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THE GRADUATE SCHOOL

ANNOUNCEMENTS

1931-1932

COLLEGE PARK, MARYLAND

THE UNIVERSITY *of* MARYLAND

THE GRADUATE SCHOOL ANNOUNCEMENTS

FOR THE SESSIONS OF

1931-1932

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CALENDAR

1931-1932

First Semester

1931		
Sept. 15-17	Tuesday-Thursday	Registration.
Sept. 18	Friday	Instruction for first semester begins.
Sept. 24	Thursday	Last day to change registration.
Oct. 1	Thursday	Last day to file applications for admission to candidacy for the Doctor's degree at Commencement of 1932.
Nov. 26	Thursday	Thanksgiving Day. Holiday.
Dec. 12	Saturday, 12.10 p. m.	Christmas Recess begins.
1932		
Jan. 4	Monday, 8.20 a. m.	Christmas Recess ends.
Jan. 23–Jan. 30	Saturday-Saturday	First semester examinations.

Second Semester

Jan. 18-22	Monday-Friday	Registration for second semester.
Feb. 2	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 1932.
Feb. 8	Monday	Last day to change registration.
Feb. 22	Monday	Washington's Birthday. Holiday.
Mar. 22–Mar. 30	Tuesday, 4.10 p. m.—Wednesday, 8.20 a. m.	Easter Recess.
May 17	Tuesday	Last day to deposit Doctors' theses in the office of the Dean of the Graduate School.
May 24	Tuesday	Last day to deposit Masters' theses in the office of the Dean of the Graduate School.
May 24–June 1	Tuesday-Wednesday	Second semester examinations for seniors.
May 25–June 4	Wednesday-Saturday	Final oral examinations.
May 27–June 4	Friday-Saturday	Second semester examinations.
May 30	Monday	Memorial Day. Holiday.
June 5	Sunday, 11 a. m.	Baccalaureate Sermon.
June 6	Monday	Class Day.
June 7	Tuesday, 11 a. m.	Commencement.

Summer Term

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

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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 degree and 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.

Work in accredited research laboratories of the United States Department of Agriculture and other local national research agencies may be accepted when previously arranged, as residence work in fulfillment of the thesis requirement for a degree. These laboratories are located within easy reach of the University.

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 or 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 close proximity of these libraries to College Park they are a very valuable asset to research and graduate work at the University of Maryland.

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

THE GRADUATE CLUB

The graduate students maintain an active Graduate Club. Several meetings for professional and social purposes are held during the year. Students working in different departments have an opportunity to become acquainted with one another and thus profit by the broad cultural values derived from contacts with fellow students working in different fields.

GENERAL REGULATIONS

ADMISSION

Graduates of colleges and universities of good standing are admitted to the Graduate School. Before entering upon graduate work all applicants must present evidence that they are qualified by their previous work to pursue with profit the graduate courses desired. 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 permits the student to register in the Graduate School. After payment of the fee, the matriculation card is stamped and returned to the student. 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 at the beginning of each semester in the office of the Dean of the Graduate School, Room DD 117, Chemistry building. Students taking graduate work in the Summer School are also required to register in the Graduate School at the beginning of each session. The program of work for the semester or the summer session is 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 in the Dean's office. The student takes the other card, and, in case of a new student, also the matriculation card, to the Registrar's office, where a charge slip for the fee is issued. The charge slip, together with the course card, is presented at the Cashier's office for adjustment of fees. After certification by the Cashier that 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 in 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 those 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 courses. Students with inadequate preparation may be obliged to take some of these courses as prerequisites for advanced courses.

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. This program receives the approval of the Dean by his endorsement of the student's course card.

To encourage thoroughness in scholarship through intensive application, graduate students in the regular sessions taking courses carrying full graduate credit are limited to a program of thirty credit hours for the year. Students holding half-time graduate assistantships are usually limited to sixteen credit hours for the year. Four or six additional credits may be allowed if six or more of the total constitute seminar and research work.

Residence credit for all research work relating directly to the Master's or the Doctor's thesis should be stated as credit hours on the registration card for the semester in which the work is to be done. If a student is doing only research work under the direction of an official of the institution he must register and pay for a minimum of four credit hours per semester. The number of credit hours reported at the end of the semester will depend upon the work accomplished, but it will not exceed the number for which the student is registered.

SUMMER GRADUATE WORK

Graduate work in the Summer Session may be counted as residence toward an advanced degree. Four Summer Sessions may be accepted as satisfying the residence requirement for the Master's degree. By carrying approximately six semester hours of graduate work for each of four sessions and submitting a satisfactory thesis, students may be granted the degree of Master of Arts or Master of Science. In some instances a fifth summer may be required in order to complete the thesis. Teachers and other graduate students working for a degree on the summer plan must meet the same requirements and proceed in the same way as do students enrolled in the other sessions of the University.

A student who is not working for a degree on the regular Summer School plan may satisfy one-third of an academic year's residence by full-time graduate work for 11 or 12 weeks during the summer, provided satisfactory supervision and facilities for summer work are available in the student's field.

The University publishes a special bulletin giving full information concerning the Summer School and the graduate courses offered during the Summer Session. This bulletin is available upon application to the Registrar of the University.

GRADUATE WORK IN PROFESSIONAL SCHOOLS AT BALTIMORE

Graduate courses and opportunities for research work 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 page 50.

GRADUATE WORK BY SENIORS IN THIS UNIVERSITY

Seniors who have completed all of 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.

Seniors of this University who have nearly completed the requirements for the undergraduate degree may, with the approval of their undergraduate Dean and the Dean of the Graduate School, register in the undergraduate college for graduate courses, which will be transferred for graduate credit toward a degree at this University, but the total of undergraduate and graduate courses must not exceed 15 credits for the semester.

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 accompany the application unless these are already on file in the Dean's office.

A student making application for admission to candidacy for the degree of Doctor of Philosophy must also obtain from the head of the Modern Language department, a statement that he possesses a reading knowledge of French and German.

Admission to candidacy in no case assures the student of a degree, but merely signifies that the candidate has met all of the formal requirements and is considered by his instructors sufficiently prepared and able to pursue such graduate study and research as is demanded by the requirements of the degree sought. The candidate must show superior scholarship by the type of graduate work already completed. Preliminary examinations or such other substantial tests as the departments elect are also required for admission to candidacy for the degree of Doctor of Philosophy.

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 the equivalent of one semester of graduate work has been completed.

Residence Requirements. The standard residence requirement is one academic year, but this does not mean that the work prescribed for each individual student can always be completed in one academic year. Inadequate preparation for the graduate courses the student wishes to pursue may make a longer period necessary.

Credits and Scholarship Requirements. The minimum credit requirement is 30 semester hours in courses approved for graduate credit. From 10 to 12 credits must lie outside the major subject and form a coherent group of courses intended to supplement and support the major work. A minimum of 18 credits, including the thesis credits, must be devoted to the major subject. At least one-half of the total credits in the major subject must be earned in courses for graduates only. The credits for thesis work are included. The number of major credits allowed for thesis work will range from 6 to 10, depending upon the amount of work done and upon the major course requirements. The maximum total credit for the one hour per week seminar courses is limited to four semester hours in the major subject and to two semester hours in the minor subjects. At least 20 of the 30 semester 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 the final examination will cover all graduate work offered in fulfillment of the requirements for the degree. The Graduate Council, upon recommendation of the head of the major department, passes upon all graduate work accepted from other institutions. No credits are acceptable for an advanced degree that are reported with a grade lower than "C".

Thesis. The thesis required for the Master's degree should be typewritten on a good quality of paper 11 x 8½ inches in size. The original copy must be deposited in the office of the Graduate School not later than two weeks before commencement. One or two additional copies should be provided for use of members of the examining committee prior to the final examination.

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 the examination. 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 examination 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 final examination is oral, but a previous written examination in courses of the semester immediately preceding the examination may be re-

quired at the option of the individual members of the committee. The period for the oral examination should be approximately 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 October 1 of the academic year in which the degree is sought.

Residence. Three years of full-time resident graduate study beyond the Bachelor's degree or two years beyond the Master's degree 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 of the thesis must be deposited in the office of the Dean at least three weeks before the time the degree is granted. One or two extra copies should be provided for use of members of the examining committee prior to the date of the final examination. The theses are printed in such form as the committee and the Dean may approve and fifty copies are deposited in the library.

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 should be approximately three hours and should cover 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. Candidates for the doctor's degree are expected to possess a reading knowledge of French and German. In the examination they will be expected to read at sight from books or articles in their specialized fields. It is not expected that the candidate know every single word of the text. The examiners will supply occasional foreign terms, but it is presumed that the student knows sufficient grammar to recognize inflectional forms.

2. The student is asked to bring books or periodicals to the examination to the amount of about 400 to 500 pages, from which the examiners will select a number of paragraphs for the reading test.

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. Graduate students expecting to take the examination are asked to register their names in the Graduate School Office at least three days prior to the test. *Examinations are held in the office of the Modern Language Department 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 $1.50 per semester credit hour, with a minimum charge of $6.00.

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

Graduation fee, including hood (doctor's degree), $20.00.

FELLOWSHIPS AND GRADUATE ASSISTANTSHIPS

A number of fellowships and graduate assistantships have been established by the University. A few industrial fellowships are also available in certain departments.

Applications for Fellowships and Graduate Assistantships. Application blanks may be obtained at the office of the Dean of the Graduate School. All applications with the necessary credentials are sent by the applicant direct to the Dean not later than May 15. His endorsement assures the applicant of admission to the Graduate School in case he is awarded either a fellowship or a graduate assistantship. After the applications have been approved by the Dean they are sent to the heads of the departments concerned who make the selection and recommend to the proper administrative officer that the successful applicants be appointed. All of the applications, together with the credentials, are then returned to the office of the Dean of the Graduate

School. Those of the successful applicants properly endorsed are placed on file for record. The credentials will be returned to the unsuccessful applicants.

Stipend. The University fellowships pay $500 and the appointment is for the academic year. In certain cases the term of appointment may be extended to include one or two summer months in addition to the nine months of the academic year.

The stipend for the industrial fellowships varies according to the type of fellowship.

The stipend attached to the graduate assistantships is $1,000 per annum and the appointments are made for twelve months, with one month's vacation. Graduate students holding appointments as fellows or graduate assistants are exempt from all fees except graduation fees.

