

THE CORNELL UNIVERSITY  
GRADUATE SCHOOL



1944-45

PUBLISHED BY THE UNIVERSITY  
ITHACA, NEW YORK

## CALENDAR

## SPRING TERM

Mar. 2	Registration.
Mar. 3	Registration.
Mar. 5	Instruction begins.
Mar. 17	Last day for filing statement-of-courses blanks, change-of-committee blanks, and for new students to file candidacy blanks to receive residence credit for the term.
Mar. 29	Last day for payment of tuition for the term.
Mar. 31	Last day for taking qualifying examinations for the Ph.D. degree in order to have them considered as of the beginning of the term.
Mar. 31	Last day for taking language examinations in order to have them considered as of the beginning of the term.
Apr. 21	Last day for announcing titles of theses by candidates for Ph.D degrees to be conferred in October, 1945.
June 2	Last day for new students to file applications for admission to the Graduate School for the Summer Term.
June 13	Last day for payment of graduation fee for candidates for June degrees.
June 13	Last day for June candidates for the Ph.D. to pay the abstract of thesis fee.
June 16	Last day for completing requirements for advanced degrees to be conferred in June.
June 23	Term ends.



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It is the policy of Cornell University during the national emergency to offer full-time instruction throughout the calendar year in all those colleges and departments in which this practice is feasible. The Graduate School will permit accelerated programs of study, at the rate of three terms a calendar year instead of two terms, in all cases where the facilities for such study can be made available. By action of the Faculty, the Dean of the Graduate School is authorized to suspend all regulations relating to work done during the summer that would interfere with such programs.

## GENERAL INFORMATION

### THE FACULTY OF THE GRADUATE SCHOOL

The Faculty of the Graduate School has exclusive jurisdiction over all graduate work and advanced degrees. It consists of three groups: (1) an *ex-officio* group, including the President of the University, who is the presiding officer, the Deans or Directors of the several Faculties of the University, and the Directors of the Experiment Stations; (2) a variable academic group consisting of those professors, associate professors, assistant professors, and instructors who, as members of special committees, are actively engaged in supervising the work of graduate students; (3) a permanent academic group including those members of the University Faculty who, during five consecutive years, have been members of group (2).

Professors, associate professors, assistant professors, instructors who hold the Doctor's degree, and such other members of the teaching or research staff of the University as the Faculty may authorize are eligible for membership on the Special Committees which supervise the work of graduate students.

The General Committee of the Graduate School is the chief administrative body of the Faculty. It is composed of thirteen members elected by the Faculty and two members *ex-officio* (see page 2). It is the duty of the General Committee to pass upon questions which do not involve a change of policy; to consider such matters as may be referred to it by the Faculty; and upon its own initiative to make recommendations to the Faculty regarding questions involving the interests of the Graduate School.

### DEGREES OFFERED

It is the purpose of the Graduate School to offer facilities for advanced study and research, to the end that adequately trained students may receive a comprehensive view of a field of knowledge and the training required for independent investigation in that field. The requirement for receiving an advanced degree is a high grade of scholarly work rather than the fulfillment of routine requirements.

The following degrees are offered:

Master of Arts (A.M.)

Master of Science (M.S.)

Master of Science in Agriculture<sup>1</sup> (M.S. in Agr.)

Master of Fine Arts<sup>2</sup> (M.F.A.)

Master of Architecture<sup>2</sup> (M.Arch.)

Master of Landscape Architecture<sup>2</sup> (M.L.A.)

Master in Regional Planning<sup>2</sup> (M.R.P.)

<sup>1</sup>Open only to students who have had a four-year course in Agriculture or the equivalent.

<sup>2</sup>Under the special jurisdiction of the Division of Architecture and Fine Arts.

Master of Science in Engineering<sup>3</sup> (M.S. in Eng.)  
 Master of Chemical Engineering<sup>3</sup> (M.Chem.E.)  
 Master of Civil Engineering<sup>3</sup> (M.C.E.)  
 Master of Electrical Engineering<sup>3</sup> (M.E.E.)  
 Master of Mechanical Engineering<sup>3</sup> (M.M.E.)  
 Master of Laws<sup>4</sup> (LL.M.)  
 Master of Education<sup>5</sup> (M.Ed.)  
 Master of Science in Education<sup>5</sup> (M.S. in Ed.)  
 Doctor of the Science of Law<sup>4</sup> (J.S.D.)  
 Doctor of Philosophy (Ph.D.)

### ADMISSION TO THE GRADUATE SCHOOL

An application for admission should be made on the proper form, which will be supplied at the office of the Graduate School. No application will be acted upon until all the credentials enumerated in this form have been filed. In addition to presenting these credentials, the applicant is strongly urged to take the Graduate Record Examination and to submit his scores with his application. This examination does not require any special preparation, and it is available for a moderate fee (\$3.00). Information about the examination may be obtained and arrangements for taking it made by direct application to the Graduate Record Office, 437 West 59th Street, New York 19, New York.

Inquiries about admission should be addressed to *The Graduate School, Cornell University, Ithaca, New York*. Inquiries about facilities for advanced study and research should be addressed to the Department in which such work is done, or to the Division under whose jurisdiction the degree is granted.

For admission in the fall term, applications with all supporting documents should be filed by October 10; for admission in the spring term, by February 9; and for admission in the summer, by June 2. Applications filed later than these dates may fail of consideration in time for registration at the beginning of the term following.

To be admitted to the Graduate School an applicant (1) must hold a baccalaureate degree from a college or university of recognized standing, or have done work equivalent to that required for such a degree; (2) as judged by his previous scholastic record, or otherwise, must show promise of ability satisfactorily to pursue advanced study and research; and (3) must have had adequate preparation to enter upon graduate study in the field chosen.

A senior in one of the colleges of Cornell University who has completed the academic requirements for a Bachelor's degree, and who qualifies under (2) and (3), may be admitted to the Graduate School, provided his admission is approved by the dean of his college.

An applicant is admitted to the Graduate School in one of the

<sup>3</sup>Under the special jurisdiction of the Division of Engineering.

<sup>4</sup>Under the special jurisdiction of the Division of Law.

<sup>5</sup>Under the special jurisdiction of the School of Education.

following categories: (1) a candidate for a degree; (2) a non-candidate; (3) a resident doctor.

*Candidates.* Students admitted to the Graduate School usually pursue a course leading to one of the advanced degrees. The work of a candidate for a degree is directed by a Special Committee, selected by the student, as explained below (see pages 16, 18, 24).

Candidates for the degrees A.M., M.S., M.Arch., M.L.A., or M.F.A. are expected to have had training in a foreign language equivalent to three college entrance units, or in two foreign languages equivalent to two college entrance units each. If an applicant cannot offer such training, a longer period of residence is required for the degree. See below, page 15.

A candidate for an advanced professional degree given under the jurisdiction of some division of the Graduate School should examine the special requirements for the degree printed at the beginning of the announcement for the division which has jurisdiction over it.

*Non-candidates.* A properly qualified person who, for valid reasons, does not wish to meet the requirements for a degree may be admitted to the Graduate School as a "non-candidate" and may arrange a program of graduate study suitable to his purposes. A non-candidate is required to select from the members of the Graduate Faculty an adviser to direct his work. He must file with the Dean not later than two weeks after his first registration a statement of the field in which he wishes to work, approved by his adviser. A non-candidate is expected to pursue a coordinated program of graduate work, and his courses must as a rule be chosen from those titled in bold-faced type in this Announcement. Each term he must file a statement of the courses which he means to pursue, approved by his adviser.

*Resident Doctors.* Persons who hold the Doctor's degree or who have equivalent standing may, with permission from the Dean, be admitted to the Graduate School as Resident Doctors, for the purpose of engaging in advanced study and research in a field in which they have had adequate preparation. On the recommendation of the Dean, Resident Doctors are exempt from the payment of tuition and all fees except laboratory charges. Ordinarily they are not permitted to attend classes.

#### MEDICAL REQUIREMENTS

Every student matriculating in the University is required to present a satisfactory certificate of vaccination against smallpox. This must certify either to a successful vaccination within the five years preceding matriculation or to at least three unsuccessful attempts at vaccination within that period.

Within a month preceding or a month following matriculation every student must submit to the University Health Officer for permanent filing, a satisfactory chest radiograph taken within this two-month period. Such radiographs are made at the Infirmary at a special rate charged to students.



## REGISTRATION

The rules of the University provide: "All students taking work in the Graduate School or work leading to, or in contemplation of, an advanced degree, shall, at the beginning of each term or session, register both in the Graduate School and with the Registrar of the University."

Candidates for advanced professional degrees shall register also with the division concerned.

A graduate student who has completed the requirements of residence for his degree and who remains in residence while working on his thesis or while doing other work in contemplation of a degree must register each term in which he is thus engaged.

A graduate student who returns to the University to present his thesis and to take the final examination for an advanced degree, all other work for that degree having been previously completed, shall register as a "candidate for degree only" and shall pay only an administration fee of \$12.50.

A graduate student who discontinues his work for any reason during a term in which he is registered should immediately report this fact at the office of the Graduate School.

## REQUIREMENTS FOR THE MASTERS' DEGREES

## RESIDENCE REQUIREMENTS

*The minimum residence requirement for a master's degree is two terms.*

Before he may be awarded any degree conferred by Cornell University, a student must have spent at least one full academic year, or the equivalent, in residence at the University and in study for that degree. In consequence, graduate work done elsewhere cannot be counted to reduce the residence requirement for a master's degree below one year.

To receive credit for residence a candidate must be regularly enrolled in the Graduate School. The satisfactory completion of his work, term by term, must be attested by the members of his Special Committee.

The amount of residence credit granted to a candidate who holds an appointment as instructor, as a teaching or research assistant, or who is acting in any capacity involving a significant loss of time from his graduate work, shall be determined by the General Committee of the Graduate School, upon recommendation of the student's Special Committee. In no case shall such credit exceed three-fourths, and in the case of full-time instructors one-half, of full residence credit.

A candidate for an advanced degree is expected to complete his residence with reasonable continuity. All work for an advanced degree, including the final examination, must be completed within four years after the minimum residence requirement for the degree has been satisfied.



*Residence credit in the Summer Session.*<sup>1</sup> For A.M., M.S., and M.S. in Agr., residence during Summer Sessions may be counted at the rate of three Summer Sessions for one term of credit, and five sessions for two terms; for all other masters' degrees at the rate of two Summer Sessions for each term of credit.

To obtain residence credit in the Graduate School for work done in the Summer Session the candidate must register both in the Summer Session and in the Graduate School. He must file in the office of the Graduate School within one week after registration a statement of courses as provided for students in the regular session (see page 16).

*Additional requirements of residence for deficiency in foreign language.* Candidates for the degree of A.M., M.S., M.Arch., M.L.A., or M.F.A., are subject to the following special requirement in foreign language, which may affect the amount of residence required of them.

(a) A candidate must have had training in a foreign language equivalent to three college entrance units, or in two foreign languages equivalent to two college entrance units in each; or

(b) if he lacks such training he must, at the beginning of his candidacy (i.e., within one month after registration), prove his ability to read either French or German (or another language other than English approved by his Special Committee) by passing an examination given by a member of the Language Examination Board.

(c) An applicant who, at entrance, cannot meet either of the requirements (a) or (b), but who is otherwise qualified for admission, may be admitted to candidacy subject (1) to presenting three terms of residence (instead of two) for graduation and (2) to demonstrating, before a member of the Language Examination Board not later than the beginning of his last term of residence, a reading knowledge of a foreign language as provided above. The General Committee of the Graduate School, upon the recommendation of the student's Special Committee, may waive the requirement of an extra term of residence, provided preparation in foreign language is made during a period when the student is not receiving residence credit.

#### REQUIREMENTS IN COURSE

Two plans of procedure are offered to candidates for masters' degrees, described below as Plan A and Plan B.

**Plan A.** Open to candidates for A.M., M.S., M.S. in Agr., M.F.A., M.Arch., M.L.A., M.R.P., M.S. in Eng., M.Chem.E., M.C.E., M.E.E., or M.M.E.

Plan A is intended for those candidates who wish to acquire a considerable degree of competence in a restricted field of work, frequently as a basis for further study and research, or for professional purposes.

The candidate works under the direction of a Special Committee, usually of two faculty members, representing a Major and a Minor

<sup>1</sup>This rule applies to the Summer Session of six weeks.

Subject. He is required to present a thesis or an essay acceptable to his committee and to pass a final examination.

