wylie, Schmidt.)

BIOCHEM. 202 f and s. *Research.* Limited to graduate students seeking a Ph. D. degree in biochemistry. Credit is given on the basis of extent and quality of accomplishment. (Wylie, Schmidt.)

SCHOOL OF PHARMACY

BOTANY

Courses for Graduates and Advanced Undergraduates

BOT. 101 y. *Taxonomy of the Higher Plants* (4)—One lecture; one laboratory.

A study of the kinds of seed plants and ferns, their classification, and field work on local flora. Emphasis will be placed on official drug plants. Instruction will be given in the preparation of an herbarium.

BOT. 102 y. *Advanced Vegetable Histology* (8)—Two lectures; two laboratories.

Work covers advanced plant anatomy, embedding of material in celloidin and in paraffin, section cutting, etc., leading to research.

Courses for Graduates

BOT. 201 y. *Advanced Study of Vegetable Powders* (8)—Two lectures; two laboratories. Prerequisite, Bot. 102 y.

A study of powdered vegetable drugs and spices from the structural and micro-chemical standpoints, including practice in identification and the detection of adulterants.

BOT. 202 y. *Advanced Taxonomy of Vascular Plants.* Credit dependent on work done. Prerequisite, Bot. 101 y.

BOT. 203 y. *Research in Pharmacognosy.* Credit according to amount and quality of work performed.

PHARMACEUTICAL CHEMISTRY

Courses for Graduates and Advanced Undergraduates

PHAR. CHEM. 101 f. *Chemistry of Medicinal Products* (3-5)—Two lectures; one to three laboratory periods.

A study of the more important medicinal plant products and of synthetic compounds. The laboratory work will include the isolation and identification of plant principles and the preparation of the simpler organic compounds used in medicine. (Hartung.)

PHAR. CHEM. 101 s. *Food Chemistry* (4)—Two lectures; two laboratory periods.

A study of the composition of foods, their adulterants, and the methods employed by public health and industrial laboratories for the analytical examination of foods. (Hartung.)

PHAR. CHEM. 102 y. *Advanced Pharmaceutical Analysis* (3-6)—Three laboratory periods. The course may be elected for either or both semesters, and may be taken by undergraduates with the consent of the professor in charge.

A laboratory study of the qualitative and quantitative analytical procedures and methods as applied to official and commercial, natural and synthetic drugs, their intermediates and derivatives. (Hartung.)

Courses for Graduates

PHAR. CHEM. 201 y. *Chemistry of Alkaloids* (4)—Two lectures.
A survey of the chemical structure and the reactions of pharmaceutically and pharmacologically important organic bases. (Hartung.)

PHAR. CHEM. 202 y. *Advanced Pharmaceutical Syntheses* (1-8)—Laboratory work and conferences.
A study of fundamental and basic chemical procedures employed in the synthesis of various drugs and their intermediates, and a survey of their application. (Hartung.)

PHAR. CHEM. 203 y. *Pharmaceutical Chemistry Seminar* (2).
Reports of progress and discussion of the problems encountered in research and the presentation of papers which survey the recent developments of pharmacutical chemistry reported in the current literature. Required of all students majoring in the department throughout their period of matriculation. (Hartung.)

PHAR. CHEM. 204 y. *History of Pharmaceutical Chemistry* (2-4)—One lecture and assigned reading. (Not given in 1937-1938.)
A study of the development of pharmaceutical chemistry in relation to the history of other sciences, industry and civilization. (Hartung.)

PHAR. CHEM. 205 y. *Research in Pharmaceutical Chemistry.* Credit to be determined by the amount and the quality of the work performed. (Hartung.)

PHARMACOLOGY AND THERAPEUTICS

Courses for Graduates and Advanced Undergraduates

PHARMACOLOGY 101 f. *Physiological Assaying and Testing* (4)—Two lectures, two laboratories. Prerequisite, Physiology 1 f and Pharmacology 1 y.
A course in physiological drug assaying with special reference to the methods of the United States Pharmacopoeia and National Formulary. (Thompson.)

Courses for Graduates

PHARMACOLOGY 201 y. *Advanced Physiological Assaying and Testing* (8)—Two lectures; two laboratories. Prerequisite, Pharmacology 101 f.
A study of modern unofficial methods of physiological assaying applied to the evaluation of medicinal substances. (Thompson.)

PHARMACOLOGY 202 y. *Special Studies in Pharmaco-dynamics* (2-4)—Two lectures; two laboratories. Prerequisite, Pharmacology 101 f.
The procedures involved in pharmacological analysis and in the determination of the site of action and the nature of action of drugs. (Thompson.)

PHARMACOLOGY 203 y. *Physiological Assay Methods* (4-8)—Two lectures; two laboratories. Prerequisite, Pharmacology 101 f.

The development of physiological assay methods for drugs for which no satisfactory chemical or physiological methods are known, involving both library and experimental studies. (Thompson.)

PHARMACOLOGY 204 y. *Research in Pharmacology and Therapeutics.* Credit according to amount and quality of work performed. (Thompson.)

PHARMACY

Courses for Graduates and Advanced Undergraduates

PHARMACY 101 y. (6)—One lecture; two laboratories. Prerequisite, consent of the instructor.

A continuation of the courses given in the pharmacy school in the second and third years with special reference to methods employed in manufacturing pharmacy. (DuMez.)

Courses for Graduates

PHARMACY 201 y. *Advanced Pharmaceutical Technology* (8)—Two lectures; two laboratories.

A study of pharmaceutical manufacturing processes from the standpoint of plants, crude materials used, their collection, preservation, and transformation into forms suitable for therapeutic use. (DuMez.)

PHARMACY 202 y. *Survey of Pharmaceutical Literature.* Credit according to the work performed.

Lectures and topics on the literature pertaining to pharmacy with special reference to the origin and development of the works on drug standards; pharmaceutical periodicals. (DuMez.)

PHARMACY 203 y. *History of Pharmacy.* Credit according to the work performed.

Lectures and topics on the development of pharmacy in America and in the principal countries of Europe. (DuMez.)

PHARMACY 204 y. *Research in Pharmacy.* Credit according to the amount and quality of the work done. (DuMez.)

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