Service Requirements. Each University fellow is expected to give a limited portion of his time to instruction or performing equivalent duties prescribed by the major department. The usual maximum amount of service required is five hours per week of class-room work or twelve hours of laboratory and other prescribed duties. No service is required of the industrial fellow other than research. The teaching graduate assistants devote one-half of their time to instruction. This is equivalent to about one-half of the load of a full-time instructor. Several research assistantships are offered by the Experiment Station and the only service required is in connection with research projects.

Residence Requirements for a Degree. Fellows may satisfy the residence requirements for either the Master's or Doctor's degree without extension of the usual time.

The Graduate Assistants are required to spend two years in residence for the Master's degree, but for the Doctor's degree they are allowed two-thirds residence credit for each academic year at this University, so that the minimum residence requirement from the Bachelor's degree may be satisfied in four academic years and one summer or three academic years and three summers of 11 to 12 weeks.

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:

The letter following the number of the course indicates the semester in which the course is offered: Thus, 1f is offered the first semester; 1s, the second semester; 1y, the year. A capital S after a course number indicates that the course is offered in the summer session only.

The number of hours' credit is shown by the arabic numeral in parenthesis after the title of the course.

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)—Three lectures.

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

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

Historical and comparative development of farmers' co-operative organizations; reasons for failure and essentials to success; present tendencies. (Russell.)

A. E. 104 s. *Agricultural Finance* (3)—Three lectures. *Agricultural Credit* requirements; institutions financing agriculture; financing specific farm organizations and industries. *Taxation* of various farm properties; burden of taxation on different industries; methods of taxation; proposals for tax reform. *Farm Insurance*—fire, crop, livestock, and life insurance—how provided, benefits, and needed extension. (Russell.)

A. E. 105 s. *Food Products Inspection* (2).

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 students primary instruction in the grading, standardizing and inspection of fruits and vegetables, dairy products, poultry products, and meats. Theoretical instruction covering the fundamental principles will be given in the form of lectures, while the demonstrational and practical work will be conducted through field trips to Washington, D. C., and Baltimore. (Staff.)

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.)

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* (1-3).

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 and Thesis* (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.)

AGRICULTURAL EDUCATION AND RURAL LIFE

Courses for Graduates and Advanced Undergraduates

Ag. Ed. 100 s. *Survey of Teaching Methods for Agricultural Students* (3)—Two lectures; one laboratory. Open to Juniors and Seniors; required of Juniors in Agricultural Education. Prerequisite, Ed. 101. Cannot be counted toward major for advanced degree in Agricultural Education.

The nature of educational objectives, the class period, steps of the lesson plan, observation and critiques, type lessons, lesson planning, class management. (Cotterman.)

Ag. Ed. 101 y. *Teaching Secondary Vocational Agriculture* (8)—Three lectures; one laboratory the first semester. One seminar period and practicum work to be arranged the second semester. Practicum work may be arranged during the first semester. Prerequisites, Ag. Ed. 100; A. H. 1, 2; Dairy 1; Poultry 1; Soils 1; Agronomy 1, 2; Hort. 1, 11; F. Mech. 101, 104; A. E. 1; F. M. 2. Cannot be counted toward major for advanced degree in Agricultural Education.

Types of schools and classes; administrative programs; qualifications of teachers; day class instruction—objectives, selection of projects, project instruction, selection of content for group instruction, methods of class period; evening class instruction; part-time class instruction; equipment and other administrative problems; unit courses; student projects; investigations; reports. (Cotterman.)

Ag. Ed. 102 s. *Rural Life and Education* (3)—Three lectures.

Ancient and foreign rural communities; evolution of American rural communities; rural social institutions; social and cultural measurements, standards of living; the analysis of rural communities; community and educational programs; problems in leadership; investigations; reports. This 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.)

Ag. Ed. 103 s. *Objectives and Methods in Extension Education* (2-3)—Two lectures.

Given under the supervision of the Extension Service, and designed to equip young men to enter the broad field of extension work. Methods of assembling and disseminating the agricultural information available for the practical farmer; administration, organization, supervision, and practical details connected with the work of a successful county agent, with club

work and duties of an extension specialist. Students will be required to gain experience under the guidance of men experienced in the respective fields. Traveling expenses for this course will be adjusted according to circumstances, the ability of the man, and the service rendered. (Cotterman and Extension Specialists.)

Ag. Ed. 104 s. *Teaching Farm Shop in Secondary Schools* (1)—One lecture. Cannot be counted toward major for an advanced degree in Agricultural Education.

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.)

Ag. Ed. 106 f. *Project Cost Accounting* (1)—One two-hour practicum period per week. Cannot be counted toward major for an advanced degree in Agricultural Education.

Objectives in cost accounting in vocational agriculture; cost accounting as a device in developing the home project, contemporary developments; home projects; record books and systems; uses of home projects; standards in project work; parental interest in project records; publicity; permanent school project records; significant cases; investigations and reports. (Worthington.)

Ag. Ed. 107 y. *Farm Practicums and Demonstrations* (2)—One laboratory period per week. Cannot be used for credit toward an advanced degree in Agricultural Education.

The essential practicums and demonstrations in vocational agriculture in the secondary school; objectives; organization; equipment; equipment construction; laboratory practice in deficiencies; special assignments and reports. This course is designed especially to check the agricultural student's training in skills and to introduce him to the conditions under which such training must be given in the laboratories and patronage areas of vocational departments. (Cotterman and assistants.)

Courses for Graduates

Ag. Ed. 201 f. *Comparative Agricultural Education* (3)—Prerequisites, Ag. Ed. 101.

State systems of instruction in agriculture are examined and evaluated from the standpoint of analysis of the work of the teacher; day-classes; evening; part-time instruction. Investigations and reports. (Cotterman.)

Ag. Ed. 202 s. *Supervision of Vocational Agriculture* (3)—Prerequisites, Ag. Ed. 101.

Analysis of the work of the supervisor; supervisory programs; policies; problems; contemporary developments; principles of supervision; investigations; reports. (Cotterman.)

Ag. Ed. 203 s. *School and Rural Community Studies* (2).

The function of school and rural community studies; typical studies, their purposes and findings; types of surveys; sources of information; planning and preparation of studies; collection, tabulation and interpretation of data. Essentially a course for those majoring and preparing theses in Agricultural Education.

Ag. Ed. 204 s. *Seminar in Agricultural Education* (3).

Problems in the administration and organization of agricultural education—prevocational, secondary, collegiate and extension; individual problems and papers; current literature. (Cotterman.)

Ed. 202 f. *College Teaching* (3).

Ed. 203 s. *Problems in Higher Education* (3).

(See Courses under Education, page 31.)

AGRONOMY

Division 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. 120 s. *Cropping Systems and Methods* (2)—Two lectures. Prerequisites, Agron. 1 and Soils 1.

Principles and factors influencing cropping systems in the United States; study of rotation experiments; theories of cropping methods; and practice in arranging type farming systems. (Metzger.)

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

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

Courses for Graduates

Agron. 201 y. *Crop Breeding*—Credits determined by work accomplished

The content of this course is similar to that of Agron 103, but will be adapted more to graduate students, and more of a range will be allowed in choice of material 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*—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 and Advanced Undergraduates

Soils 104 s. *Soil Micro-Biology* (3)—Two lectures; one laboratory. Prerequisite, Bact. 1.

A study of the micro-organisms of the soil in relation to fertility. It in-

cludes 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, algæ, and protozoa.

This course includes a critical study of the methods used by Experiment Stations in soil investigational work. (Thom.)

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* (7-5 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.)

ANIMAL HUSBANDRY

Courses for Graduates and Advanced Undergraduates

A. H. 101 s. *Nutrition* (3)—Two lectures; one laboratory. Senior year.

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

A. H. 102 y. *Seminar* (2)—One lecture. Senior and graduate students only. 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.)

Courses for Graduates

A. H. 201 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, Hunt.)

BACTERIOLOGY AND PATHOLOGY

Courses for Graduates and Advanced Undergraduates

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

Bacteria in milk, sources and development; care and preservation of milk and cream; pasteurization. Public health requirements. Standards Methods of Milk Analysis; practice in the bacteriological control of milk supplies; occasional inspection trips. (Black.)

Bact. 102 s. *Dairy Bacteriology* (Continued) (3)—One lecture; two laboratories. Prerequisite, Bact. 101 f.

Relation of bacteria, yeasts and molds to ice cream, butter, cheese, and other dairy products; sources of contamination. Bacteriologicol analyses and control; occasional inspection trips. (Black.)

Bact. 103 f. *Hematology* (2)—Two laboratories. Bact. 1, desirable.

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 f. *Serology* (3)—One lecture; two laboratories. Junior year. Prerequisite, Bact. 2.

The theory of agglutinin, precipitin, lysin and complement fixation reactions and their application in the identification of bacteria and diagnosis of disease; preparation of necessary reagents; general immunologic technique. (Black.)

Bact. 106 f. *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. 107 s. *Urinalysis* (2)—Two laboratories. Bact. 1, desirable.

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

Bact. 109 f. *Pathological Technique* (3)—One lecture; two laboratories. Bact. 1, desirable.

Examination of fresh material; fixation; isolation; decalcification. Sectioning by free hand and freezing methods; celloidin and paraffin imbedding and sanctioning. General staining methods. (Reed.)

Bact. 110 s. *Pathological Technique* (Continued) (3)—One lecture; two laboratories. Prerequisite, Bact. 109.

Special methods. (Reed.)

Bact. 112 s. *Sanitary Bacteriology* (3)—One lecture; two laboratories. Also open to senior engineers as a one hour lecture course. Prerequisite for laboratory, Bact. 1.

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

Bact. 120 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. 121 f. *Bacteriological Problems* (3-5)—Laboratory. Prerequisite, Bact. 1.

This course is intended primarily to give the student a chance to develop

his own initiative. He will be allowed to decide upon his project and work it out as much as possible in his own way under proper supervision. In this manner he will be able to apply his knowledge of bacteriology to a given problem in that particular field in which he is interested. He will get to know something of the methods of research. Familiarity with library practices and current literature will be included. (Black and Pickens.)