*Major and Minor Subjects.* A list of approved Major and Minor Subjects will be found below, in the announcement of each department of instruction. Before selecting his Major and Minor Subjects the student should consult members of the Faculty regarding suitable combinations of subjects. Ordinarily the candidate will devote the major portion of his time—say something over one-half—to his Major Subject, and the remainder to his Minor Subject, the exact division being determined by his Committee. The requirements may consist of work in formal courses, informal work in seminars, or assigned reading or study and research—in the discretion of the Special Committee. There are no requirements in semester hours under Plan A.

*Special Committees.* After the candidate has chosen his Major and Minor Subjects, he must select at least one member of the Faculty to represent each subject and to serve as the members of his Special Committee. The representative of the Major Subject is the chairman. Not later than two weeks after his first registration in the Graduate School a candidate must file, on the proper blank, a statement of the Major and Minor Subjects which he has selected. This statement must be signed by each member of the Special Committee as an indication of his approval and consent to serve on the committee.

A student may change the membership of his Special Committee with the approval of all the members of the newly constituted Committee. Notice of such change must be filed immediately with the Dean of the Graduate School. A vacancy on a Special Committee, caused by the absence of a member from the University, may be filled by the Dean on joint recommendation of the student and the members concerned.

*Statement of Courses.* At the beginning of each term a graduate student shall make out in duplicate a list of all the courses which he plans to take during the term and shall have this list signed by the chairman of his Committee as an indication of approval. The chairman of the Committee shall retain one copy; the duplicate copy shall be filed in the office of the Graduate School within two weeks after registration. Any subsequent change in this list of courses must be certified to the office of the Graduate School by the chairman of the Committee. Courses primarily for undergraduates, printed in italics, are ordinarily not open to graduate students.

*Thesis or Essay.* A candidate for any of the masters' degrees under Plan A must complete an acceptable thesis, or, in the discretion of his Special Committee, an essay. The general subject of the thesis, or essay, approved by the chairman of the Committee, must be filed with the Dean at the beginning of the term in which the candidate intends to complete all the requirements for his degree. The thesis, or essay, is ordinarily written in the candidate's major field and under the direction of the chairman of his Special Committee. It must be

approved, however, by all members of the Committee. For this purpose it should be in the Committee's hands at least fifteen days before the final examination; and during the five days immediately preceding this examination a typewritten copy, approved by all members of the Special Committee, must be on file in the office of the Graduate School.

The thesis must be typewritten, double spaced, on a durable rag bond, 8 x 10½ inches, with a left-hand margin of at least an inch and a quarter. The carbon copy need not be on bond paper. The title-page should be set up according to the following form:

[TITLE OF THESIS]  
 A Thesis  
 Presented to the Faculty of the Graduate School of Cornell  
 University for the degree of  
 [—————]  
 By  
 [Author's Name in Full]  
 [Date on which degree is to be conferred.]

Immediately following the title-page there must be a biographical sketch of the author, in length not exceeding 150 words.

Before the degree can be conferred two<sup>1</sup> bound typewritten copies (one of which must be a ribbon copy) of the completed thesis, approved by the Special Committee, must be deposited in the office of the Graduate School. These copies become the property of the University Library.

When the Major Subject for the degree of Master of Architecture or the degree of Master of Landscape Architecture is in Design, the candidate is required to deposit, in place of the thesis, either his original drawings or a photographic reproduction of them.

*Final examination.* After the thesis, or essay, has been completed and filed in the office of the Graduate School, as provided above, and after the required period<sup>2</sup> of residence has been substantially completed, the candidate is required to present himself for the final examination. No candidate may proceed to the final examination until the other requirements for his degree have been completed, except that the final examination may be given near the end of the candidate's last term of residence. The examination covers the thesis and the Major and Minor Subjects. It may be written or oral, or both, at the option of the Special Committee.

An application for final examination, approved by the Special Committee, must be filed in the office of the Graduate School at least five days in advance of the examination.

Final examinations are conducted by the student's Special Committee and are open to all members of the Faculty. At the discretion of the Special Committee those under whom the student has worked

<sup>1</sup>The candidate should consult the chairman of his committee to ascertain if additional copies are required by the department.

may be invited to participate in the examination. But the Special Committee alone shall decide upon the merits of the candidate's performance.

A report on each final examination, whether passed or failed, shall be filed by the Special Committee in the office of the Dean. A candidate who has failed in a final examination may not be re-examined within three months.

**Plan B.** Open to candidates for A.M., M.S., or M.S. in Agr.

Plan B is designed for those who wish a somewhat broader training than is permitted under Plan A. It is intended to meet the needs of prospective or in-service teachers in secondary schools and of others who wish to supplement a four-year college course by an additional year of study at the graduate level. The candidate, working under the direction of a Special Committee, is required (1) to complete satisfactorily a minimum of thirty semester hours of work, comprising (a) work in formal courses and in seminars including such examinations as may be given therein; and (b) either an acceptable expository or critical essay or problem in research, or, if he prefers, a formal thesis; and (2) to pass a final comprehensive examination.

*Fields of Concentration.* Of the thirty semester hours in formal courses, seminars, and the like required of a candidate working under plan B, approximately one-half must be in a field of concentration chosen by the candidate; and the remainder may be distributed in that field and in related fields, in the discretion of the candidate's Special Committee, as best meets his needs. Fields of concentration are broader than major and minor subjects specified under Plan A.

The following is a provisional list of fields of concentration from which selection may be made; but the student's choice is not limited to this list. If none of these is suitable, he should consult the Dean of the Graduate School or the professors in the field in which he is interested.

- Agricultural Economics
- Biological Sciences
- Education
- English
- Fine Arts
- Foreign Languages
- Home Economics
- Mathematics
- Physical Sciences
- Speech and Drama
- Social Studies
- Technical Agriculture

*Special Committees.* After the candidate has chosen his field of concentration, he must select two members of the Faculty to serve as his Special Committee. One of these, who is chairman of the committee, must represent the field of concentration, the other may be chosen



from either that field or some related field, depending on the candidate's program. The committee members' consent to serve, together with a statement of the field of concentration approved by both members of the Committee, must be filed with the Dean of the Graduate School, on the proper blank, not later than two weeks after first registration.

A student may change the membership of his Special Committee with the approval of all the members of the newly constituted Committee. Notice of such change must be filed immediately with the Dean of the Graduate School. A vacancy on a Special Committee, caused by the absence of a member from the University, may be filled by the Dean on joint recommendation of the student and the members concerned.

*Statement of Courses.* At the beginning of each term a graduate student shall make out in duplicate a list of all the courses which he plans to take during the term and shall have this list signed by the chairman of his Committee as an indication of approval. The chairman of the Committee shall retain one copy; the duplicate copy shall be filed in the office of the Graduate School within two weeks after registration. Any subsequent change in this list of courses must be certified to the office of the Graduate School by the chairman of the Committee. Courses primarily for undergraduates, printed in italics, are ordinarily not open to graduate students.

*Thesis, Research, or Essay.* A substantial part of the candidate's work in the field of concentration shall be devoted to studies requiring investigation, organization of material, and criticism. Whether the candidate is to meet this requirement by work in seminars, by writing an essay or a thesis, or in some other way is left to the Special Committee in consultation with the student. If a thesis is required, the candidate must follow the procedure for presenting theses outlined under Plan A, pages 16-17.

The Special Committee will report to the office of the Graduate School the semester-hour equivalent and the grades for the thesis or the essay, or for other work, not otherwise reported in formal courses, done by the candidate in meeting this requirement.

*Final Examination.* After the candidate has substantially satisfied the minimum period of residence and has satisfactorily completed at least thirty semester hours of work approved by his Special Committee, he must present himself for the final comprehensive examination. No candidate may proceed to the final examination until the other requirements for his degree have been completed, except that the final examination may be given near the end of the candidate's last term of residence while he is still taking courses required for the degree. Eligibility for the final examination depends on satisfactory progress in those courses, and their completion is essential to meeting all requirements. The examination covers the thesis or essay, if presented, as well as work done in formal courses and seminars. The examina-



tion may be written or oral, or both, at the option of the Special Committee.

An application for final examination, approved by the Special Committee, must be filed in the office of the Graduate School at least five days in advance of the final examination.

Final examinations are conducted by the student's Special Committee and are open to all members of the Faculty. At the discretion of the Special Committee those under whom the student has worked may be invited to participate in the examination. But the Special Committee alone shall decide upon the merits of the candidate's performance.

A report on each final examination, whether passed or failed, shall be filed by the Special Committee in the office of the Dean. A candidate who has failed in a final examination may not be re-examined within three months.

#### SPECIAL REQUIREMENTS FOR PROFESSIONAL DEGREES

The following special requirements apply in the case of the professional masters' degrees enumerated.

*Master of Laws, LL.M.* The degree of LL.M. is intended primarily for those who desire to increase their knowledge of the law by work in special fields. In addition to meeting the general requirements for admission given on page 12, the candidate must have received the degree of Bachelor of Laws from an approved law school and must have shown a high level of professional ability. To complete the requirements for the degree the candidate (1) must work for a minimum period of two terms under the direction of a Special Committee of three or more, chosen by the candidate, after consultation with the chairman of the Division of Law, from the Faculty in Law and related fields (such as Economics, Government, History, and Philosophy); (2) shall complete with high merit such a program of instruction and investigation as shall be approved by his Special Committee and acceptable to the Division; (3) must demonstrate his ability creditably to pursue research in Law by the submission of articles or reports; and (4) must pass with superior standing a final examination and such other examinations as shall be required by his Special Committee and acceptable to the Division. For further information see page 182 of this *Announcement* and also the *Announcement of the Cornell Law School*.

*Master of Education, M.Ed.* This degree is awarded at the end of the fifth year of the five-year program for the preparation of secondary school teachers. Though a brief statement regarding the program for this degree is presented on page 132 of this *Announcement*, complete information may be found in the *Announcement of the School of Education*. Prospective candidates should communicate with the Director of the School of Education, 211 Stone Hall, Ithaca, N. Y.

*Master of Science in Education, M.S. in Ed.* This degree is de-

signed for persons of experience who wish to prepare themselves for specialized forms of educational work. The candidate, working under the direction of a Special Committee for a minimum of two terms, is required to complete an approved program of study adjusted to his needs. The candidate is required to pass a comprehensive final examination. For further details see page 132 of this *Announcement*.

*Master of Fine Arts, M.F.A.*, with major in the History and Practice of the Fine Arts. This degree is designed for students whose undergraduate major in the history and practice of the fine arts prepares them for advanced work. The graduate work requires two years with a specified curriculum. See page 45; and for details consult the Dean of the College of Architecture.

*Masters' Degrees in Engineering.* For special requirements, see the announcement of the Engineering Division, below, pages 139ff.

### REQUIREMENTS FOR THE PH.D. DEGREE

Work leading to the Ph.D. degree is designed to give the candidate a thoroughly comprehensive view of a field of knowledge and to train him in methods of research and scholarship in that field. A candidate is expected to maintain a high grade of achievement and to show evidence of ability in independent investigation and study. The requirements for the degree include (1) a minimum of six terms of residence as a graduate student; (2) the satisfactory completion, under the direction of a Special Committee, of work in one Major Subject and two Minor Subjects; (3) certain requirements in foreign language; (4) the presentation of an acceptable thesis and an abstract of the thesis; and (5) the passing of a qualifying examination and a final examination.

### RESIDENCE REQUIREMENTS

For the Ph.D. degree a minimum of six terms of residence is required; or seven terms if the candidate does not pass one of the examinations in foreign language (see requirements in foreign language) on beginning candidacy at Cornell University.

To receive credit for residence a candidate must be regularly enrolled in the Graduate School. The satisfactory completion of his work, term by term, must be attested by the members of his Special Committee.

No candidate may earn more than two terms of residence credit in any twelve-month period except with the permission of the Dean in special cases. (This rule is suspended to permit accelerated programs of study during the emergency.)

The amount of credit granted to a candidate who holds an appointment as instructor, as a teaching or research assistant, or who is acting in any capacity involving a significant loss of time from his graduate work, shall be determined by the General Committee of the Graduate School, upon recommendation of the Special Committee.

In no case shall such credit exceed three-fourths, and in the case of full-time instructors one-half, of full residence credit.

A candidate for an advanced degree is expected to complete his residence with reasonable continuity. All work for an advanced degree, including the final examination, must be completed within four years after the minimum residence requirement for the degree has been satisfied.

At least two of the last four terms, and ordinarily the last two, must be spent in consecutive regular terms (other than the six-week Summer Session) at Cornell University.