BACT. 122 s. *Bacteriological Problems* (Continued) (3-5)—Laboratory. Prerequisite, Bact. 1. (Black and Pickens.)

BACT. 123 f. *Thesis* (4)—Laboratory. Prerequisites, Bact. 1 and at least one of the advanced courses. May be substituted for Bact. 121.

Investigation of given project, results of which are to be presented in the form of a thesis and submitted for credit towards graduation. (Pickens and Black.)

BACT. 124 s. *Thesis* (Continued) (4)—Senior year. Prerequisites, Bact. 1 and at least one of the advanced courses. May be substituted for Bact. 122. (Pickens and Black.)

BACT. 125 s. *Public Health* (1)—One lecture. Prerequisite, Bact. 1.

A series of weekly lectures on Public Health and its Administration, by the experts of the Maryland State Board of Health. (Pickens, in charge.)

BACT. 130 f. *Seminar* (1)—Prerequisites, Bact. 1 and at least one of the advanced courses.

The work will consist of making reports on individual projects and on recent scientific literature. (Pickens and staff.)

BACT. 131 s. *Seminar* (Continued) (1)—Prerequisites, Bact. 1 and at least one of the advanced courses. (Pickens and staff.)

Courses for Graduates

BACT. 201 f. *Research Bacteriology* (2-10)—Laboratory. Prerequisites, Bact. 1 and any other courses needed for the particular project. (Pickens and Black.)

BACT. 202 s. *Research Bacteriology* (Continued) (2-10)—Laboratory. Prerequisites, Bact. 1 and any other courses needed for the particular project. (Pickens and Black.)

BACT. 203 f. *Research in Genital Diseases of Farm Animals* (2-6)—Prerequisite degree in Veterinary Medicine from an approved Veterinary college. Laboratory and field work by assignment. (Reed.)

BACT. 204 s. *Research in Genital Diseases of Farm Animals* (Continued) (2-6)—Prerequisite degree in Veterinary Medicine from an approved Veterinary college. ((Reed.)

*BACT. 205 f. *Advanced Food Bacteriology* (3)—Two lectures; one laboratory. Prerequisite, Bact., 10 hours.

Critical review of microrganisms necessary or beneficial to food products. Food spoilage; theories and advanced methods in food preservation. Application of bacteriological control methods to manufacturing operations. (James.)

*BACT. 206 s. *Physiology of Bacteria* (2)—Two lectures; one laboratory. Prerequisites, Bact., 10 hours and Chem., 108 or equivalent.

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*Ten students are required for each of these courses. A special fee is charged for them.

Chemical composition of bacteria; life cycles; influence of environmental conditions on growth and metabolism; bacterial enzymes; fermentations; protein decomposition; disinfection; bacterial variation; 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.)

BOTANY

(For other Botanical Courses see Plant Physiology and Plant Pathology.)

Courses for Graduates and Advanced Undergraduates

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

A study of the structures of roots, stems, leaves, flowers, and fruits; the origin and development of organs and tissue systems in vascular plants. (Temple.)

BOT. 102 s. *Methods in Plant Histology* (3)—One lecture; two laboratories. Prerequisite, Bot. 1.

Primarily a study in technique. It includes methods of the killing, fixing, imbedding, sectioning, staining, and mounting of plant materials. (Temple.)

BOT. 103 f or s. *Advanced Taxonomy* (3)—One lecture; two laboratories. Prerequisite, Bot. 1.

This course is offered for students who want more proficiency in systematic botany than the elementary course affords. (Norton.)

BOT. 105 s. *Economic Plants* (2)—One lecture; one laboratory. Not offered in 1931-32.

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 in 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. Not offered in 1932-33.

Discussion of the development of the ideas and knowledge about plants. (Norton.)

Courses for Graduates

BOT. 202. *Special Studies of Fungi*—Credit hours according to work done. Prerequisite, Plt. Path. 109 or equivalent.

Special problems in the structure or life history of fungi or the monographic study of some group of fungi. (Norton.)

BOT. 203. *Special Plant Taxonomy*—Credit hours according to work done. Prerequisite, Bot. 103.

Original studies in the taxonomy of some group of plants. (Norton.)

BOT. 204. *Research in Plant Taxonomy*—Credit hours according to work done. (Norton.)

CHEMISTRY

A. General Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 100 s. *Special Topics for Teachers of Elementary Chemistry* (2)—Two lectures. Prerequisite Inorg. Chem. 1 s or equivalent.

A study of the method of presentation and the content of a High School Chemistry Course. It is designed chiefly to give a more complete understanding of the subject-matter than is usually contained in an elementary course. Some of the more recent advances in inorganic chemistry will be discussed. (Given in Summer School.) (White.)

Courses for Graduates

CHEM. 200 y. *Advanced Inorganic Chemistry* (6)—Two lectures; one laboratory. Prerequisite, Chem. 6 y.

A study of the rarer elements is made by comparing their properties with those of the more common elements. The course is based upon the periodic system, the electromotive series, and the electronic structure of matter. The laboratory is devoted to the preparation of pure, inorganic substances. (White.)

CHEM. 201 y. *Research in Inorganic Chemistry* (12)—Open to students working for the higher degrees. (White.)

B. Analytical Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 101 y. *Advanced Quantitative Analysis* (10)—Two lectures. Three laboratories each semester.

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. Prerequisite, Chem. 6 or its equivalent. (Wiley.)

CHEM. 202 y. *Research in Quantitative Analysis* (12)—Open to students working for the higher degrees. (Wiley.)

C. Organic Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 116 y. *Advanced Organic Chemistry* (8) or (10)—Two lectures; two or three laboratory periods. Prerequisite, Chem. 8 f or s or its equivalent.

This course is devoted to a more advanced study of the compounds of carbon than is undertaken in Chem. 8 f or s. The three credit laboratory course is required of graduate students specializing in chemistry. Seniors and

juniors may take the two credit laboratory course. The laboratory work includes quantitative determinations of halogen, nitrogen, carbon and hydrogen in organic substances, and also preparation work more difficult than encountered in the elementary course. The laboratory work of the second half year will be devoted principally to organic qualitative analysis. Required of students specializing in chemistry. Course 116 y may be taken without the laboratory work. (Drake.)

Courses for Graduates

CHEM 203 f. *Special Topics in Organic Chemistry* (2)—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, carbon-hydrates, plant pigments, etc. The subject-matter will be varied to suit best the needs of the particular group enrolled. (Drake.)

CHEM. 204 s. *Special Topics in Organic Chemistry* (2)—A continuation of Chem. 203 f. Either this course or course 203 f will be given when there is sufficient demand. (Drake.)

CHEM. 205 f or 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 or s. *Organic Micro Analysis* (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 210. *Research in Organic Chemistry* (12)—Open to students working for the higher degrees. (Drake.)

D. Physical Chemistry

Courses for Graduates and Advanced Undergraduates

CHEM. 102 y. *Physical Chemistry* (10)—Three lectures; two laboratory periods. Prerequisites, Chem. 6 y; Physics, 2 y; Math. 6 s. One term may be taken for graduate credit.

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

Courses for Graduates

NOTE: CHEM., 102 y or its equivalent is prerequisite for all advanced courses in physical chemistry.

CHEM. 212 y. *Colloid Chemistry* (8) or (4)—Two lectures; two laboratory periods; or two lectures only.

This is a thorough course in the chemistry of matter associated with surface energy. (Haring.)

CHEM. 213 f. *Phase Rule* (2)—Two lectures.

A systematic study of heterogeneous equilibria. One, two, and three component systems will be considered with practical applications of each. (Not given 1931-1932.) (Haring.)

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

Subjects considered will be radioactivity, isotopes, the Bohr and Lewis-Langmuir theories of atomic structure, and allied topics. (Not given 1931-1932.) (Haring.)

CHEM. 215 f. *Catalysis* (2)—Two lectures.

This course consists of lectures on the theory and applications of catalysis. (Not given 1931-1932.) (Haring.)

CHEM. 216 s. *Theory of Solutions* (2)—Two lectures.

A detailed study will be made of the modern theory of ideal solutions, of the theory of electrolytic dissociation and of the recent developments of the latter. (Not given 1931-1932.) (Haring.)

CHEM. 217 y. *Electrochemistry* (8) or (4)—Two lectures; two laboratory periods; or two lectures only.

A study of the principles and some of the practical applications of electrochemistry. (Not given 1931-1932.) (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 y. *Research in Physical Chemistry* (12)—Open to students working for the higher degrees. (Haring.)

E. Agricultural Chemistry

Courses for Graduates and Advanced Undergraduates

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

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 the 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 f or its equivalent.

A study of the chemistry of the fats, carbohydrates and proteins and their fate in digestion and metabolism. (Broughton.)

CHEM. 115 f or s. *Organic Analysis* (4)—One lecture; three laboratories. Prerequisite, Chem. 6 y and 8 y.

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 publications of the Association of the Official Agricultural Chemists are used freely as references. (Broughton.)

Courses for Graduates

CHEM. 220 f or s. *Special Problems* (4 to 8)—A 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 ten hours each week. Prerequisite, Chem. 104 f and consent of instructor.

This course consists of studies of special methods such as the separation of the fatty acids from a selected fat, the preparation of certain 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. 221 f or s. *Tissue Analysis* (3)—Three laboratories. Prerequisite, Chem. 12 f or its equivalent.

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

CHEM. 223 f. *Physiological Chemistry* (5)—Three lectures; two laboratories. Prerequisites, Organic Chemistry 12 f or its equivalent.

Lectures and laboratories on the study of the constitution and reactions of proteins, fats, carbohydrates and allied compounds of biological importance. (Broughton.)

CHEM. 224 f or s. *Research* (5 to 10)—Agricultural chemical problems will be assigned to graduate students who wish to gain an advanced degree. (Broughton.)

F. Industrial Chemistry

Courses for Graduates and Advanced Undergraduates

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

A study of the principal chemical industries; factory inspection, trips and reports; the preparation of a paper on some subject of importance in the chemical industries. (Machwart.)

CHEM. 111 y. *Engineering Chemistry* (3) or (2)—Two lectures; one laboratory period; or two lectures.

A study of water, fuels and combustion, the chemistry of engineering materials, etc. Problems typical of engineering work. (Machwart.)

CHEM. 112 f or s. *Technical Methods* (3)—One lecture; two laboratories. Prerequisite, Chem. 6 y.

An examination of water from an industrial viewpoint. (Machwart.)

Courses for Graduates

CHEM. 222. *Unit Operations* (3)—Three lectures. Prerequisite, consent of instructor.

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

CHEM. 225 y. *Research in Industrial Chemistry.* The investigation of special problems and the preparation of a thesis toward an advanced degree. (Machwart.)

G. Chemistry Seminar

CHEM. 226 y—(2) Required of *all* graduate students in chemistry. The students are required to prepare reports of papers in the current literature. These are discussed in connection with the recent advances in the subject. (The Chemistry Staff.)

DAIRY HUSBANDRY

Courses for Graduates and Advanced Undergraduates

D. H. 101 s. *Advanced Breed Study* (2)—One lecture: one laboratory. Breed Association rules and regulations, important families and individuals, pedigree studies. Work largely by assignment. (Ingham.)

D. H. 102 s. *Advanced Dairy Manufacturing* (3)—Hours to be arranged as to lecture and laboratory. Prerequisites, D. H. 4.

Plant and laboratory management, storage problems. Study of costs of production, accounting systems, purchase of equipment and supplies, market conditions, relation of the manufacturer to the shipper and dealer.

In this course the student will be required to act as helper and foreman and will be given an opportunity to participate in the general management of the dairy plant. Visits will be made to nearby dairies and ice-cream establishments. (Munkwitz.)

D. H. 103 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.)

Courses for Graduates

D. H. 201 y. *Research.* Credit to be determined by the amount and quality of work done. Students will be required to pursue, with the approval of the head of the department, an original investigation in some phase of dairy husbandry, carry the same to completion, and report the results in the form of a thesis. (Meade, Munkwitz, Ingham.)

ECONOMICS AND SOCIOLOGY

A. Economics

Courses for Graduates and Advanced Undergraduates

ECON. 101 f. *Money and Credit* (2)—Two lectures. Prerequisite, Econ. 3 y 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. (Brown.)

Econ. 102 s. *Banking* (2)—Two lectures. Prerequisites, Econ. 101 f.

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

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. (Brown.)

Econ. 104 s. *Investments* (3)—Three lectures. Prerequisites, Econ. 3 y and senior standing.

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

Econ. 105 f. *Business Organization and Operation* (2)—Two lectures. Prerequisite, Econ. 3 y.

A study of the growth of large business organizations. Types of organization are studied from the viewpoints of legal status, relative efficiency, and social effects. (Dodder.)

Econ. 107 f. *Business Law* (3)—Three Lectures. Prerequisite, junior standing.

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

Econ. 108 s. *Business Law* (3)—Three lectures. Prerequisite, Econ. 107 f. A continuation of Econ. 107 f. (Johnson.)

Econ. 109 y. *Introductory Accounting* (6)—Two lectures; one laboratory.

This course has two aims; namely, to give the prospective business man an idea of accounting as a means of control, and to serve as a basic course for advanced and specialized accounting. Methods and procedure of accounting in the single proprietorship, partnership, and corporation are studied. (Dodder.)

Econ. 110 y. *Principles of Accounting* (6)—Three lectures. Prerequisite, Econ. 109 y.

A continuation of Econ. 109 y with emphasis placed upon the theory of accounting. Special phases of corporation accounting are studied. The introduction of accounting systems for manufacturing, commercial and financial institutions. (Dodder.)

Econ. 111 f. *Public Finance* (2)—Two lectures. Prerequisite, Econ. 3 y.

The nature of public expenditures, sources of revenue, taxation and budgeting. Special emphasis upon the practical, social and economic problems involved. (Johnson.)

Econ. 112 s. *Land Transportation* (3)—Three lectures. Prerequisite, Econ. 3 y or Econ. 5 f or s. Not open to students who receive credit in A. E. 101 s.

The development of inland means of transportation in the United States.

This course is largely devoted 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. (Johnson.)

Econ. 114 s. *Insurance* (3)—Three 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. (Johnson.)

Econ. 115 y. *History of Economic Theory* (4)—Two lectures. Prerequisite, Econ. 4 s and senior standing.

History of economic doctrines and theories from the eighteenth century to the modern period. (Johnson.)

Econ. 116 s. *Principles of Foreign Trade* (3)—Three lectures. Prerequisite, 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. 117 f. *Labor Problems* (3)—Three lectures. Prerequisite, Econ. 3 y or consent of the instructor.

The background of the labor problem, wage determination, unemployment and remedies for it, labor organizations, agencies for promoting industrial peace, the economic, social and political programs of labor at the present time. (Brown.)

Econ. 119 f. *Advanced Economics* (2)—Two lectures. Prerequisites, Econ. 3 y and senior standing.

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

Econ. 120 s. *Applied Economics* (2)—Two lectures. Prerequisites, Econ. 119 f.

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

Courses for Graduates

Econ. 201 y. *Thesis* (4-6)—Graduate standing. (Members of the staff.)

B. Sociology

Courses for Graduates and Advanced Undergraduates

Soc. 101 y. *Social Pathology and Social Work* (4)—Two lectures. Prerequisite, Soc. 1 f.

Causative factors and social complications in individual and group pathological conditions; types of social work and institutional treatment; the theory and technique of social case work; visits to major social agencies. (Bellman.)

Soc. 103 f. *History of Social Theory* (3)—Three lectures. Prerequisites, Soc. 1 f and four additional hours of sociology, or consent of instructor.

A survey of man's attempt to understand and explain the origin, nature and laws of human society; the emergence and establishment of sociology as a social science. (Bellman.)

Soc. 104 s. *Contemporary Sociological Theories and Methods* (3)—Three lectures. Prerequisites, Soc. 103 f.

A survey of the most important contemporary sociological theories in combination with a general analysis of research methods used by the sociologist. (Bellman.) (Not given in 1931-1932.)

(For other courses see Education, Agricultural Education and Rural Life.)

EDUCATION

A. History and Principles

Courses for Graduates and Advanced Undergraduates

Ed. 102 s. *Technic of Teaching* (3)—Required of juniors in Education. Prerequisite, Ed. 101 f.

Educational objectives and outcomes of teaching; types of lesson: problem, project and unit; measuring results and marking; socialization and directed study; classroom management; observation. (Long.)

Ed. 103 s. *Principles of Secondary Education* (3)—Required of all seniors in Education. Prerequisites, Ed. 101 f, Ed. 102 s, and full senior standing.

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. (Small.)

Ed. 104 f. *History of Education* (3)—Senior Elective.

History of the evolution of educational theory, institutions, and practices. Emphasis is upon the modern period. (Small.)

Ed. 105 f. *Educational Sociology* (3)—Three lectures.

The sociological foundations of education; the major educational objectives; the function of educational institutions; the program of studies; objectives of the school subjects; group needs and demands; methods of determining educational objectives. (Cotterman.)

Ed. 110 s. *The Junior High School* (2)—Senior Elective.

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. *Historical Backgrounds of Scientific Achievement* (2).

A study of the more important contributions to the progress of science with special attention upon the lives and characters of the men and women who made them. Stress is placed upon the discovery of pertinent historical and biographical writings suitable for use in high school classes. (Brechbill.)

Ag. Ed. 102 s. *Rural Life and Education.*

Ag. Ed. 105 f. *School and Rural Community Surveys.*

(See Agricultural Education.)

Courses for Graduates

Ed. 201 y. *Seminar in Education* (6)—(The course is organized in semester units.)

Problems in educational organization and administration. Study of current literature; individual problems. (Small.)

Ed. 202 f. *College Teaching* (3)—One seminar period.

Analysis of the work of the college teacher; objectives; nature of subject matter; nature of learning; characteristics of college students; methods of college teachers; measuring results; extra-course duties; problems; investigations; reports. (Cotterman.)

Ed. 203 s. *Problems in Higher Education* (3)—One double period a week. Lectures, surveys, and individual reports. Prerequisite, Ed. 202 f.

American collegiate education; status of the college teacher; collegiate education in foreign countries; demands upon institutions of higher learning; tendencies in the reorganization of collegiate education; curriculum problems; equipment for teaching. (Cotterman.)

Ed. 204 s. *Chemical Education* (3)—Two lectures. Open to graduate students whose major is Chemistry. Prerequisites, Ed. 101 f and Ed. 202 f.

Recent developments in the field of chemical education methods, laboratory design, equipment, etc. Required of all students qualifying for college chemistry teaching.

B. Educational Psychology

Courses for Graduates and Advanced Undergraduates

Ed. 106 s. *Advanced Educational Psychology* (3)—Prerequisite, Ed. 101 f and Ed. 102 s. The latter may be taken concurrently with Ed. 106 s.

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. (Sprowls.)

Ed. 107 f. *Educational Measurements* (3)—Prerequisites, Ed. 101 f and Ed. 102 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. (Sprowls.)

Ed. 108 s. *Mental Hygiene* (3)—Prerequisite, Ed. 101 f or Psychol. 1 f or s or equivalent.

Normal Tendencies in the development of character and personality. Solving problems of adjustment to school and society; obsessions, fears, compulsions, conflicts, inhibitions, and compensations. Methods of personality analysis. (Sprowls.)

Ed. 109 y. *Child Development* (4)—Seniors and graduate students. Prerequisite, H. E. Ed. 102 f or equivalent.

A survey of existent knowledge of the physiological, psychological, and psychiatric development of children. This course is given at the Washington Child Research Center, Tuesday and Thursday at 4 P. M. (Sherman.)

Courses for Graduates

Ed. 205 f-s. *Psychiatric Problems in Education* (3-3).

This course is open to graduate students who have sufficient background in psychology and education and have demonstrated ability to undertake a minor research. Conducted at the Washington Child Research Center. Hours to be arranged. (Sherman.)

Ed. 206 y. *Seminar in Psychology* (6).

For candidates for advanced degrees who are working on special problems. Hours to be arranged. (Sprowls.)

C. Methods in High School Subjects

Courses for Graduates and Advanced Undergraduates

Ed. 120 f. *English in the High School* (4)—Prerequisites, Ed. 101 f, Ed. 102 s.

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. 121 f or s. *Supervised Teaching of English* (3)—Observation and supervised teaching. Minimum of 20 teaching periods required. (Smith.)