*Residence Credit for a Master's Degree.* Residence credit earned as a candidate for a master's degree, either at Cornell or elsewhere, may be credited toward the Ph.D. degree. Normally not more than two terms of credit may be gained in this way, and the transfer requires the recommendation of the Special Committee.

*Credit for Work in Other Universities.* Upon the recommendation of the student's Special Committee residence up to a maximum of four terms may be credited toward the doctor's degree for work done in other universities. Application for such credit should be made by the student as soon as possible after registration, and not later than the end of the first term of residence at Cornell.

*Residence in Summer Sessions.*<sup>1</sup> To obtain residence credit in the Graduate School for work done in the Summer Session the candidate must register both in the Summer Session and in the Graduate School. He must file in the office of the Graduate School within one week after registration a statement of courses, as provided for students in the regular session (see page 24). For the Ph.D. degree residence during Summer Sessions may be counted at the rate of three Summer Sessions for one term of credit, and five Sessions for two terms.

Credit toward the Ph.D. degree earned in Summer Sessions at Cornell or elsewhere is ordinarily limited to two terms. A candidate who has already earned two terms of credit by work in Summer Sessions and who has demonstrated ability in graduate work may, however, upon recommendation of his Special Committee and with the approval of the General Committee, earn one more term of credit by work in Summer Sessions at Cornell, with the privilege of credit for an additional term for research under personal direction. In this case, however, the last year of candidacy must be spent in residence at the University and in consecutive, regular terms (other than the six-week Summer Sessions).

*Research under Personal Direction.* A candidate for the Ph.D. degree who has demonstrated ability in graduate studies may, upon recommendation of his Special Committee and with the approval of the Dean, receive residence credit for research done during the summer under the personal direction of a member of the Faculty of the Graduate School. The privilege of working under Personal Direction

<sup>1</sup>These rules apply to the Summer Session of six weeks.

will not ordinarily be granted to a student until he has completed at least a full year of graduate work in regular terms (other than the six-week Summer Session). Application for the privilege must be accompanied by a statement of the member of the Faculty concerned showing the number of weeks during which he is prepared to supervise the work of the student and the nature of the research to be done. To obtain credit for such work, the student must register *in advance* at the office of the Graduate School, and the professor must certify to its satisfactory completion. A maximum of two terms may be earned in this way.

A candidate registered under Personal Direction during the summer may be admitted to the classes of the six-weeks Summer Session. Such students must register both in the Summer Session and in the Graduate School and must pay tuition at least equal to that required for the Summer Session.

*Work in Absentia.* A candidate for the Ph.D. degree may be credited with residence for work done away from the University, provided such an arrangement offers superior advantages for the prosecution of the student's work. *Work in absentia* is subject to the following conditions:

(a) An applicant for this privilege must be regularly registered in the Graduate School as a candidate for the doctorate, and while not in residence shall receive no compensation except from the University.

(b) He shall have spent at least two terms in Cornell University in study towards the doctor's degree.

(c) Permission to count such time as residence may be given by the Dean of the Graduate School for a period not to exceed one term, when the application is unanimously approved by the members of the student's Special Committee. When a longer period of outside study is required, application for an extension of time should be made to the General Committee, which may, at its discretion, extend the period to two terms. In no event, however, shall a student acquire a total of more than two terms' residence under these provisions.

(d) A student who avails himself of this privilege shall continue to work under the general direction of his Special Committee. Whenever possible, however, the work should be carried on under the immediate supervision of a competent director, acting for the Special Committee and to be designated by that Committee.

(e) Reports regarding the progress of the work shall be made as directed by the Special Committee at intervals not in excess of one month.

(f) In case a student desires to work *in absentia* during either or both of the last two terms of his residence, he must petition the General Committee for a waiver of the rule requiring him to spend these terms in residence at the University.

### MAJOR AND MINOR SUBJECTS

A candidate for the Ph.D. degree must select a Major Subject and two Minor Subjects properly related to the Major Subject. He will devote more time to the Major Subject than to either Minor Subject, but the division of his time is left to the Special Committee. A list of approved Major and Minor Subjects will be found below, in



the announcement of each department of instruction. The candidate should consult members of the Faculty regarding his choice of subjects. Work in Major and Minor Subjects consists of work in formal courses, informal work in seminars, assigned reading and independent study, in the discretion of the Special Committee. There are no requirements in semester hours for the Ph.D. degree.

*Special Committees.* After the candidate has chosen his Major and Minor Subjects, he must select a member<sup>1</sup> of the Faculty to represent each subject. The three persons so selected constitute the candidate's Special Committee, the representative of the Major Subject being chairman. Not later than two weeks after his first registration in the Graduate School a candidate must file, on the proper blank, a statement of the Major and Minor Subjects which he has selected. This statement must be signed by each member of the Special Committee as an indication of his approval and consent to serve on the committee.

A student may change the membership of his Special Committee with the approval of all the members of the newly constituted Committee. Notice of such change must be filed immediately with the Dean of the Graduate School. No such change in his Special Committee may be made after the fourth term of residence except with the approval of the Dean. A vacancy on a Special Committee, caused by the absence of a member from the University, may be filled by the Dean on joint recommendation of the student and the members concerned.

*Statement of Courses.* At the beginning of each term a graduate student shall make out in duplicate a list of all the courses which he plans to take during the term and shall have this list signed by the chairman of his Committee as an indication of approval. The chairman of the Committee shall retain one copy; the duplicate copy shall be filed in the office of the Graduate School within two weeks after registration. Any subsequent change in this list of courses must be certified to the office of the Graduate School by the chairman of the Committee. Courses primarily for undergraduates, printed in italics, are ordinarily not open to graduate students.

#### REQUIREMENTS IN FOREIGN LANGUAGES

A candidate for the Ph.D. degree must demonstrate his ability to read both French and German (or two languages, other than English, approved by his Special Committee), by passing in each of these languages an examination given by a member of the Language Examination Board. The examiner is to be designated by the Dean

<sup>1</sup>In special cases two members of the Faculty may be chosen to represent either the Major or a Minor Subject. If the candidate chooses two members to represent the Major Subject, he may designate one of them as chairman.



of the Graduate School. The two languages so approved shall be significantly useful in the candidate's field of work and not chosen solely with reference to the preparation of the thesis.

A candidate for Ph.D. is expected to meet the foreign language requirements at the beginning of his candidacy at Cornell University for that degree. A minimum of seven terms of residence is required of a candidate who does not pass at least one language examination at this time. The extra term of residence may be waived by the General Committee of the Graduate School upon recommendation of the student's Special Committee, if preparation in foreign language is made during a period when the student is not receiving residence credit.

All examinations to test a candidate's knowledge of a foreign language must be passed at Cornell University before a member of the Language Examination Board. In case of failure in an examination, no re-examination can be given, ordinarily, within one month.

A minimum of three terms of residence is required after completion of all language requirements, except in the case of a student admitted to candidacy with two or more terms of residence credit; in such case, a minimum of two terms is required.

Language examinations passed within one month after registration are considered as being passed at the time of registration.

#### THESIS

A candidate for the Ph.D. degree is required to present a thesis. Ordinarily the thesis is written in the candidate's major field and under the direction of the chairman of his Special Committee. But with the approval of the representatives of the Major and Minor Subjects the candidate may elect to write the thesis under the direction of another member of the Faculty, who then becomes a member of the Special Committee.

The general subject of the thesis, approved by the chairman of the candidate's Special Committee, must be filed with the Dean at least six months before the candidate intends to complete the requirements for the degree.

The thesis must be approved by all members of the Special Committee and must be acceptable in respect both of scholarship and of literary quality. The completed thesis should be in the hands of the Special Committee at least fifteen days before the final examination (Examination B or C; see page 27). During the five days immediately preceding this examination a typewritten copy, approved by all members of the Special Committee, shall be on file in the office of the Graduate School. Under no circumstances may this final examination (B or C) be given before the thesis has been accepted and filed.

The thesis must be typewritten, double spaced, on a durable rag bond, 8 x 10½ inches, with a left-hand margin of at least an inch and a quarter. The carbon copy need not be on bond paper. The title-page should be set up according to the following form:

[TITLE OF THESIS]  
 A Thesis  
 Presented to the Faculty of the Graduate School of Cornell  
 University for the degree of  
 [—————]  
 By  
 [Author's Name in Full]  
 [Date on which degree is to be conferred.]

Immediately following the title-page there must be a biographical sketch of the author, in length not exceeding 150 words.

Before the degree can be conferred two<sup>1</sup> bound typewritten copies (one of which must be a ribbon copy) of the completed thesis, approved by the Special Committee, must be deposited in the office of the Graduate School. These copies become the property of the University Library.

*Abstract of thesis.* A candidate for the Ph.D. degree must deposit in the office of the Graduate School an abstract of his thesis in two copies, typewritten, double spaced, on bond paper, 8 x 10½ inches. The abstract should be about 1500 words in length and should not exceed 1700 words. It must be approved by the Chairman of the Special Committee and presented in a form acceptable for printing.

The candidate must pay to the Treasurer of the University a fee of \$12.50 to cover the cost of publishing his abstract in an annual volume, "Abstracts of Theses." This volume will be available in the year following that in which the student receives his degree. A recipient of the degree who wishes to receive a copy of the volume containing the abstract of his thesis should file his name and address in the Office of the Graduate School at the time of submitting his abstract. Off-prints of an abstract may be obtained by agreement with the contracting printer.

#### EXAMINATIONS

*Qualifying Examination.* A candidate for the Ph.D. degree must pass a qualifying examination given by his Special Committee. The primary purposes of the qualifying examination are: (1) to ascertain whether the candidate is qualified to continue work for the doctorate; and, if so, (2) to aid in planning his work during the remainder of his candidacy. The examination is ordinarily given at the end of the first year of graduate study, if that year is at Cornell. If the candidate

<sup>1</sup>The candidate should consult the chairman of his committee to ascertain if additional copies are required by the department.

has had one year or more of graduate work elsewhere, the qualifying examination should be given as soon as possible after his entrance into the Graduate School. The qualifying examination may be oral or written or both.

Any member of the Special Committee may waive his part of the qualifying examination. The report on the qualifying examination shall, however, be made by the Special Committee as a whole, after consultation. If a candidate fails to pass the qualifying examination, no re-examination shall be allowed except on recommendation of the Special Committee.

A report on each qualifying examination, whether passed, waived, or failed, shall be filed by the Special Committee in the office of the Graduate School.

Before presenting himself for Final Examination B or C (see next paragraph), a candidate must have earned at least two terms of residence credit after the passing or the waiving of the qualifying examination.

*Final Examination.* A candidate for the Ph.D. degree must pass a final examination, conducted by his Special Committee and covering (1) the Major and Minor Subjects and (2) the thesis and related topics. At the discretion of the Special Committee, the two parts of this examination may be given either separately or in combination.

When the two parts are given separately, an examination dealing mainly with the Major and Minor Subjects, designated as Final Examination A, may be given at the end of the fourth term of candidacy, or thereafter. Examination A will be both oral and written. The early completion of Examination A will leave the student free to devote his attention to the thesis and collateral studies during the remainder of his candidacy. Final Examination B, on the thesis and related topics and on such other work as the student may have done after completing Examination A, will be given after the residence requirement has been satisfied and the thesis has been completed and filed as provided on page 25. This examination may be oral, or both oral and written, at the discretion of the Special Committee. At the time of taking this examination the student must be registered in the Graduate School, either regularly or as candidate for degree only.

When the two parts of the final examination are given in combination, the combined examination, designated as Final Examination C, will be given after the residence requirement has been satisfied and the thesis has been completed and filed, as provided on page 25. Examination C may be both oral and written.

No candidate may present himself for Final Examination B or C until he has satisfied the minimum period of residence and has filed the thesis as provided on page 25.

Applications for final examinations, (A, B, and C), approved by the Special Committee, must be filed in the office of the Graduate School at least five days in advance of the examination.

Final examinations are conducted by the student's Special Com-

mittee and are open to all members of the Faculty. At the discretion of the Special Committee those under whom the student has worked may be invited to participate in the examination. But the Special Committee alone shall decide upon the merits of the candidate's performance.

A report on each final examination, whether passed or failed, shall be filed by the Special Committee in the office of the Graduate School. A candidate who has failed in any of these Final Examinations may not be re-examined within six months.

Final examinations must be completed within four years after the minimum residence requirements for the degree has been satisfied.

### REQUIREMENTS FOR THE J.S.D. DEGREE

Work leading to this degree is designed to train legal scholars and to stimulate original investigation in the purpose, administration, history, and progress of the law.