Ed. 122 f. *The Social Studies in the High School* (4)—Prerequisites, Ed. 101 f, Ed. 102 s.

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. 123 f or s. *Supervised Training of the Social Studies* (3)—Observation and supervised teaching. Minimum of 20 teaching periods required. (Long.)

Ed. 124 f. *Modern Language in the High School* (4)—Prerequisites, Ed. 101 f, Ed. 102 s.

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

Ed. 125 f or s. *Supervised Teaching of Modern Language* (3)—Observation and supervised teaching. Minimum of 20 teaching periods required.

Ed. 126 f. *Science in the High School* (4)—Prerequisites, Ed. 101 f, Ed. 102 s.

Objectives of science teaching, their relation to the general objectives of secondary education; application of the principles of psychology and of teach-

ing to the science class room situation; selection and organization of subject-matter; history, trends and status; textbooks, reference works and laboratory equipment. Technic of class room and laboratory; measurement, standardized tests; professional organizations and literature; observation and criticism.

Ed. 127 f or s. *Supervised Teaching of Science* (3)—Observation and supervised teaching. Minimum of 20 teaching periods required. (Brechbill.)

Ed. 128 f. *Mathematics in the High School* (4)—Prerequisites, Ed. 101 f, Ed. 102 s.

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

Ed. 129 f or s. *Supervised Teaching of Mathematics* (3)—Observation and supervised teaching. Minimum of 20 teaching periods required. (Brechbill.)

ENGLISH LANGUAGE AND LITERATURE

Courses for Graduates and Advanced Undergraduates

Eng. 105 s. *Poetry of the Romantic Age* (3)—Three lectures. Prerequisite, Eng. 7 f and 8 s or Comp. Lit. 105, first semester. A study of the Romantic movement in England as illustrated in the works of Shelley, Keats, Byron, Wordsworth, Coleridge. (Hale.)

(This course is identical with the second semester of Comp. Lit. 105 y.)

Eng. 115 f. *Literature of the Eighteenth Century* (2)—Two lectures. Prerequisite, Eng. 7 and 8. Readings in the period dominated by Defoe, Swift, Addison, Steele and Pope. (Fitzhugh.)

Eng. 116 s. *Literature of the Eighteenth Century* (2)—Two lectures. Prerequisite, Eng. 7 and 8. A continuation of Eng. 115 f. Dr. Johnson and his Circle; the Rise of Romanticism; the Letter Writers. (Fitzhugh.)

Eng. 117 y. *Medieval Romance in England* (4)—Two lectures. Prerequisite, Eng. 7 f. Lectures and readings in the cyclical and non-cyclical romances in Medieval England and their sources, including translations from the Old French. (Hale.) (Not given in 1931-1932.)

Eng. 118 y. *The Major Poets of the Fourteenth Century* (4)—Two lectures. Prerequisite, Eng. 7 f. Lectures and assigned readings in the works of Langland, Gower, Chaucer, and other poets of the fourteenth century. (Hale.)

Eng. 119 y. *Anglo-Saxon* (6)—Three lectures. Some knowledge of Latin and German is desirable, as a preparation for this course. Required of all students whose major is English.

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

Eng. 122 f. *The Novel* (2)—Two lectures.

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

Eng. 123 s. *The Novel* (2)—Two lectures.

Continuation of Eng. 122 f. (House.)

ENG. 124 f. *English and American Essays* (2)—Two lectures.

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

ENG. 126 f. *Victorian Poets* (2)—Two lectures.

Studies in the poetry of Tennyson, Browning, Arnold, Swinburne and others. (House.)

ENG. 127 s. *Victorian Poets* (2)—Two lectures.

Continuation of Eng. 126 f. (House.)

ENG. 129 f or s. *College Grammar* (3)—Three lectures. Required of all students whose major is English. The course is completed each semester.

Studies in the descriptive grammar of modern English, with some account of the history of forms. (Harman.)

ENG. 130 f. *The Old Testament as Literature* (2)—Two lectures. For seniors and graduate students.

A study of the sources, development, and literary types. (Hale.)

Courses for Graduates

ENG. 201. *Seminar.* Credit proportioned to the amount of work and ends accomplished. (Staff.)

Original research and the preparation of dissertations looking toward advanced degrees.

ENG. 202 y. *Beowulf* (4)—Two lectures. Prerequisite, Eng. 119 y.

Critical study of grammar and versification, with some account of the legendary lore. (Harman.) Alternate with Eng. 203 f and 204 s.

ENG. 203 f. *Middle English* (2)—Two lectures. Prerequisite, Eng. 119 y.

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

ENG. 204 s. *Gothic* (2)—Two lectures. Prerequisite, Eng. 119 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. 203 f and 204 s alternate with Eng. 202 y.

ENG. 205 f. *Browning's Dramas* (2)—Two lectures. *Luria, The Return of the Druses, Pippa Passes, Colombe's Birthday, A Blot in the 'Scutcheon.* (House.)

ENG. 206 s. *Victorian Prose* (2)—Two lectures. Works of Carlyle, Arnold, Mill, Ruskin, and others. (House.)

ENTOMOLOGY

Courses for Graduates and Advanced Undergraduates

ENT. 101 y. *Economic Entomology* (6)—Three lectures.

An intensive study of the problems of applied entomology, including life history, ecology, behavior, distribution, parasitism, and control. (Cory.) (Not offered in 1931-1932.)

ENT. 102 y. *Economic Entomology* (4)—Two laboratories.

Expansion of Ent. 101 y to include laboratory and field work in economic entomology. (Cory.) (Not offered in 1931-1932.)

Ent. 103 y. *Seminar* (1)—Time to be arranged.

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

Ent. 104 y. *Insect Pests of Special Groups* (8)—Prerequisite, Ent. 1 f or s.

A study of the principal insects 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, Ornamentals and Shade Trees; 5, Forests; 6, Field Crops; 7, Stored Products; 8, Live Stock; 9, The Household. (Cory-Knight.)

Ent. 105 f. *Medical Entomology* (3)—Three lectures. Prerequisite, Ent. 1 or 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.)

Courses for Graduates

Ent. 201. *Advanced Entomology* (2).

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* (6-10).

Advanced students having sufficient preparation, with the approval of the head of the department, may undertake supervised research in morphology, taxonomy, or biology and control of insects. Frequently the student 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. *Insect Morphology* (2-4).

Insect Anatomy with special relation to function. Given particularly in preparation for work in physiology and other advanced studies. Two lectures, and laboratory work by special arrangement, to suit individual needs. This course starts in the middle of November and continues into the spring semester to give the equivalent of one semester's work. So arranged to interfere as little as possible with field work. (Snodgrass.)

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 f).

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: pathological diets as treated in the home; children's diets. (Welsh.)

H. E. 134 s. *Advanced Foods* (3)—One recitation; two laboratories. Prerequisite, H. E. 31 y.

Advanced cookery and catering. (Welsh.)

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

Commercial experience in foods or food research. (Welsh.)

H. E. 136 s. *Child Nutrition* (2).

Lectures, discussions and field trips relating to the principles of Child Nutrition. (Welsh.)

Courses for Graduates

H. E. 201 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. *Special Problems in Foods.* 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 Nutrition* (3)—One recitation; two laboratories.

A survey of methods of feeding experiments with an opportunity to conduct such experiments with small laboratory animals. (Welsh.)

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 crops. (Kemp.)

GEN. 102 s. *Advanced Genetics* (3)—Two lectures; one laboratory. Prerequisites, Gen. 101 f. Alternate year course.

A consideration of chromosome irregularities and other mutations, interspecies crosses, genetic equilibrium, and the results of artificial attempts to modify germplasm. (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, and correlation, together with the making of diagrams, graphs, charts, and maps. (Kemp.)

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

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

Courses for Graduates

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

GEN. 209 y. *Research*—Credit according to work done. (Kemp.)

HISTORY AND POLITICAL SCIENCE

A. History

Courses for Graduates and Advanced Undergraduates

H. 101 f. *American Colonial History* (3)—Three lectures and assignments. Prerequisite, H. 2 y.

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

H. 102 s. *Recent American History* (3)—Three lectures. Prerequisite, H. 2 y.

The history of national development from the close of the reconstruction period to the present time. (Crothers.)

H. 103 y. *American History* 1790-1865 (4)—Two lectures. Prerequisite, H. 2 y.

The history of national development to the reconstruction period. (Crothers.)

H. 104 y. *World History Since* 1914 (6)—Three lectures.

A study of the principal nations of the world since the outbreak of the World War. (Alternates with H. 105 y.) (Jaeger.)

H. 105 y. *Diplomatic History of Europe in the Nineteenth and Twentieth Centuries* (6)—Three lectures.

A study of the European nations, stressing their political problems and their political activities. (Alternates with H. 104 y.) (Not given in 1931-1932.) (Jaeger.)

H. 106 y. *American Diplomacy* (4)—Two lectures.

A study of American foreign policy. (Alternates with H. 107 y.) (Not given in 1931-1932.) (Crothers.)

H. 107 y. *Social and Economic History of the United States, 1607 to the present time* (4)—Two lectures.

An advanced history course giving a synthesis of American Life. (Alternates with H. 106 y.) (Crothers.)

Courses for Graduates

H. 201 y. *Seminar American History* (3). (Crothers.)

H. 202 y. *Seminar European History* (3). (Jaeger.)

B. Political Science

Courses for Graduates and Advanced Undergraduates

POL. SCI. 101 f. *International Law* (3)—Two lectures and cases.

A study of the sources, nature, and sanction of international law, peace, war, and neutrality. (Jaeger.)

POL. SCI. 102 s. *International Relations* (3)—Lectures and conferences.

An examination of the economic and political reasons that motivate nations in their relations with one another. This course is designed to give the student a clear insight into the *actual causes*, whether economic or otherwise, that induce States to adopt one policy or another in the international sphere of their activity. (Jaeger.)

HORTICULTURE

Courses for Graduates and Advanced Undergraduates

HORT. 101 f. *Commercial Fruit Growing* (3)—Two lectures; one laboratory. Prerequisite, Hort. 1 f.

The proper management of commercial orchards in Maryland. Advanced work is taken up on the subject of orchard culture, orchard fertilization, picking, packing, marketing, and storing of fruits; orchard by-products; orchard heating, and orchard economics. (Not offered in 1930-1931.) Given in alternate years. (Wentworth.)

HORT. 102 f. *Economic Fruits of the World* (2)—Two lectures. Prerequisites, Hort. 1 f and Hort. 101 f.

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 reference 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. (Not offered in 1930-1931.) Given in alternate years. (Wentworth.)

HORT. 103 f. *Tuber and Root Crops* (2)—One lecture; one laboratory. Prerequisites, Hort. 11 s and 12 f. (Offered in 1930-1931.) Given in alternate years.

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

HORT. 104 s. *Advanced Truck Crop Production* (1)—Prerequisites, Hort. 11 s, 12 f and 13 s.

A trip of one week is made to the commercial trucking section of Maryland, Delaware, New Jersey, and Pennsylvania. A study of the markets in several large cities is included in this trip. Students are required to hand in a detailed report of this trip. The cost of such a trip should not exceed thirty dollars per student. The time will be arranged each year with each class. (Hort. Staff.)

HORT. 105 f. *Systematic Olericulture* (3)—Two lectures; one laboratory. Prerequisites, Hort. 11 s and 103 f. (Not offered in 1930-1931.) Given in alternate years.

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

HORT. 106 y. *Plant Materials* (5)—One lecture; one or two laboratories. (Not offered in 1930-1931.) Given in alternate years.

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

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. (Auchter.)

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. (Boswell.)

HORT. 203 s. *Experimental Floriculture* (2)—Two lectures.

A systematic study of the sources of knowledge and opinion as to practice in floriculture are discussed in this course. The results of all experimental work in floriculture which have been or are being conducted will be thoroughly discussed. (Thurston.)

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

For graduate students only. 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. (Auchter.)

HORT. 205 y. *Advanced Horticultural Research and Thesis* (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 are to be published in the form of a thesis. (Auchter, Boswell, Schrader, Gardner.)

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. (Auchter.)

Special Requirements of Graduate Students in Horticulture

Pomology—Graduate students specializing in Pomology who are planning to take an advanced degree will be required to take or offer the equivalent of the following courses: Hort. 1 f, 2 f, 101 f, 102 f, 201 y, 204 s, 205 y, and

206 y; General Biochemistry 102 f; Plant Microchemistry 203 s; Plant Biochemistry 201 s; Plant Biophysics 202 f; Plant Ecology (Plt. Phys. 101 s), and Organic Chemistry (Chem. 8 y).

Olericulture—Graduate students specializing in vegetable gardening who are planning to take an advanced degree will be required either to take or offer the equivalent of the following courses: Hort. 12 f, 13 s, 103 f, 105 f, 202 y, 204 s, 205 y, and 206 y; General Biochemistry 102 f; Plant Microchemistry 203 s; Plant Biochemistry 201 s; Plant Biophysics 202 f; Plant Ecology (Plt. Phys. 101 s), and Organic Chemistry (Chem. 8 y).

Floriculture—Graduate students specializing in floriculture who are planning to take an advanced degree will be required to take or offer the equivalent of the following courses: Hort. 22 y, 23 y, 24 s, 25 y, 26 f, 203 s, 204 s, 205 y and 206 y; General Biochemistry 102 f; Plant Microchemistry 203 s; Plant Biophysics 202 f; Plant Biochemistry 201 s; Botany 103 f or s, and Organic Chemistry (Chem. 8 y).

Landscape Gardening—Graduate students specializing in landscape gardening who are planning to take an advanced degree will be required to take or offer the equivalent of the following courses: Hort. 32 f, 33 s, 35 f, 105 f, 204 s, and 206 y; Botany 103 f or s; Drafting 1 y and 2 y, and Plane Surveying 1 f and 2 s.

Additional Requirements—In addition to the above required courses, all graduate students in horticulture are advised to take physical and colloidal chemistry.

Unless graduate students in Horticulture have had some course work in entomology, plant pathology, genetics, and biometry, certain of these courses will be required.

Note: For courses in Biochemistry and Biophysics, see Plant Physiology.

MATHEMATICS

Courses for Graduates and Advanced Undergraduates

MATH. 103 f. *Differential Equations* (3)—Three lectures. Elective. Prerequisite, Math. 7 y.

Integration of ordinary differential equations. Singular solutions. Integration by Series. Applications to Geometry, Physics, etc.

MATH. 104 s. *Theoretical Mechanics* (3)—Three lectures. Elective. Prerequisite, Math. 7 y.

Elementary Vector Analysis. Statics. Kinematics. The equations of Motion. Applications. (Alrich.)

MATH. 105 f. *Advanced Topics in Algebra* (3)—Three lectures. Elective.

Theory of Equations. Galois Groups. Matrices and Determinants. Linear Substitutions. Quadratic Forms. (Not given in 1931-1932.) (Dantzig.)

MATH. 106 s. *Advanced Topics in Geometry* (3)—Three lectures. Elective

The Conic Sections. Homogeneous Co-ordinates. The Quadric Surfaces. Collineations. Principles of Projective Geometry. (Not given in 1931-1932.) (Dantzig.)

MATH. 107 f. *Elementary Theory of Functions* (3)—Three lectures. Elective.

Functions of a Real Variable. Polynomials and Rational Functions. Transcendental Functions. Principles of Graphing and of Approximation. (Dantzig.)

MATH. 108 s. *Vector Analysis* (3)—Three lectures. Elective.

Vector Algebra. Applications to geometry and physics. Vector differentiation and integration. Applications to mathematical physics. (Dantzig.)

MATH. 109 y. *Selected Topics in Mathematics* (4)—Two lectures. Elective.

The purpose of the course is to enable advanced students in Physics, Chemistry, Biology, and Economics to understand such mathematics as is encountered in modern scientific literature in the fields named. The course begins with a review of general college mathematics from a mature standpoint. Applications to various problems of thermodynamics, physical chemistry, economic and biometric statistics will be made for illustrative purposes. (Dantzig.) (Not given in 1930-1931.)

MATH. 110 y. *Applied Mathematics* (4)—Two lectures. Elective.

Principles and methods used in the mathematical problems encountered in the Applied Sciences. This course is intended for advanced students in Science and Engineering, and aims to train them in the mathematical formulation of problems in which they are engaged and in the practical solution of these problems. Numerous applications will be considered. (Dantzig.)

MATH. 111 f. *History of Mathematics* (3)—Three lectures. Elective.

The courses will deal with the historical development of mathematical ideas and methods. Special emphasis will be placed on the Greek period and the period of Revival of Learning. The history of Arithmetic, Algebra and Geometry will receive particular attention. (Taliaferro.) (May not be given in 1931-1932.)

Courses for Graduates

MATH. 201 y. *Seminar and Thesis*—Credit hours in accordance with work done. (Dantzig.)

MATH. 202 f. *Fundamental Concepts of Mathematics* (2)—Two lectures. Elective.

A historical and critical survey of the Number Concept, Limit and Infinitesimals. The space, and the various geometries. The concept of time and one Relativity Theory. The concept of chance and its application to natural and social sciences. (Dantzig.) (Not given in 1931-1932.)

MODERN LANGUAGES

A. French

Courses for Graduates and Advanced Undergraduates

(French 4 y, 5 y, 6 f and 7 s, or equivalent, are prerequisite for courses in this group.)

FRENCH 101 f. *History of French Literature in the Seventeenth Century* (3)—Three lectures. (Deferrari.)

FRENCH 102 s. *History of French Literature in the Eighteenth Century* (3)—Three lectures. (Deferrari.)

French 103 f. *History of French Literature in the Nineteenth Century* (3)—Three lectures. (Not given in 1931-1932.) (Deferrari.)

French 104 s. *History of French Literature in the Nineteenth Century* (Continuation of French 103 f.) (3)—Three lectures. (Not given in 1931-1932.) (Deferrari.)

French 105 f. *The Renaissance in France* (3)—Study of the literature of the period. Three lectures. (Not given in 1931-1932.) (Deferrari.)

French 106 s. *The Renaissance in France* (3)—Continuation of French 105 f. Three lectures. (Not given in 1931-1932.) (Deferrari.)

French 107 f. *The Middle Ages in France* (3)—Three lectures.

Introduction to the study of the literature of the period, with some attention given to etymology and historical grammar. This course is strongly recommended to all those majoring in French. (Deferrari.)

French 108 s. *The Middle Ages in France* (3)—Three lectures. Continuation of French 107 f. (Deferrari.)

Courses for Graduates

French 201 y. *Research and Thesis.* Credits determined by work accomplished. (Deferrari.)

Attention is also called to Comparative Literature 105, *Romanticism in France, Germany, and England, and* 106 f, *Introduction to European Philology.*

B. German

Courses for Graduates and Advanced Undergraduates

(Prerequisite for courses in this group, German 4 and 5 or equivalent.)

German 101 f. *German Literature of the Eighteenth Century* (3)—Three lectures. The earlier classical literature. (Zucker.)

German 102 s. *German Literature in the Eighteenth Century* (3)—Three lectures. The latter classical literature. (Zucker.)

German 103 f. *German Literature of the Nineteenth Century* (3)—Three lectures. Romanticism and young German. (Not given 1931-1932.) (Zucker.)

German 104 s. *German Literature of the Nineteenth Century* (3)—Three lectures. The literature of the Empire. (Not given 1931-1932.) (Zucker.)

Courses for Graduates

German 205 y. *Research and Thesis*—Credits determined by work accomplished. (Zucker.)

C. Spanish

Courses for Graduates and Advanced Undergraduates

Spanish 101 f. *The Middle Ages in Spain* (3)—Three lectures.

Introduction to the study of the literature of the period, with some attention given to etymology and historical grammar. This course is strongly recommended to all those majoring in Spanish. (Deferrari.)

Spanish 102 s. *The Middle Ages in Spain* (3)—Three lectures.

Continuation of Spanish 101 f. (Deferrari.)

Courses for Graduates

SPANISH 201 y. *Research and Thesis.* Credits determined by work accomplished. (Deferrari.)

D. Comparative Literature

Courses for Graduates and Advanced Undergraduates

The courses in Comparative Literature are, for the time being, under the direction of the Department of Modern Languages. They may be elected as partially satisfying major or minor requirements in this department. Comparative Literature 101 f, 102 s, 104 s, and 105 y may also be counted toward a major or minor in English.