*Admission.* To be eligible for admission to candidacy for J.S.D. the candidate shall have met the general requirements for admission stated on page 12; shall have received the degree Bachelor of Laws from an approved law school; shall have had some professional practice or teaching experience after obtaining that degree; and must have shown a high level of professional ability.

*Residence and Special Committee.* The candidate shall be in residence a minimum period of two terms working under the direction of a Special Committee of three or more chosen by the candidate after consultation with the Chairman of the Division of Law. The chairman of the committee and one other member shall be from the Faculty of the Law School, but the other member or members may be chosen from the graduate School Faculty in a field or fields appropriate to the candidate's graduate objective, which normally will be in the related fields of Economics, Government, History, or Philosophy.

*Program.* The candidate shall pursue with distinction a program of study and investigation approved by his Special Committee and acceptable to the Division of Law and shall pass with superior standing such examinations as his Special Committee shall prescribe.

*Thesis.* The candidate must embody the results of his investigation in a thesis which shall be a creditable contribution to legal scholarship and which shall be presented in a form suitable for publication. He is required to file two bound copies, together with two copies of a typewritten abstract thereof, in the office of the Graduate School. For the procedures to be followed in presenting the thesis see page 25.

*Final Examination.* After the thesis has been completed and filed in the office of the Graduate School, as provided on page 25, the candidate is required to present himself for a final examination. A report on each final examination shall be filed by the Special Com-



mittee in the office of the Graduate School. A candidate who has failed in a final examination may not be re-examined within six months.

For further information concerning J.S.D. see page 182 of this *Announcement* and also the *Announcement of the Cornell Law School*.

## TUITION AND OTHER FEES

### GENERAL REGULATIONS

Tuition and other fees become due when the student registers. The University allows twenty days of grace in each term, five days in the six-weeks Summer Session. The last day of grace is generally printed on the registration coupon which the student is required to present at the Treasurer's office. Any student who fails to pay his tuition charges, other fees, and other indebtedness to the University, or who, if entitled to free tuition, fails to claim it at the Treasurer's office and to pay his other fees within the prescribed period of grace, is thereby dropped from the University unless the Treasurer has granted him an extension of time to complete payment. The Treasurer is permitted to grant such an extension when, in his judgment, the circumstances of a particular case warrant his doing so. For any such extension the student is assessed a fee of \$2. A reinstatement fee of \$5 is assessed against any student who is permitted to continue or return to classes after being dropped from the University for default in payments. The assessment may be waived in any instance for reasons satisfactory to the Treasurer and the Registrar, when such reasons are set forth in a written statement.

Students registering at any time during the last ten weeks of any term are required to pay tuition at the rate of ten per cent of the regular tuition of the term for each week or fraction of a week between the day of registration and the last examination day of the term. Students registering at any time during the last five weeks in the short summer courses are required to pay tuition at the rate of twenty per cent of the term's tuition for each week or fraction of a week between the day of registration and the last examination day of the term.

A tuition fee or other fee may be changed by the Trustees at any time without previous notice.

### FEES PAYABLE BY GRADUATE STUDENTS

A *Tuition Fee* of \$100 a term is to be paid by all students registered in the Graduate School except candidates for the LL.M. degree, who must pay a fee of \$200 a term. It is payable at the beginning of each term.

Certain classes of students are exempt from the payment of the tuition fee. They are:

1. Graduate students holding certain appointments as University Fellows or Graduate Scholars, and holders of certain temporary fellowships and scholarships.

2. Resident Doctors, upon recommendation of the Dean.
3. Graduate students who have satisfactorily completed the requirements of residence for the degree but who remain in residence while working on their theses or while doing other work in contemplation of a degree.
4. In addition to students exempt under the charter of the University from the payment of tuition the following, to the extent herein mentioned, shall also be exempt from such payments of fees:

Upon recommendation by the appropriate college dean and by action of the Board of Trustees, for each appointment, waiver of tuition in the Graduate School and of laboratory and shop fees in the department or line of work in which he is employed, may be made to a member of the teaching or scientific staff whose salary is not in excess of \$750 a term, subject to the following limitations:

- (a) In the case of a candidate for a master's degree or a J.S.D. degree, up to a maximum of four academic terms only, any credits toward residence earned prior to appointment to be included in the four terms.
- (b) In the case of a candidate for the Ph.D., until by work here or elsewhere he has completed the minimum residence credit of six terms required by the Graduate School, and for not to exceed two academic terms thereafter.
- (c) Whenever waiver of tuition in the Graduate School is involved in the making of any given appointment, said appointment shall not carry a salary in excess of \$750 a term.

Members of the teaching or scientific staff taking work outside the department or line of work in which they are employed shall be charged tuition in proportion to the amount of work for which they are registered.

In the case of students leaving during the term to enter the armed forces, a tuition charge of  $\frac{1}{16}$  per week or fraction thereof is made from the first day of instruction to the date of withdrawal.

*An Administration Fee* of \$12.50 a term, payable at the beginning of each term, is to be paid by all students registered in the Graduate School except Honorary Fellows and Resident Doctors.

A graduate student who returns to the University to present his thesis and to take the final examination for an advanced degree, all other work for that degree having been previously completed, shall register as a "candidate for degree only" and shall pay only an administration fee of \$12.50.

*A Matriculation Fee* of \$11 is required of every student upon his first entrance into the University. It must be paid at the time of registration and is not refundable.

*A Health and Infirmary Fee*<sup>1</sup> of \$10 a term is required of all students (except Honorary Fellows, Resident Doctors, and students registered in the Medical College in New York City) at the beginning of each term. For a statement of the privileges given in return for this fee, see the *General Information Number*.

<sup>1</sup>Teachers and others not on the University teaching staff taking four hours of work or less, whose tuition payments have been regularly prorated, and who reside and regularly commute to the University from without the area of the city and town of Ithaca, shall be exempt from the payment of the Infirmary fee upon the understanding that if they should be admitted to the Infirmary they will pay the regular daily rate. To such students, membership in Willard Straight Hall is optional.

A *Graduation Fee* of \$20 is required, at least ten days before the degree is to be conferred, of every candidate for an advanced degree. The fee will be returned if the degree is not conferred.

An *Abstract of Thesis Fee* of \$12.50 is required, at least ten days before the degree is to be conferred, of each candidate for the degree Doctor of Philosophy. This fee, the cost of publication in the volume "Abstracts of Theses," is in addition to the \$20 graduation fee.

*Laboratory Fees.* Every person taking laboratory work in courses in which a fee is charged must pay to the Treasurer of the University the required fee or the required deposit for the materials *et cetera* that are to be used in the work.

A *Willard Straight Hall Membership Fee*<sup>1</sup> of \$5 a term is required of all graduate students.

*Fees for the Summer Session.* Graduate students who attend classes in the Summer Session must register both in the Graduate School and in the Summer Session and must pay a tuition fee of \$60 for each Summer Session.

A graduate student who is registered in both the Summer Session and in the Graduate School must also pay a health service and infirmary fee of \$4.50.

Please note that this paragraph refers only to fees for double registration in the Graduate School and the Summer Session.

Graduate students registering for the first time at Cornell must also pay the matriculation fee of \$11. The usual laboratory fees and deposits and motor vehicle fees listed below are required.

*Motor Vehicle Registration and Parking Fees.* For the duration of the war no student, with a few exceptions, may have or use a motor-driven vehicle in Tompkins County, New York, while the University is in session. The graduate student has, for the present, been exempted from this restriction. Any student, unless he has the rank of instructor in Cornell University, who owns, maintains, or for his own benefit operates, or has in charge a motor-driven vehicle in Tompkins County, the environment of Ithaca, is required to register his vehicle in person with the Campus Patrol, and, unless it is owned by another member of his immediate family who is a resident of Tompkins County, to pay a registration fee of \$1 a term. He must present (a) written consent of his parent or guardian if he is under 21 years of age, (b) evidence that the vehicle may be legally driven in New York State, (c) evidence that the operator may legally drive in New York State, and (d) evidence that the vehicle is effectively insured against public liability for personal injury and property damage for the standard minima of 5-10-5. (Exceptions are: (1) Summer Session students who have not been registered in the University during the past term and (2) special students who are registered for six hours or less a term.) This registration must be completed within the registration days at the beginning of the first term if the

<sup>1</sup>See footnote on preceding page.

student is then subject to the rule. If he becomes subject to the rule after that time, he has one week in which to comply with it. Late registration of a vehicle makes the student liable to a penalty of \$1.

*Motorcycles* must be registered but may not be used on the campus during class hours.

*Student Parking* during University hours on the campus is for the present prohibited or limited by signs, curb markings, and to a few other places a list of which will be given to registrants. The parking of *trailers* on any part of the University's grounds or outlying farms or other properties is prohibited.

During the Summer Session, the rules are the same.

The student's registration in the University is held to constitute an agreement on his part that he will abide by its rules and regulations with regard to traffic and parking or suffer the penalty prescribed for any violation of them. All privileges under this head may be denied a student who is not in good standing.

*Personal Direction.* Students carrying on studies during the summer under Personal Direction are required to register with the Registrar as well as in the Graduate School.

Students registered under Personal Direction, if they desire residence credit for their work, must pay a tuition fee proportionate to the ratio which the credit desired bears to one entire term. Such students must pay the administration fee of \$12.50, the Willard Straight Hall membership fee of \$5, and the Health and Infirmary fee of \$10; provided, however, that one half these fees will be remitted if the registration is for a period not exceeding 8 weeks. Such payment admits them to the current Summer Session classes without additional tuition payments, provided that the amount paid is at least equal to that charged students registered in the Summer Session. Students registered under Personal Direction during the summer, not for credit, are exempt from the payment of tuition, but may not attend, either as visitors or for subsequent credit, any of the classes or exercises of the Summer Session.

The privilege of taking work under Personal Direction during the summer without the payment of tuition shall be restricted to *bona fide* candidates for degrees at Cornell University, who have been in residence during the preceding academic year.

### FOREIGN STUDENTS

The University maintains on its staff a Counselor to Foreign students, Mr. Donald C. Kerr, whose duty is to look after the welfare of all students from other countries. He may be consulted on personal problems, social questions, or any other matter in which he may be helpful. His office is in the Cornell Cosmopolitan Club, 301 Bryant Avenue, which has living and dining room accommodations for a group of foreign and American students. It is suggested that all foreign students write him before coming to Ithaca, or call on him



immediately upon arrival. He will be glad to meet them at the train, help them find suitable living quarters, either at the Club or elsewhere, and introduce them to other University officials and members of the faculty.

### LIVING EXPENSES IN ITHACA

A few men graduate students live in the University Residential Halls. For information about these, address the Manager of Residential Halls, Morrill Hall. The majority of graduate students live in rooms or apartments which are for rent in the vicinity of the University. The lowest possible price is about \$3.50 a week. The usual figure is probably about \$5 to \$6. About the middle of each summer the University publishes a list of inspected rooms in which prices are quoted. For this list write to the Manager of Residential Halls.

The University offers no dining service in connection with its Residential Halls for Men. There are, however, two large cafeterias, the one at Willard Straight Hall and the other at the College of Home Economics. Near the Campus there are many restaurants which cater chiefly to students.

Because of the scarcity of self-supporting labor, new graduate students are advised not to register in the University unless they have sufficient funds for their expenses during the first year.

*For Women.* All women graduate students at Cornell University live in houses approved by the Counselor for Women. Graduate women students who are under twenty-one years of age are required to live in the University Residential Halls. About the first of September the Office of the Counselor of Women issues a list of rooms off the campus available for the fall term. This list may be had by writing to the Counselor for Women who will give assistance in finding suitable rooms. For information regarding any possibilities of self-help for women, inquiries should be addressed to the same office.

### LOANS

#### THE GRADUATE STUDENT LOAN FUND

Contributions from the alumni of Cornell University have made it possible to establish a Graduate Student Loan Fund for use of graduate students already enrolled at Cornell University.

#### LOAN FUNDS FOR WOMEN GRADUATE STUDENTS

There is available a loan fund for the use of women graduate students, provided by the Ithaca Branch of the Association of American University Women and Mu Chapter of Pi Lambda Theta. Applications should be made in writing to the Counselor of Women.

A loan fund is available for the use of women graduate students in science, provided by Alpha Chapter of Sigma Delta Epsilon, Graduate Women's Scientific Fraternity. Applications should be made in writ-

ing to the Treasurer of Sigma Delta Epsilon, Martha Van Rensselaer Hall, Cornell University.

### THE BUREAU OF EDUCATIONAL SERVICE

Established in 1932, the Cornell University Bureau of Educational Service correlates the educational services which the University is prepared to offer with the needs of the institutions which it serves. These services require contact with students and faculty at the University, with alumni, and with other educational institutions and officials.

The chief activities of the Bureau are concerned with the various phases of teacher placement. In the field of education, this is a highly specialized function. Each prospective teacher prepared at Cornell is urged to register with this office well in advance of the completion of his training. By means of this registration, there is on file in appropriate form comprehensive information as to personal, educational, and experiential qualifications of each registrant. With the co-operation of the registrant, this record is kept up to date at all times and is available to any institution or qualified official upon request.

The Bureau's program of rendering discriminating service to interested educational institutions is facilitated by and combined with the follow-up check on registrants previously placed. By this means a realistic evaluation is attained which permits a practical upgrading program to be followed.

Answering frequent requests for information about trends and demands, both long and short term, forms an important part of the Bureau's service. Location of positions, salary range, contract terms, certification requirements, and many other factors are items on which the Bureau is equipped to give up-to-date information.

All graduate students who expect to teach are invited to avail themselves of the services which the Bureau offers. It is located in 102 Stone Hall.

### FELLOWSHIPS, SCHOLARSHIPS, PRIZES

#### HONORARY FELLOWSHIPS

Holders of the Doctor's degree, or other persons of recognized standing as scholars, who wish to continue work in a field in which they have already achieved distinction may, in the discretion of the Faculty, be appointed to honorary fellowships. These fellowships cover all fees except laboratory charges. Actual residence at the University and regular registration in the Graduate School are required of incumbents.

#### AWARD AND TENURE

Appointments to fellowships and scholarships are made on April 1 of each year. Forms for making application may be had from the

Office of the Graduate School. These applications, together with supporting documents, must be filed in the Office of the Graduate School on or before the first of March.

The Faculty may combine the stipends of two or more scholarships or fellowships or may divide a fellowship into two or more scholarships. Appointments are made for one academic year.

The holder of a fellowship or a scholarship may not accept another appointment, but must devote his whole time to his studies. He may, however, be called upon to assist in instruction up to a maximum of six clock-hours a week.

The stipends of fellowships and scholarships are payable at the office of the Treasurer of the University in eight equal installments, beginning July 15 or November 15; the other payments being due on the fifteenth of each month following.

#### FELLOWSHIPS AND SCHOLARSHIPS FOR 1945-46

The following fellowships and scholarships offered during the year 1945-46 carry exemption from tuition unless otherwise indicated:

##### TWO ALLEN SEYMOUR OLMSTEAD SCHOLARSHIPS

Stipends \$1,000 each. These scholarships are open to graduate students in any field of study in which major work for the Ph.D. degree is offered.

##### AGRICULTURE

Three *Henry Strong Denison Fellowships in Agriculture*. Stipends \$1,000 each; no exemption from tuition. These fellowships are distributed annually among the following fields: plant sciences, animal sciences, social sciences, and agricultural engineering. Preference will be given to those applicants who expect to complete the requirements for the Ph.D. degree and who appear most promising from the standpoint of ability to conduct research. (These fellowships have been discontinued for the duration of the war).

*The Clinton DeWitt Smith Fellowship in Agriculture*. Stipend \$400. This fellowship is limited to students who come from farm homes and who have had farm training. Applicants should submit detailed statements covering such experience.

*The University Fellowship in Agriculture*. Stipend \$400.

See also under Animal Biology, Botany, and Entomology.

##### ANIMAL BIOLOGY

*The Simon Henry Gage Fellowship in Animal Biology*. Stipend \$500.

*The Schuyler Fellowship in Animal Biology*. Stipend \$400.

*The Graduate Scholarship in Animal Biology*. Stipend \$200.

See also under Agriculture and Entomology.

##### ARCHITECTURE

*The University Fellowship in Architecture, Landscape Architecture, Fine Arts, and Regional and City Planning*. Stipend \$400.

*The Graduate Scholarship in Architecture, Landscape Architecture, Fine Arts, and Regional and City Planning*. Free tuition only; no stipend.

##### REGIONAL AND CITY PLANNING

See Architecture.

## GENERAL INFORMATION

## FINE ARTS

See Architecture.

## LANDSCAPE ARCHITECTURE

See Architecture.

## BACTERIOLOGY

Applicants who wish to pursue work in Bacteriology should apply for either the fellowships in Agriculture or the scholarship in Veterinary Medicine.

## BOTANY

*The Goldwin Smith Fellowship in Botany, Geology, or Physical Geography.* Stipend \$400.

*The Graduate Scholarship in Botany, Geology, or Physical Geography.* Stipend \$200.

See also under Agriculture.

## CHEMISTRY

These fellowships are ordinarily awarded for the last year of residence for the doctorate.

*The Sage Fellowship in Chemistry.* Stipend \$600.

*The du Pont Fellowship in Chemistry.* Stipend \$750.

*The Carl G. Schluederberg Fellowship.* Stipend \$200.

*The John E. Teeple Fellowship.* Stipend \$400.

## CLASSICS

Two *Fellowships in Greek and Latin.* Stipends \$500 each.

These fellowships may be increased to three or more fellowships or scholarships with correspondingly reduced stipends.

One *Graduate Scholarship in Greek and Latin.* Stipend \$200.

## ECONOMICS

*Cornell-Brookings Fellowship in Economics.* Stipend \$1,000. The Brookings Institution of Washington, D. C., and Cornell University are joint participants in offering this fellowship. It is awarded by the Graduate School of Cornell University to a graduate student previously in residence at Cornell. The fellow must be regularly registered in the Graduate School, but be in residence at the Brookings Institution. (Temporarily suspended).

*The President White Fellowship in Political and Social Science.*<sup>1</sup> Stipend \$600. Awarded in alternate years in Government and Economics.

*The Fellowship in Political Economy.* Stipend \$600.

## EDUCATION

See Tuition Scholarships in Education below.

## TUITION SCHOLARSHIPS FOR PROSPECTIVE SECONDARY SCHOOL TEACHERS

Ten tuition scholarships are available for students in the fifth year of the five-year program, who give promise of becoming outstanding secondary school teachers. Five of these scholarships are available for students who have received their undergraduate training in institutions other than Cornell. Applications should be made to the Director of the School of Education before July 1.

<sup>1</sup>Holders of the President White Fellowships in Modern History and in Political and Social Science may be called upon to be in attendance for a certain period each day in the President White Library, where they will ordinarily do a large part of their study.



## ENGINEERING

Two or more of the following fellowships or scholarships may be combined if such combination be deemed desirable.

*The McGraw Fellowship in Civil Engineering.* Stipend \$400.

*The Graduate Scholarship in Civil Engineering.* Stipend \$200.

*The Sibley Fellowship in Mechanical and Electrical Engineering.* Stipend \$400. (Ordinarily awarded for work in Mechanical Engineering.)

*The Charles Bull Earle Memorial Fellowship in Mechanical and Electrical Engineering.* Stipend \$400. (Ordinarily awarded for work in Electrical Engineering.)

*The Edgar J. Meyer Memorial Fellowship in Engineering Research.* Stipend \$400. (Ordinarily awarded for work in Mechanical Engineering.)

See also the John McMullen Graduate Scholarships and the Elon Huntington Hooker Fellowship in Hydraulics, listed below.

## THE JOHN McMULLEN GRADUATE SCHOLARSHIPS

THE JOHN McMULLEN GRADUATE SCHOLARSHIPS are open to candidates for advanced degrees in Chemical, Civil, Electrical, or Mechanical Engineering. These scholarships were founded by a bequest of John McMullen, of Norwalk, Conn., to Cornell University "for the purpose of creating and maintaining free scholarship or scholarships for the education of young men as engineers, the details as to the amounts of said scholarships and the qualifications of the beneficiaries to be left to said institution to determine, said scholarships to be known as the John McMullen Scholarships." With the proceeds of this bequest the Board of Trustees has established fifteen scholarships of an annual value of \$900 each. The scholarships have not been assigned to any particular School of the College, but will be awarded as conditions dictate. Each holder of one of these scholarships must register in the Graduate School and pay the appropriate tuition and fees. Applications should be addressed to the Graduate School.

## THE ELON HUNTINGTON HOOKER FELLOWSHIP IN HYDRAULICS

This fellowship was founded in 1919 by E. H. Hooker, a graduate of the School of Civil Engineering of the class of 1894, and is offered for research in experimental hydraulics in Europe or America. It is open to graduates of the School of Civil Engineering and similar schools of equivalent rank. The stipend of the fellowship is \$510 without free tuition. Applications should be sent to the Graduate School.

## ENGLISH

*The Cornell Fellowship in English.* Stipend \$600.

This fellowship is ordinarily awarded only to an applicant who has completed a year of graduate study.

## ENTOMOLOGY

See *The Comstock Scholarship in Entomology.* Stipend \$150. See also under Agriculture and Animal Biology.

## COMSTOCK SCHOLARSHIPS

Under the terms of the will of the late Professor John Henry Comstock there have been established two graduate scholarships, each carrying a stipend of \$150. These scholarships have, by vote of the Faculty of the Graduate School, been allocated to the fields of Entomology and Nature Study. Applications should be made not later than March 1 to the office of the Graduate School. These Scholarships carry free tuition.

## GEOLOGY

*The Goldwin Smith Fellowship in Botany, Geology, or Physical Geography.* Stipend \$400.

*The Graduate Scholarship in Botany, Geology, or Physical Geography.* Stipend \$200.

## THE ELEANOR TATUM LONG GRADUATE SCHOLARSHIP

THE ELEANOR TATUM LONG GRADUATE SCHOLARSHIP in structural Geology is open to graduate students who are majoring in the branch of Geology named. Application for the scholarship should be made to the Department of Geology not later than March 1. The stipend is approximately \$1,200 a year, and does not carry free tuition.

## CHARLES BEAN DELONG GRADUATE RESEARCH FUND

A fund of \$6,000, the income from which is to be used at the discretion of the Department of Geology for the purpose of assisting male graduate students or assistants of the University who are majoring in and carrying out scientific research in economic or structural geology.

## PHYSICAL GEOGRAPHY

See Geology.

## GERMAN

*The University Fellowship in Germanic Languages.* Stipend \$400.

## GOVERNMENT

*The President White Fellowship in Political and Social Science.*<sup>1</sup> Stipend \$600. Awarded in alternate years in Government and Economics.

## HISTORY

These fellowships are ordinarily awarded only to applicants who have completed a year of graduate work or are able to submit written work of superior quality.

*The President White Fellowship in Modern History.*<sup>1</sup> Stipend \$500. In the discretion of the Faculty this fellowship may be made a traveling fellowship, with a stipend of \$700.

*The Fellowship in American History.* Stipend \$400.

*The George C. Boldt Fellowship in History.* Stipend \$1,000; no exemption from tuition.

*The Graduate Scholarship in History.* Stipend \$200.

## HOME ECONOMICS

*The Anna Cora Smith Fellowship.* Stipend \$400.

According to the bequest, this fellowship "is to be awarded annually to a young woman for research in home economics problems."

## MATHEMATICS

*The Erastus Brooks Fellowship in Mathematics.* Stipend \$600.

This fellowship is ordinarily awarded only to an applicant who has had a year or more of graduate study.

## NATURE STUDY

*The Comstock Scholarship in Nature Study.* Stipend \$150. Because of accumulation, this scholarship will have a higher cash value during the year 1945-46.

*American Nature Association Research Fellowship.* Two or three American Nature Association research fellowships of \$400 to \$600 are available to graduate students in nature study. Free tuition is not included.

<sup>1</sup>Holders of the President White Fellowships in Modern History and in Political and Social Science may be called upon to be in attendance for a certain period each day in the President White Library, where they will ordinarily do a large part of their study.

## PHILOSOPHY

Three *Susan Linn Sage Fellowships in Philosophy*. Stipends \$600 each. One or more of these fellowships may be divided to make two scholarships, stipends \$300 each.

## PHYSICS

*The President White Fellowship in Physics*. Stipend \$600. The stipend of this Fellowship may, in the discretion of the Faculty, be reduced to \$400 and the remaining \$200 be assigned to a Graduate Scholarship.

See also Special Temporary Fellowships, below.

## PSYCHOLOGY

*The Susan Linn Sage Fellowship in Psychology*. Stipend \$400.

*The Susan Linn Sage Graduate Scholarship in Psychology*. Stipend \$200.

## ROMANCE LANGUAGES

*The University Fellowship in Romance Languages*. Stipend \$400.

This fellowship is ordinarily awarded only to an applicant who has had a year or more of graduate study.

## VETERINARY MEDICINE

*The Graduate Scholarship in Veterinary Medicine*. Stipend \$200.