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

Survey of the background of European literature through study in English translation 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. (Zucker.)

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

Continuation of 101 f; study of medieval and modern Continental literature. (Zucker.)

COM LIT. 104 s. *The Modern Ibsen.* Lectures on the life of Ibsen and the European drama in the middle of the Nineteenth Century. Study of Ibsen's social and symbolical plays in Archer's translation. (Zuker.)

COM. LIT. 105 y. *Romanticism in France, Germany and England* (6)—Two lectures and reports.

Introduction to the chief authors of the Romantic movement in England, France, and Germany, the latter two groups being read in English translation. Lectures on the chief thought currents and literary movements of the late eighteenth and early nineteenth centuries. First semester: Rousseau to Gautier; Buerger to Heine. Second semester: Wordsworth, Coleridge, Landor, Byron, Shelley, Keats, and others. The course is conducted by members of both the Modern Language and the English departments. (Deferrari, Zucker, Hale.)

PHYSICS

Courses for Graduates and Advanced Undergraduates

PHYS. 101 f. *Physical Measurements* (3)—Two lectures; one laboratory. Elective. Prerequisite, Phys. 1 y or 2 y.

This course is designed for the study of physical measurements and for familiarizing the student with the manipulation of the types of apparatus used in experimentation in physical problems. (Clark.)

PHYS. 102 y. *Graphic Physics* (2)—One lecture. Elective. Prerequisite, Phys. 1 y or 2 y.

A study of physical laws and formulae by means of scales, charts, and graphs. (Eichlin.)

PHYS. 103 f. *Advanced Physics* (3)—Two lectures; one laboratory. Required of students in the Industrial Chemistry curriculum. Elective for other students. Prerequisite, Phys. 2 y.

An advanced study of Molecular Physics, wave motion, and heat. (Eichlin.)

PHYS. 104 s. *Advanced Physics* (3)—Two lectures; one laboratory. Elective. Prerequisite, Phys. 2 y.

An advanced study of electricity and magnetism. (Eichlin.)

PHYS. 105 y. *Advanced Physics* (6)—Three lectures. Elective. Prerequisite, Phys. 1 y or 2 y.

A study of physical phenomena in optics, spectroscopy, conduction of electricity through gases, etc., with a comprehensive review of their basic underlying principles. (Eichlin.)

Courses for Graduates

PHYS. 201 y. *Modern Physics* (6)—Three lectures. Elective.

A study of some of the problems encountered in modern physics. (Eichlin.)

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.

PLT. PATH. 102 s. *Diseases of Garden and Field Crops* (2-4)—Two lectures; laboratory according to credit desired. Prerequisite, Plt. Path. 1 f. Not offered in 1929-1930.

The disease 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.

PLT. PATH. 103 f. *Research Methods* (2)—One conference and five hours of laboratory and library work. Prerequisite, Plt. Path. 1 or equivalent.

Technique of plant disease investigations: 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. (Temple.)

PLT. PATH. 104 f and s. *Minor Investigations*—Credit according to work done. A laboratory course with an occasional conference. Prerequisite, Plt. Path. 1 f.

In this course the student may enter or withdraw at any time, including the summer months, and receive credit for the work accomplished. The course is intended primarily to give practice in technique so that the student may acquire sufficient skill to undertake fundamental research. Only minor

problems or special phases of major problems may be undertaken. Their solution may include a survey of the literature on the problem under investigation and both laboratory and field work. (Temple and Norton.)

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.)

PLT. PATH. 107 f. *Plant Disease Control* (3)—Two lectures; one laboratory. Prerequisite, Pit. Path. 1 f. (Not offered in 1931-1932.)

An advanced course dealing with the theory and practice of plant disease control; the preparation of sprays and other fungicides and the testing 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. (Jehle, Temple, Hunter.)

PLT. PATH. 108 f. *Plant Disease Identification*—Credit according to work accomplished. A laboratory and field study with conferences. (Not offered in 1931-1932.)

An extensive study of symptomatology and mycology leading to the identification of pathogens and the diseases caused by them. (Norton, Temple.)

PLT. PATH. 109 f or s. *Pathogenic Fungi* (2-5)—One lecture and one or more laboratory periods, according to credit. Prerequisites, Bot. 1 f or s and Bact. 1 f or s. (Not offered in 1931-1932.)

A detailed treatment of the classification, morphology and economics of the fungi, with studies of life histories in culture; identification of field materials. (Norton.)

Courses for Graduates

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

An advanced course dealing with the mosaic and similar or related diseases of plants, including a study of the current literature on the subject and the working of a problem in the greenhouse. (Temple.)

PLT. PATH. 203 f. *Non-Parasitic Diseases* (3)—Two lectures; one laboratory.

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

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

PLANT PHYSIOLOGY AND BIOCHEMISTRY

Courses for Graduates and Advanced Undergraduates

PLT. PHYS. 101 s. *Plant Ecology* (3)—One lecture; two laboratories. 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.

BIOCHEM. 102 f. *General Biochemistry* (4)—Two lectures; two laboratories. Prerequisites, General Chemistry (Chem. 1 y), Analytical Chemistry (Chem. 7 y) or their equivalents; also an elementary knowledge of organic chemistry.

A general course in chemical physiology treated from the point of view of both plants and animals. The first half of the course is devoted to the chemistry of protoplasm and its products. The second half of the course deals with cell matabolism, and embraces processes and problems of fundamental importance in both animal and plant life. Not given every year. (Appleman, Conrad.)

Courses for Graduates

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

An advanced course on the chemistry of plant life. It deals with materials and processes characteristic of plant life. Primary syntheses and the transformations of materials in plants and plant organs are especially emphasized. (Appleman, Conrad.)

PLT. PHYS. 202 f. *Plant Biophysics* (3 or 4)—Two lectures; one or two laboratories. Prerequisites, Bot. 1 f or Bot. 1 s, and Plt. Phys. 1 f or equivalent. An elementary knowledge of physics or physical chemistry is highly desirable.

An advanced course dealing with the operation of physical forces in life processes and physical methods of research in plant physiology. Practice in recording meteorological data constitutes a part of the course. (Johnston.)

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. (Conrad.)

PLT. PHYS. 204 s. *Growth and Development* (2)—Not given every year. (Appleman.)

PLT. PHYS. 205 y. *Seminar* (2).

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

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

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

PSYCHOLOGY

Courses for Graduates and Advanced Undergraduates

See "Education" for description of the following courses:

Ed. 106 s. *Advanced Educational Phychology* (3).

Ed. 107 f. *Educational Measurements* (3).

Ed. 108 s. *Mental Hygiene* (3).

Ed. 109 y. *Child Development* (4). (Sherman.)

Courses for Graduates

Ed. 205 f-s. *Psychiatric Problems in Education* (3-3). (Sherman.)

Ed. 206 y. *Seminar in Psychology.* (Sprowls.)

ZOOLOGY AND AQUICULTURE

Courses for Graduates and Advanced Undergraduates

Zool. 101 f. *Embryology* (4)—Two lectures; two laboratories. Prerequisite, two semesters of biology, one of which should be in this department. Required of three-year pre-medical students.

The development of the chick to the end of the fourth day. (Pierson, Burhoe.)

Zool. 102 y. *Mammalian Anatomy* (2-3)—A laboratory course. Prerequisite, one year of zoology.

A thorough study of the gross anatomy of the cat or other mammal. Open to a limited number of students. The permission of the instructor must be obtained before registration. Schedule to be arranged. (Pierson.)

Zool. 103 y. *Journal Club* (1)—Reviews, reports, and discussions of current literature. Required of students selecting Zoology and Aquiculture as the principal department in the major group. (Staff.)

Zool. 104 y. *Animal Physiology* (3)—Two lectures and one laboratory. A general and particular study of the phenomena exhibited by animal organisms. Particular stress, both in lecture and in laboratory, is placed upon mammalian and human physiological activity. Prerequisites, at least one year of chemistry and one course in zoology. Registration is limited to 16 and the permission of the instructors must be obtained before registration. (Blanchard.)

Zool. 105 y. *Aquiculture* (2)—Lectures and laboratory to be arranged. Prerequisites, one course in general zoology and one in general botany.

Plankton studies and the determination of other aquatic life of nearby streams and ponds. Morphology and ecology of representative commercial and game fishes in Maryland, the Chesapeake blue crab, and the oyster. (Truitt.)

Zool. 106 s. *Endocrinology* (2)—Two lectures. A study of the functional significance of the glands of internal secretion as related to growth, metamorphosis, metabolism, sex, etc. Lectures will be supplemented by discussions and demonstrations. No definite prerequisites. The permission of the instructor should be obtained before registration. (Blanchard.)

Zool. 107 f. *Animal Histology* (3)—Two lectures; one laboratory. This course covers the general field of animal histology and of cell structure and organization. Laboratory includes the technique for preparation of material for histological examination. Prerequisite, at least one course in zoology. Permission of the instructor should be obtained before registration. Limited to 10.

May not be given in 1931-1932. (Blanchard.)

Zool. 110 s. *Organic Evolution* (2)—Two lectures. Prerequisites, two semesters of biological science, one of which must be in this department.

The object of this course is to present the zoological data on which the theory of evolution rests. The lectures will be supplemented by discussion, collateral reading, and reports. Not given every year. (Pierson.)

Zool. 115 y. *Vertebrate Zoology*—Credit hours and schedule to be arranged to suit the individual members of the class.

Each student may choose, within certain limits, a problem in taxonomy, morphology, or embryology. Prerequisite, Zool. 8 f or its equivalent. (Pierson.)

Zool. 120 s. *Genetics* (3)—Two lectures; one laboratory. Prerequisite, one course in general zoology or general botany.

A general introductory course designed to acquaint the student with the fundamental principles of heredity and variation. While primarily of interest to students of biology, it will be of value to those interested in the humanities. Required of students in zoology and aquiculture who do not have credit for Genetics 101 f. (Burhoe.)

Zool. 140. *Marine Zoology*—Credit to be arranged.