Through accumulations it is sometimes possible to increase the amount available for this scholarship.

## TUITION SCHOLARSHIPS

The Board of Trustees has established thirty tuition scholarships for graduate students. They entitle the holder to exemption from payment of tuition fees, but not other fees, for the duration of the appointment.

The holder of a tuition scholarship may not accept another appointment or be gainfully employed without permission from the General Committee of the Graduate School.

## PHI KAPPA PHI SCHOLARSHIP

The Phi Kappa Phi Scholarship, established by the Cornell Chapter of Phi Kappa Phi, is open to graduate students in any field of study. In awarding the scholarship preference is given to applicants who are members of Phi Kappa Phi. The scholarship carries free tuition in the Graduate School and a stipend fixed yearly for each succeeding year by the Executive Committee of the Cornell Chapter of Phi Kappa Phi. For the year 1944-45 the stipend has been fixed at \$150. Applications for this scholarship should be made on the regular application forms of the Graduate School and should be filed in the office of the Graduate School not later than March 1.

## SPECIAL TEMPORARY FELLOWSHIPS

At the present time the following special fellowships also are awarded by the Faculty of the Graduate School:

*The Allied Chemical and Dye Corporation Fellowship* (Chemistry).

*The American Nature Association Fellowship* (Nature Study).

*The American Potash Institute Fellowship* (Vegetable Crops and Agronomy).

*The Cerophyl Fellowship* (Poultry Husbandry).

*The Dairy Products Industrial Research Fellowship* (Dairy Industry).

*The Dow Chemical Company Fellowship* (Plant Pathology).

*The Eli Lilly Company Fellowship* (Chemistry).

*Birds Eye-Snyder, Inc. Fellowship* (Foods Chemistry).

*The G.L.F. Poultry Fellowship* (Poultry Husbandry).

*The Nassau County Farm Bureau Association Fellowship* (Plant Pathology).

*The New York Farmers Pasture Research Fellowship* (Agronomy).

*The Tobacco By-Products and Chemical Company Insecticide Fellowship* (Entomology).

*The Western Condensing Company Fellowship* (Poultry Husbandry).

*The William S. Merrill Fellowship* (Chemistry).

For information regarding these special fellowships, address the department concerned.

#### THE GRADUATE PRIZE IN PHILOSOPHY

The Graduate Prize in Philosophy has an annual value of about twenty-five dollars and is open for competition to all students registered in the Graduate School of Cornell University.

The prize will be awarded to the graduate student who submits the best paper embodying the results of research in the field of philosophy. The subject of the paper may be either historical or critical or constructive. It may be concerned either with problems of pure philosophy or with the philosophical bearing of the concepts and methods of the sciences.

Papers submitted in competition must be deposited in the office of the Dean of the Graduate School on or before the first of May. Each paper is to be type-written and must bear a fictitious signature and be accompanied by the name of the writer in a sealed envelope.

The prize will be awarded by a committee appointed by the President of the University. A copy of the successful paper is to be deposited in the University Library.

#### THE UNIVERSITY LIBRARIES

OTTO KINKELDEY, *Librarian*; E. R. B. WILLIS, *Associate Librarian*; HALLDOR HERMANSSON, *Curator of the Icelandic Collection*; T. G. BERGIN, *Curator of the Dante and Petrarch Collections*; Miss GUSSIE E. GASKILL, *Curator of the Wason Chinese Collection*; L. W. MORSE, *Librarian of the Law Library*; W. W. ELLIS, *Librarian of the Agricultural College Library*; Miss VIRGINIA WARTERS, *Librarian of the College of Home Economics*; Miss E. C. WILLIAMS, *Librarian of the Veterinary College*; ROBERT P. LANG, *Librarian of the College of Architecture*; Dr. H. H. KING, *Faculty Research Assistant*.

The University Libraries comprise the General Library of the University, the Seminary Libraries in the General Library Building, the Architectural Library, the Chemical Library, the Sibley Engineering Library, the Civil Engineering Library, the Law Library, the Flower Veterinary Library, the Van Cleef Zoology Library, the Barnes Hall Library, the Goldwin Smith Hall Library, the Library of the New York State College of Agriculture, the Library of the New York State Agricultural Experiment Station at Geneva, and the Library of the College of Home Economics. The total number of bound volumes in them is now over one million. The number of periodicals, transactions, and other serials currently received is over five thousand; and, of many of these, complete sets are on the shelves.

In addition to the general store of books which a University Library of this size may be expected to contain, there are many special collections, assembled by scholars or with scholarly intent. Among the more noteworthy are:

THE PRESIDENT WHITE LIBRARY, received in 1891 as a gift from the first President of the University and largely increased by subsequent gifts and purchases. It



includes special collections on the History of Superstition, the Age of the Reformation, and the French Revolution.

THE DANTE, PETRARCH, AND ICELANDIC COLLECTIONS, for which separate catalogues have been printed, were gathered by the first Librarian, Willard Fiske, who gave them to the University and bequeathed funds for their upkeep.

THE MAY COLLECTION relating to the history of slavery had as its nucleus the Library of the late Rev. Samuel J. May, long secretary of the American Anti-slavery Society.

THE WASON COLLECTION of books dealing with China and the Chinese was bequeathed to the Library by Charles William Wason, '76, with provision for its increase.

THE WORDSWORTH COLLECTION, formed by Cynthia Morgan St. John, presented to the University in 1925 by Mr. Victor Emanuel, '19, now includes more than 2,800 books by and about Wordsworth.

For the study of English, of the classical languages, of the Germanic and Romance languages, of philosophy, of politics and economics, of American and of European history, there have been provided in the library building seven seminary rooms, each equipped with a carefully chosen body of reference books, to which advanced students in these fields have access. In connection with the scientific and technical laboratories similar collections have been formed and well supplied with reference books, standard works, and sets of periodicals, conveniently arranged for study and research.

Cards of admission to the shelves in the stackrooms and to the White Historical Library will be issued to graduate students for the purpose of consultation and research. The privilege of taking books for home use is granted to all students who comply with the library regulations.

LECTURES IN BIBLIOGRAPHY. As a part of the work of the General Library, Mr. Willis, associate librarian, offers a series of informal talks to graduate students in the spring term on the resources and facilities of the Library and on the employment as aids to research of the general bibliographical helps.

## FIELDS OF INSTRUCTION

The several fields of instruction of the Graduate School are described in the pages that follow hereafter.

ARRANGEMENT OF SUBJECTS. Subjects are grouped in broad fields as follows, and in the following order:

- Architecture and the Fine Arts.
- Languages and Literatures.
- Philosophy.
- History and the Social Sciences.
- Animal Sciences.
- Plant Sciences.
- Physical Sciences.
- Agriculture.
- Education.
- Engineering.
- Home Economics.
- Hotel Administration.

Law.

Veterinary Medicine.

The Medical Sciences as presented in the Medical College, New York City.

The Agricultural Sciences as presented in the New York State Experiment Station at Geneva.

APPROVED MAJOR AND MINOR SUBJECTS. For each field there is given an approved list of titles from which candidates for advanced degrees choose major and minor subjects. The numerals 1, 2, 3, 4 have the following meaning:

- 1, approved as major subject for the Ph.D.
- 2, approved as major subject for the master's degree.
- 3, approved as minor subject when the major is in the same field.
- 4, approved as minor subject when the major is in another field.

UNDERGRADUATE AND GRADUATE COURSES. In this announcement courses intended primarily for graduate students but open also to advanced undergraduates are titled in **bold face** type. Courses intended primarily for undergraduates but often meeting needs of graduates are titled in *italic* type, and are given in skeleton outline only. For details about these courses, see the respective college announcements.

## ARCHITECTURE AND FINE ARTS

The Faculty of the Graduate School by its action of January 27, 1933, created the Division of Architecture and Fine Arts for the more effective administration of the work leading to the professional degrees of Master of Architecture, Master of Landscape Architecture, Master of Fine Arts, and Master in Regional Planning. Those primarily concerned with these professional degrees are the Professors and Assistant Professors of Architecture, of Landscape Architecture, of Painting and Sculpture, of Regional and City Planning, of Music, of Poetry, of Drama, and of Aesthetics.

Courses under the jurisdiction of the Division of Fine Arts are available to candidates for advanced degrees other than those mentioned above, subject to such conditions as may be imposed by the student's Special Committee.

### Approved Major and Minor Subjects (key to symbols on p. 42)

(The combination of subjects chosen must be approved by the professors in the student's major field. Certain subjects outside the field of Fine Arts may be chosen for a minor with the approval of the professors concerned.)

Aesthetics 2, 3, 4  
Architectural Construction 2, 3, 4  
Architectural Design, 2, 3, 4  
Composition Relative to Pictorial and Decorative Art 2, 3, 4  
Dramatic Production 2, 3, 4  
Dramatic Technique 2, 3, 4  
Drawing 2, 3, 4  
History of Architecture 1, 2, 3, 4  
History of Landscape Architecture 2, 3, 4  
History of Music 2, 3, 4  
History of Painting 2, 3, 4  
History of Painting and Sculpture 1, 2  
History of Sculpture 2, 3, 4  
Landscape Design 2, 3, 4  
Modeling 2, 3, 4  
Musical Composition 2, 3, 4  
Musicology 1, 2, 3, 4  
Painting 2, 3, 4  
Planting Design 2, 3, 4  
Playwriting 2, 3, 4  
Poetry 2, 3, 4  
Regional and City Planning 2, 3, 4  
Sculpture 2, 3, 4  
Theory of Music 2, 3, 4

### AESTHETICS

*Professors* R. M. OGDEN and R. W. CHURCH.

The courses in Aesthetics offered by the Sage School of Philosophy are:

**Philosophy 8a. *Aesthetics: Psychology of Art.*** Fall term. Three hours a week. Professor OGDEN. M W F 11. Museum of Casts.

**Philosophy 8b. *Aesthetics: Philosophy of Art.*** Spring term. Three hours a week. Professor Church. M W F 11. Goldwin Smith 128.

**Philosophy 19. *Advanced Readings in Aesthetics.*** Professor CHURCH. Hours by appointment. To be given at the discretion of the instructor.

Readings to be selected in accordance with the interests and preparation of the student.

**Philosophy 45. *Seminar in Aesthetics.*** Professor CHURCH. Hours to be arranged. Goldwin Smith 220. To be given at the discretion of the instructor.

## ARCHITECTURE

*Professors* H. E. BAXTER, L. P. BURNHAM, G. D. CLARKE, A. H. DETWEILER, A. D. SEYMOUR, J. N. TILTON, JR., GEORGE YOUNG, JR., J. A. HARTELL.

Graduate work is offered in architectural design, in the history of architecture, in advanced construction, and in regional and city planning.

Candidates for the degree of Master of Architecture must have had preliminary training in the subjects elected for graduate work equivalent to that required in like subjects in this University for the degree of Bachelor of Architecture.

The facilities for graduate work in architecture are excellent. Large well-lighted drafting-rooms and studios are provided and a special architectural library, comprising several thousand books, photographs, lantern slides, and numerous original drawings, is situated in White Hall where it is easily accessible to the student.

Instruction is given by means of lectures, seminar discussions, and especially by direct personal criticism and advice.

**Architectural Design.** Professors BURNHAM, SEYMOUR, and HARTELL.

**History of Architecture.** Professor DETWEILER.

**Architectural Construction.** Professors BAXTER, TILTON, and YOUNG.

## REGIONAL AND CITY PLANNING

*Professors* G. D. CLARKE and T. W. MACKESEY, and other members of the University Faculty.

Graduate work is offered in regional and city planning leading to the degree, Master in Regional Planning. The purpose of graduate work in regional and city planning is to offer to adequately trained students facilities for advanced study and research, with the twofold purpose of providing each student with a comprehensive view of the field of planning and of training him for independent investigation in that field. Students may approach advanced work in planning from a background of study in any one of a number of related fields including architecture, landscape architecture, engineering, government, geography, sociology, economics, or agriculture. Each graduate student follows a plan of study drawn up in consultation with a Faculty Committee. That plan of study is based on the individual student's background and interests.

710. **Principles of Regional and City Planning.** Fall term. Credit three hours. M W F 12.

711. **City Planning Practice.** Spring term. Credit three hours. Prerequisite, Course 710. Professors CLARKE and MACKESEY. M W F 12. White 201.

The procedures and techniques of gathering and analyzing data for municipal planning studies; the selection and integration of data for use in planning; practical application of the theories of city planning; office practice. Lectures, assigned reading, reports.