This work is given at the Chesapeake Biological Laboratory, which is conducted co-operatively by the Maryland Conservation Department and the Department of Zoology and Aquiculture, on Solomons Island, where the research is directed primarily toward those problems concerned with commercial forms, especially the blue crab and the oyster. The work starts during the third week of June and continues until mid-September, thus affording ample time to investigate complete cycles in life histories, ecological relationships, and plankton contents. Course limited to few students, whose selection will be made from records and recommendations submitted with applications, which should be filed on or before June 1st.

Laboratory facilities, boats or 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. (Truitt.)

Courses for Graduates

Zool. 200 y. *Marine Zoology*—Credit hours according to the work done. Problems in salt water animal life of the higher phyla. (Truitt.)

Zool. 201 y. *The Chordates*—Credit to be arranged.

Minor problems in embryology or anatomy. (Pierson.)

GRADUATE COURSES IN THE PROFESSIONAL SCHOOLS AT BALTIMORE

SCHOOL OF MEDICINE

ANATOMY

The courses recorded under "Minors" are acceptable as graduate courses only if they are taken to satisfy minor requirements in a major subject.

Minors

ANAT. 101 f. *Human Gross Anatomy* (10)—Five lectures, eighteen laboratory hours during October, November, December and January; three lectures and fifteen laboratory hours during February.

A complete dissection of the human body (exclusive of the central nervous system). Dr. Uhlenhuth and Dr. Aycock.

ANAT. 102 f. *Mammalian Histology* (6)—One lecture, eleven laboratories.

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. Dr. Davis and Dr. Lutz.

ANAT. 103 s. *Human Neurology* (2)—Three lectures, six laboratory hours during May.

An elementary study of the human central nervous system. This course is an introduction to the general structure of the central nervous system mainly directed towards the fiber tracts and the nuclei contained therein. It includes a brief study of the eye and the internal ear. The laboratory work is based on a systematic dissection of the human brain. Dr. Davis and Dr. Rubenstein.

Major Courses

ANAT. 201 s. *Advanced Neurology* (4)—Two lectures, four laboratory hours (April 1st to May 30).

This is intended to amplify the minor course in neurology especially with reference to the anatomical structure and relations to the cranial nerves, and is essential to more advanced study in neurology. It consists essentially of a study of the brain stem. The laboratory work acquaints the student with the subject through the medium of appropriately prepared microscopic sections of the human brain stem. Neurology 103 s, or its equivalent is a prerequisite for this course. Dr. Davis.

ANAT. 202 f and s. *For work leading to a Ph.D. in Anatomy.*

A study of neurological problems based on 103 s and 201 s. Only students who have had preceding courses in neurology are eligible for this work. Dr. Davis.

ANAT. 203 s. *Comparative Morphology of the Endocrine Glands* (at least 2)—One lecture, two laboratory hours.

With the aid of preparations the comparative anatomy, histology and cytology of the endocrines of the vertebrates, including man, are studied. In addition the student is required to make a number of preparations.

It is intended to give the student appreciation of the structural basis of

the physiological activity of the endocrine glands and of the gradual building up of the endocrine system during phylogenetic development from the lower vertebrates to man, making it possible to see the variations in the endocrines of higher vertebrates in the light of the phylogenetic potentiality of these organs. Dr. Uhlenhuth and Mr. Figge.

ANAT. 204 f and s. *Advanced Endocrinology.* (Credit and time dependent upon the student's qualifications.)

A study of the morphological equivalent of function. By means of proper experimentation the morphological responses of the endocrines to extrinsic and intrinsic factors are examined. This course will lead the student toward work for the Ph.D. in Anatomy. Dr. Uhlenhuth.

PHARMACOLOGY

All students majoring in Pharmacology with a view to securing the degree of Master of Arts or Doctor of Philosophy should secure special training in Mammalian Physiology, Organic Chemistry 202 y, and Physical Chemistry 10 y or preferably 102 f.

Minor

PHARMACOLOGY 101 f and s. *General Pharmacology* (7)—Three lectures, seven laboratories (January to May, inclusive).

This course consists of 50 lectures and 40 laboratory periods of three hours each; offered each year, January to May, inclusive, at Medical School. The fundamental principles of pharmacologic technic are taught in this course, hence it is a prerequisite for all other advanced courses in this subject. Dr. Schultz.

Majors

PHARMACOLOGY 201 f. *The Pharmacology of Biologic Products.*

This course involves problems of modern therapy that can be studied from the experimental physiological point of view, which includes such subjects as anaphylaxis, alergic reactions, anaphylactoid phenomena, non-specific protein therapy, toxins, antitoxins, and glandular products.

The seminars, lectures, and demonstrations will be somewhat broad in scope, but the research will be intensive along some one chosen subject.

Offered in alternate years beginning with 1930. Credit dependent upon quality of work. (Dr. Shultz.)

PHARMACOLOGY 202 f. *The Pharmacology of Industrial Poisons.*

Including Insecticides and Parasite Remedies. The nature of the subject matter of this course will vary from year to year. Credit will depend upon the amount and quality of the work accomplished.

Offered in alternate years beginning in 1931. (Dr. Schultz.)

PHARMACOLOGY 203 f. *Chemotherapy.*

The action of new synthetic compounds from a pharmacodynamic point of view. Credit will depend upon the amount and quality of the work accomplished. (Dr. Schultz.)

PHARMACOLOGY 204 f and s. *Pharmacology Seminar*—One report period each week.

SCHOOL OF PHARMACY

PHARMACEUTICAL CHEMISTRY

Courses for Graduates and Advanced Undergraduates

CHEM. 101 f. *Chemistry of Medicinal Products* (3-5)—Two lectures one to three laboratory periods.

A study of the more important medicinal products with emphasis placed upon the relationship between chemical structure and physiological action. (Jenkins.)

CHEM 102 f. *Food and Drug Analysis* (4)—Two lectures; two laboratory periods.

A study of the applied analytical methods employed by public health and industrial laboratories to control food and drug products. (Jenkins.)

Courses for Graduates

CHEM 201 y. *Advanced Survey of Pharmaceutical Chemistry* (10)—Two lectures; three laboratory periods.

A study of the practical methods employed to isolate, purify, identify and analyze the constituents of crude drugs. (Jenkins.)

CHEM. 202 y. *Advanced Pharmaceutical Syntheses* (8)—Two lectures; two laboratory periods.

A study of synthetic reactions methods to the synthesis of complex medicinal substances, and of the properties and structure of the products obtained by physical, chemical and physiological methods. (Jenkins.)

CHEM. 203 y. *Pharmaceutical Chemistry Seminar* (2-4).

Reports of progress and discussion of the problems encountered in research and the presentation of papers which survey the recent developments of pharmaceutical chemistry reported in the current literature. (Jenkins.)

CHEM. 204 y. *History of Pharmaceutical Chemistry* (2 or 4)—One lecture and assigned reading.

A study of the development of pharmaceutical chemistry in relation to the history of other sciences, industry and civilization. (Jenkins.)

CHEM. 205 y. *Research in Pharmaceutical Chemistry.* Credit to be determined by the amount and the quality of the work performed. Open to graduate students only. (Jenkins.)

PHARMACOGNOSY

Courses for Graduates and Advanced Undergraduates

PHARMACOG. 101 y. *Taxonomy of the Higher Plants* (4)—One lecture; one laboratory period.

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. Elective for students who contemplate taking advanced work in pharmacognosy. (Plitt.)

Courses for Graduates

PHARMACOG. 201 y. *Advanced Vegetable Histology* (8)—Two lectures; two laboratory periods.

Section cutting, staining, embedding of material in celloidin and in paraffin, leading to research. Prerequisite, graduate standing. (Plitt.)

PHARMACOG. 202 y. *Advanced Study of Vegetable Powders* (8)—Two lectures; two laboratory periods.

A study of vegetable powders structurally and microchemically. Prerequisite, Pharmacognosy 201 y. (Plitt.)

PHARMACOG. 203 y. *Advanced Taxonomy of Vascular Plants.* Credit dependent on work done. Prerequisite, Pharmacog. 101 y. (Plitt.)

PHARMACOG. 204 y. *Research in Pharmacognosy.* Credit according to amount and quality of work performed. Open to graduate students only. (Plitt.)

PHARMACOLOGY AND THERAPEUTICS

Courses for Graduates and Advanced Undergraduates

PHARMACOLOGY 101 s. *Physiological Assaying and Testing* (4)—Two lectures; two laboratory periods.

A course in physiological drug assaying with special reference to the methods of the United States Pharmacopoeia and National Formulary. Prerequisite, physiology and hygiene. (Thompson.)

Courses for Graduates

PHARMACOLOGY 201 y. *Advanced Physiological Assaying and Testing* (8)—Two lectures; two laboratory periods.

A study of modern unofficial methods of physiological assaying applied to the evaluation of medicinal substances. Prerequisite, Pharmacology 101 s. (Thompson.)

PHARMACOLOGY 202 y. *Special Studies in Pharmaco-dynamics* (2-4)—Two lectures; two laboratory periods.

Chiefly a study of the stability of drugs and their corresponding Pharmaceutical preparations by physiological assay methods. Prerequisite, Pharmacology 101 s. (Thompson.)

PHARMACOLOGY 203 y. *Physiological Assay Methods* (4-8)—Two lectures; two laboratory periods.

The development of physiological assay methods for drugs for which no satisfactory chemical or physiological methods are known, involving both library and experimental studies. Prerequisite, Pharmacology 101 s. (Thompson.)

PHARMACOLOGY 204 y. *Research in Pharmacology and Therapeutics.* Credit in proportion to the amount and quality of the work performed. (Thompson.)

PHARMACY

Courses for Graduates and Advanced Undergraduates

PHARMACY 101 y. (6)—One lecture; two laboratory periods.

A continuation of the courses given in the pharmacy school in the second and third year with special reference to the methods employed in manufacturing pharmacy. Prerequisite, consent of the instructor. (DuMez.)

Courses for Graduates

PHARMACY 201 y. *Advanced Pharmaceutical Technology* (8)—Two lectures; two laboratory periods.

A study of pharmaceutical manufacturing processes from the standpoint of plant; crude materials used, their collection, preservation, and transformation into forms suitable for therapeutic application. (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 and the 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 the principal countries in Europe. (DuMez.)

PHARMACY 204 y. *Research in Pharmacy.* Credit according to the amount and quality of the work done. (DuMez.)