712. **Regional Planning Practice.** Spring term. Credit three hours. Prerequisite, Course 710. Open to graduates and upperclassmen in all colleges of the University. Professors CLARKE and MACKESEY. Hours to be arranged.

A study of the principles involved in county, regional, state, and national planning. Includes discussion of following factors involved: land use, water resources, recreation, transportation, public services, and public works. Lectures, assigned reading, reports, and examinations. Occasional lectures may be given by members of other faculties and outside lecturers.

713. **Housing.** Fall term. Credit two hours. Registration limited. Prerequisite, Course 710. Professors CLARKE and MACKESEY. M 2-4. White.

An introduction to the theory and standards of housing practice through analysis and comparison of various existing examples, considering the social, economic, and technical sides of the work. Lectures, assigned reading, and reports.

[715. **Seminar in Park Planning.** Fall term. Credit two hours. Registration limited. Professor CLARKE. T 8-10. White B 15. Not given in 1944-45.]

Specific problems relating to the design of city, state, and national parks, with a study of examples.



[716. **Seminar in Parkway, Expressway, and Highway Planning.** Spring term. Credit two hours. Professor CLARKE. T 8-10. White B 6. Not given in 1944-45.]

717. **Zoning Principles and Practice.** Spring term. Credit two hours. Prerequisite, Course 710. Professor MACKESEY. M 2-4. White.

Technical and legal aspects of drafting and administering zoning regulations.

#### THE HISTORY AND PRACTICE OF THE FINE ARTS

*Professors* D. L. FINLAYSON, A. H. DETWEILER, J. A. HARTELL, CHRISTIAN MIDJO, F. O. WAAGÉ, K. L. WASHBURN, and N. D. DALY.

Graduate work is offered in historical, theoretical, or creative work in the field of the fine arts.

Candidates for the degree of Master of Fine Arts must be holders of a baccalaureate degree. A special six-year course leads to the two degrees A.B. and M.F.A.

**Drawing and Painting.** Professors MIDJO, WASHBURN, and DALY.

**Composition.** Professors MIDJO, WASHBURN, and DALY.

**Sculpture.** Professor WASHBURN.

**History of Art.** Professors FINLAYSON and WAAGÉ.

**History of Architecture.** Professor DETWEILER.

Other members of the staff will cooperate as necessary.

#### LANDSCAPE ARCHITECTURE

*Professors* G. D. CLARKE, R. W. CURTIS, E. D. MONTILLON, and members of the Faculty in Architecture.

Graduate work in Landscape Architecture is offered in design, history, and planting design.

Candidates for the degree of Master of Landscape Architecture must have had preliminary training in the subjects elected for graduate work equivalent to that required in like subjects in this University for the degree of Bachelor of Landscape Architecture.

**Landscape Design.** Professors CLARKE, and MONTILLON.

**History of Landscape Architecture.** Professor MONTILLON.

**Planting Design.** Professor CURTIS.

**Park and Parkway Design.** Professor CLARKE.

#### MUSIC

*Professors* OTTO KINKELDEY and PAUL J. WEAVER; EGON PETRI, *Pianist in Residence*; Associate Professor JOHN M. KUYPERS; Assistant Professor RICHARD T. GORE, *University Organist*; Miss CLAIRE JAMES, Mr. ERIC DUDLEY, and Mr. ROBERT PALMER.

#### MUSIC THEORY

1. *Theory I.* A two-term course; fall and spring terms. Three hours a week. Mr. PALMER.

101. *Theory II.* A two-term course; fall and spring terms. Three hours a week. Mr. PALMER.

201. *Theory IIIa.* A two-term course; fall and spring terms. Credit two hours a term. Prerequisite, Music 101 or its equivalent. Mr. PALMER. 320 Wait Avenue.

A continuation of Music 101, this course deals with more advanced harmonic materials.

203. *Theory IIIc.* A two-term course; fall and spring terms. Credit two hours a term. Prerequisite, Music 101 or its equivalent. Mr. PALMER. 320 Wait Avenue.

This course is designed to develop facility in the hearing, reading and writing of simple contrapuntal materials.

303. **Theory IVc.** A two-term course; fall and spring terms. Credit two hours a term. Prerequisite, Music 203 or its prerequisite. Mr. PALMER. 320 Wait Avenue. A continuation of Music 203, this course deals with more advanced contrapuntal materials.

305. **Theory IVe.** A two-term course; fall and spring terms. Credit two hours a term. Prerequisites, Music 201 and 203 or their equivalents. Mr. PALMER. 320 Wait Avenue.

This course is designed as a study of form and analysis and as a survey of the materials of composition. Emphasis will be placed on score reading.

#### MUSIC APPRECIATION

11. *The Art of Music.* A two-term course; one term (11a) summer and fall terms; term two (11b) spring term. Three hours a week. Professor WEAVER and Associate Professor KUYPERS.

[13. *The Orchestra.* Not given in 1944-45.]

15. *Choral and Instrumental Ensemble, First Year.* A two-term course; summer, fall and spring terms. One hour a week. Open to students who are active members of the Sage Chapel Choir or the Cornell Chorus or the University Orchestra. Associate Professor KUYPERS. 320 Wait Avenue.

19. *Conducting, First Year.* A two-term course; fall and spring terms. Two hours a week. Associate Professor KUYPERS. 320 Wait Avenue.

115. *Choral and Instrumental Ensemble, Second Year.* A two-term course; summer, fall and spring terms. One hour a week. Prerequisite, Music 15 or its equivalent. Open to students who are active members of the Sage Chapel Choir or the Cornell Chorus or the University Orchestra. Associate Professor KUYPERS. 320 Wait Avenue.

119. *Conducting, Second Year.* A two-term course; fall and spring terms. Two hours a week. Prerequisite, Music 19 or its equivalent. Associate Professor KUYPERS. 320 Wait Avenue.

#### MUSIC HISTORY

21. *History of Music.* A two-term course; term one (21a) fall term; term two (21b) spring term. Two hours a week. Professor WEAVER.

121. *The Opera.* A one-term course; fall term. Three hours a week. Prerequisite, Music 21 or its equivalent. Professor WEAVER.

[122. *Organ Music.* Not given in 1944-45.]

[123. *Orchestral Music.* Not given in 1944-45.]

[124. *Chamber Music.* Not given in 1944-45.]

125. *Piano Music.* A one-term course; spring term. Three hours a week. Prerequisite, Music 21 or its equivalent. Professor WEAVER.

[126. *Choral Music.* Not given in 1944-45.]

[127. *Music for Solo String Instruments.* Not given in 1944-45.]

[221. *Bach.* Not given in 1944-45.]

222. **Haydn and Mozart.** A one-term course; fall term. Credit two hours. Prerequisites, at least one course from the group Music 121-127 and at least two terms of Music Theory. Professor WEAVER.

A study of the life and works of Haydn and Mozart. Special topics will be assigned to each student, related to the field covered by his prerequisite courses.

[223. **Beethoven.** Not given in 1944-45.]

224. **Brahms.** A one-term course; spring term. Credit two hours. Prerequisites, at least one course from the group 121-127 and at least two terms of Music Theory. Professor WEAVER.

A study of the life and works of Brahms. Special topics will be assigned to each student, related to the field covered by his prerequisite courses.

[225. **Wagner.** Not given in 1944-45.]

[226. **Debussy.** Not given in 1944-45.]

[228. **Modern European Composers.** Not given in 1944-45.]

[229. **Modern American Composers.** Not given in 1944-45.]

APPLIED MUSIC

401. *First Year.* Individual instruction in organ, piano, voice and other instruments. Assistant Professor GORE, Miss JAMES, Mr. DUDLEY and Mr. PARKS. Students who are interested should consult the chairman of the department.

402. *Second Year.* A continuation of Music 401.

451. *Piano Master Class.* Professor PETRI. Students who are interested should consult Professor WEAVER.

COURSES FOR GRADUATES

521. *Seminar in Musicology.* A two-term course; fall and spring terms. Credit two hours a term. Professor KINKELDEY.

This course is primarily for graduates who have the requisite reading knowledge of one or more of the important foreign languages, a fair knowledge of music theory, and some skill in applied music.

The work is intended to make the student acquainted with the accomplishments of the past and with modern methods and aims in all fields, scientific, aesthetic and historical, of musical research and investigation. Special topics or fields of study will be selected each term after consultation with the class.

DRAMA AND THE THEATRE

*Professors* A. M. DRUMMOND, W. H. STANTON, EDWIN NUNGEZER, JOHN C. ADAMS, H. A. MYERS, and H. D. ALBRIGHT.

The degree of Master of Fine Arts in Drama and Dramatic Production will be granted to candidates of special aptitude in the practical phases of Dramatic Production or Playwriting. Their program must include suitable studies in related Fine Arts; two years of residence will normally be required, with approximately one-half the program of study in applied projects in stage presentation; a major practical project in the second year will be the thesis.

THE CORNELL UNIVERSITY THEATRE provides, in its *Laboratory Theatre* division, for public presentations of the work of graduate students in Dramatic Interpretation and Acting; in its *Studio Theatre* productions, for presentation of the work in Playwriting; and in the *Summer Theatre*, an opportunity for intensive work in all phases of theatre practice. *Director of the University Theatre*, A. M. DRUMMOND.

*Modern Drama.* (English 48.)

*Shakespeare.* (English 61.)

**Dramatic Structure.** Associate Professor MYERS. (English 150 and 250.)

**Dramatic Production.** Professor DRUMMOND. (*Speech and Drama* 41. Fall term, M W F 11.)

**Advanced Dramatic Interpretation and Acting.** Professor DRUMMOND. (*Speech and Drama* 42. Spring term. W 2-4.)

**Advanced Dramatic Production.** Professor DRUMMOND. (*Speech and Drama* 44.) Summer term. T 2-4, and an hour to be arranged.

**Stagecraft and Design.** Assistant Professor ALBRIGHT. (*Speech and Drama* 45. Spring term. M W 11; T 1:40-4.)

**Stage Lighting.** Assistant Professor ALBRIGHT. (*Speech and Drama* 45a.) Spring term. Hours to be arranged.

[**History of the Theatre.** Professor DRUMMOND. (*Speech and Drama* 48.) Not given in 1944-45.]

[**Playwriting.** Professor DRUMMOND. (*Speech and Drama* 49b. A two-term course.) Not given in 1944-45.]

**Dramatic Production** in relation to aesthetic principles. Professor DRUMMOND. (*Speech and Drama* 66.) Fall term, T Th 12.

[**Dramatic Art.** Professor DRUMMOND. (*Speech and Drama* 67. A two-term course.) Not given in 1944-45.]

**Modern Theories of Stage Presentation.** Professor DRUMMOND. (*Speech and Drama* 68.) Fall and spring terms. Hours to be arranged.

**Theatre Practice.** Professor DRUMMOND or Assistant Professor ALBRIGHT. (*Speech and Drama* 91. A two-term course, may be entered summer, fall, or spring term. Hours to be arranged.)

#### POETRY

Professors J. C. ADAMS, R. C. BALD, W. H. FRENCH, C. W. JONES, EDWIN NUNGEZER, W. M. SALE, H. W. THOMPSON, E. C. WILSON.

See also courses described under English Language and Literature, pp. 51ff.

31. *Medieval Literature.* Throughout the year. Three hours a week.

33. *The English Renaissance.* Throughout the year. Three hours a week.

34a. *Eighteenth Century Literature.* Second term. Three hours a week.

35. *The Romantic Revival.* Throughout the year. Three hours a week.

39. *American Literature.* Throughout the year. Three hours a week.

54. *Modern Poetry.* Second term. Three hours a week.

60. *Chaucer and his Age.* Throughout the year. Three hours a week.

61. *Shakespeare.* Throughout the year. Three hours a week.

63. *Milton.* Second term. Three hours a week.

72. *Byron and Shelley.* Throughout the year. Three hours a week.

108. **Elizabethan Non-Dramatic Literature.** Fall and spring terms. Associate Professor NUNGEZER.

109. **Shakespeare.** Fall and spring terms. Professor BALD. Room and hour to be arranged.

110. **Studies in Seventeenth Century Literature.** Fall and spring terms. Professor BALD.

112. **Scottish Literature.** Fall and spring terms. Professor THOMPSON.

114. **Eighteenth Century Literature.** Fall and spring terms. Associate Professor SALE.

116. **The Romantic Movement.** Fall and spring terms. Professor BROUGHTON.

135. **Studies in Victorian Literature.** Fall and spring terms. Professor \_\_\_\_\_.

142. **Theories of Criticism.** Fall and spring terms. Associate Professor SALE.

154. **Recent Poetry.** Fall and spring terms. Associate Professor FRENCH.



# LANGUAGES AND LITERATURES

## THE CLASSICS

Professors H. L. JONES, HARRY CAPLAN, JAMES HUTTON, F. O. WAAGÉ, FRIEDRICH SOLMSEN, and R. L. WARD.

### Approved Major and Minor Subjects (key to symbols on p. 42)

Latin Language and Literature 1, 2  
Latin Literature 2, 3, 4  
Latin Language 3, 4  
Vulgar Latin 3, 4  
Mediaeval Latin Literature 3, 4  
Classical Rhetoric (in translation) 3, 4  
Greek Language and Literature 1, 2  
Greek Literature 2, 3, 4  
Greek Language 3, 4  
Comparative Indo-European Linguistics 1, 3, 4  
Classical Archaeology 1, 2, 3, 4  
Greek Archaeology 2, 3, 4  
Roman Archaeology 2, 3, 4

Admission to graduate study in a subject included in the group of the Classics, except in Archaeology, assumes a knowledge of the field selected equivalent in general to that expected of a student who has pursued the subject concerned throughout four years of undergraduate study in a college of recognized standing.

Graduate work in the Classics is conducted in the main by the seminary system, the object of which is training in the methods, the principles, and the performance of independent research and criticism, and the work is therefore as far as possible put into the hands of the students themselves. Subjects other than those investigated in one of the seminaries of the year are ordinarily presented by courses of lectures.

Two seminary rooms in the Library Building are reserved for the exclusive use of graduate students in the Classics. In addition to the various complete sets of philological and of archaeological journals and standard works of reference in these rooms, the general University Library is at the disposal of the graduate students; stack permits are available when required, and special collections of books can be transferred from the general library to the seminary rooms when needed.

Two fellowships in Greek and Latin in the value of \$500 and tuition and one scholarship of \$200 and tuition are awarded annually.

The income of the Charles Edwin Bennett Fund for Research in the Classical Languages is used each year in the way best suited to promote the object for which the fund was established.

Doctoral dissertations of an appropriate nature will be accepted for publication in the *Cornell Studies in Classical Philology*.

### GREEK

1a. *Greek for Beginners*. Introduction to Homer's Iliad. Summer term, to be repeated in fall and spring terms. Three hours a week.

1b. *Homer's Iliad*. Continuation of Greek 1a. Summer term, to be repeated in fall and spring terms. Three hours a week.

2a. *Attic Greek. Plato, Selected Dialogues*. Summer term, to be repeated in fall and spring terms. Three hours a week.

2b. *Euripides, Iphigenia in Tauris and Alcestis; New Testament, Selections*. Summer term, to be repeated in fall and spring terms. Three hours a week.

5. *Greek Composition*. A two term course, fall and spring terms. One hour a week.

[7. *Greek Myths*. Illustrated lectures. Not given in 1944-45.]

[8. *Illustrated Lectures on Ancient Greece and Greek Life*. Not given in 1944-45.]

17. **Aristophanes, Clouds; Sophocles, Oedipus Rex, Antigone; Herodotus.** A two-term course, fall and spring terms. Three hours a week. Prerequisite, Greek 2b. Professor JONES.

20. **Lyric Poetry; Aeschylus, Prometheus Vincetus; Theocritus; Demosthenes, Philippics.** A two-term course, fall and spring terms. Three hours a week. Prerequisite, Greek 17. Professor CAPLAN.

22. **Plato, the Republic; Pindar, Selected Odes; Thucydides.** A two-term course, fall and spring terms. Three hours a week. Prerequisite, Greek 20. Associate Professor SOLMSEN.

25. **Advanced Greek Composition.** A two-term course, fall and spring terms. One hour a week. Prerequisite, Greek 5. Professor JONES.

30. **Lectures: The History of Greek Literature.** A two-term course, fall and spring terms. Two hours a week. Associate Professor SOLMSEN.

[33. **Seminary.** Studies in Greek and Roman Rhetoric and Oratory. Professor CAPLAN. Not given in 1944-45.]

39. **Seminary. Aeschylus.** A two-term course, fall and spring terms. Professor HUTTON. Library, Classical Seminary Room.

[41. **Seminary. Strabo; or Homeric Geography.** Professor JONES. Not given in 1944-1945.]

[42. **Seminary. Plato.** Associate Professor SOLMSEN. Not given in 1944-45.]

52. **Greek Dialects.** Spring term. Two hours a week. Assistant Professor WARD. See also readings in GREEK PHILOSOPHY (under PHILOSOPHY), INDO-EUROPEAN PHILOLOGY (under LATIN), and ANCIENT HISTORY (under HISTORY).

#### ARCHAEOLOGY AND ANCIENT ART

Associate Professor WAAGÉ.

1. *History of Painting and Sculpture: Ancient and Mediaeval.* Summer term to be repeated in fall term. Three hours a week.

2. *History of Greek Sculpture.* Fall term. Three hours a week.

3. *Art of the Roman Empire.* Spring term. Three hours a week.

6. *History of Coins.* Fall term. Two or three hours a week.

101. **Pausanias and the Topography of Greece with Special Reference to Athens.** Fall term. Hours to be arranged. Goldwin Smith 35.

102. **Problems in Classical Archaeology.** Spring term. Hours to be arranged. Goldwin Smith 35.

#### LATIN

1a. *Freshman Course: For Students Offering Three Units of Entrance Latin.* Ovid; Virgil; Horace, Odes and Epodes. A two-term course, fall and spring terms. Three hours a week.

1. *Freshman Course: For Students Offering Four Units of Entrance Latin.* Cicero, De Senectute; Martial, Epigrams; Horace, Odes and Epodes. A two-term course, fall and spring terms. Three hours a week.

4. *Latin Language Review.* A two-term course, fall and spring terms. One hour a week.

8. *Terence; Catullus; Horace, Satires and Epistles; Tacitus, Agricola; Livy; Seneca, Epistles.* A two-term course, fall and spring terms. Three hours a week.

11. *Sallust.* Spring term. Two hours a week.

12. *Cicero's Letters.* Fall term. Two hours a week.

16. **The Greater Republican Writers. Plautus; Cicero; Lucretius.** A two-term course, fall and spring terms. Three hours a week. Professor HUTTON.

[17. **Literature and History of the Early Empire. Tacitus, Annals; Juvenal; Pliny's Letters; Seneca's Letters.** Not given in 1944-45.]

21. **Latin Writing.** A two-term course, fall and spring terms. One hour a week.

26. **Course for Teachers.** Spring term. Two hours a week.

- [27. **Topography and Architectural Remains of Rome.** Not given in 1944-45.]
41. **Seminary. Roman Satire.** A two-term course, fall and spring terms. Professor CAPLAN. Library, Classical Seminary Room.
45. **Latin Writing, Advanced Course.** A two-term course, fall and spring terms. One hour a week.
- [47. **History of the Latin Language.** Not given in 1944-1945.]
48. **Vulgar Latin: Petronius, Cena Trimalchionis; Vulgar Latin Inscriptions Including Christian Inscriptions.** Fall term. Two hours a week. Assistant Professor WARD.
- [49. **Comparative Grammar of Greek and Latin; Introduction to Indo-European Linguistics.** Not given in 1944-45.]
- [50. **Latin Epigraphy.** Not given in 1944-45.]
- [51. **Italic Dialects: Oscan and Umbrian.** Not given in 1944-45.]

## ENGLISH LANGUAGE AND LITERATURE

Professors J. C. ADAMS, R. C. BALD, L. N. BROUGHTON, W. H. FRENCH, C. W. JONES, H. A. MYERS, EDWIN NUNGEZER, W. M. SALE, E. J. SIMMONS, E. A. TENNEY, and H. W. THOMPSON.

## Approved Major and Minor Subjects (key to symbols on p. 42)

English Literature to 1700 1, 2, 3, 4  
 English Literature since 1700 1, 2, 3, 4.  
 American Literature 1, 2, 3, 4  
 The English Language 1, 2, 3, 4  
 Medieval Literature 1\*, 2, 3, 4  
 Old and Middle English 2, 3†  
 The English Renaissance 2, 3†  
 The Classical Period 2, 3†  
 Nineteenth Century Literature 2, 3†  
 English Poetry 2, 3, 4  
 Dramatic Literature 1\*, 2, 3, 4  
 Prose Fiction 2, 3, 4

The type of work within each subject will vary, according as it is chosen for a major or a minor, and for the Master's or the Doctor's degree. Candidates are expected to choose their major and minor subjects within two weeks after registration.

In the Cornell University Library are collections suitable for advanced work in every division of English Literature; those in Old and Middle English and in Elizabethan and Nineteenth Century Literature are especially rich. A seminary room for study and small classes is also available. In addition, the Department has a separate collection, the Hart Memorial Library, with many reference-books and ample desk- and table-space. Adjacent to this is the Goldwin Smith Library, in which are other valuable sets and volumes.

The *Cornell Studies in English* is a series of monographs in which the work of graduates and members of the staff may be published. Thirty-four numbers have appeared. The more recently established series of *Cornell Studies in American History, Literature, and Folklore* provides for the publication of editions, monographs, and essays by students registered in any college or session of the University.

In general, thirty-three hours of college English are required before a student may enter upon candidacy for an advanced degree. Work in philosophy, history, and the languages, ancient and modern, may, if it is of good quality, be counted against a shortage in undergraduate English. Training in the Greek and Latin

\*May be accepted as a major subject for the Doctorate if the minors are in two fields other than English.

†May be accepted as a minor for the Doctorate, provided that it does not fall within the major subject.

literatures is especially acceptable. All candidates for the degree of Doctor of Philosophy must have at least a full year course in Old English; must show, in a qualifying examination given not later than the beginning of the second year of graduate study, that they have a general knowledge of English and American literature; must pass a final examination, to be taken approximately a year before the dissertation is submitted, on their major and minor subjects and the field in which the dissertation is to be written; and must accomplish satisfactory work in research. The candidate for the degree of Doctor of Philosophy must demonstrate his ability to read both French and German (or two languages, other than English, approved by his Special Committee) by passing in each of these languages an examination given by a member of the Language Examination Board (see page 24). The candidate's Special Committee may also, at its discretion, require a reading knowledge of Latin. The candidate for the degree of Master of Arts, Plan A, must have sufficient knowledge of French or German to make use of scholarly works in one of these languages.

One fellowship of the value of \$600, with exemption from tuition, is awarded annually to a graduate student in English. To secure consideration applicants must ordinarily have completed a year of graduate study. The Department also nominates deserving applicants for tuition scholarships (see page 39). Furthermore, a number of part-time teaching appointments are often available to men working for advanced degrees; these carry exemption from tuition fees in the Graduate School in addition to the regular remuneration.

Information for candidates for the Master's degree under Plan B has been drawn up and may be obtained from the secretary of the Department. All graduate students in English are advised, on their arrival at Cornell, to consult at the earliest moment a member of the Committee of Graduate Studies in English, who will advise them about their work and help them to select a special committee.

Courses in English open to candidates for advanced degrees are listed below in three groups: I. Undergraduate courses (to be taken by graduate students who need preliminary work); II. Graduate courses primarily intended for students in their first year of graduate work, or for students beginning work in a field new to them; and III. Seminars designed for advanced graduate students. The candidate for the Master's degree under Plan A is ordinarily expected to have completed successfully at least three courses from Groups II, or III, or to have completed three courses which his Special Committee deems equivalent in scope and quality. The candidate for the Doctor's degree is ordinarily expected to have completed successfully at least four courses of Group II, and two of Group III, or to have completed six courses which his Special Committee deems equivalent in scope and quality.

**Group I.** Undergraduate courses: graduate students taking these are expected to do extra work in order to achieve graduate credit. For a full description of these courses, see the *Announcement of the College of Arts and Sciences* and the supplementary announcements.

31. *Medieval Literature*. Two terms. Three hours a week.
- 32 and 33a. *The English Renaissance*. Two terms. Three hours a week.
- 33b. *Restoration Literature*. One term. Three hours a week.
- 34a and 34b. *Eighteenth Century Literature*. Two terms. Three hours a week.
35. *The Romantic Revival*. Two terms. Three hours a week.
36. *The Victorian Age*. Two terms. Three hours a week.
39. *American Literature*. Two terms. Three hours a week.
- 40a. *Modern English Fiction*. One term. Three hours a week.
- 40b. *Modern American Fiction*. One term. Three hours a week.
43. *The English Novel in the Eighteenth Century*. One term. Three hours a week.
44. *European Fiction*. Two terms. Three hours a week.
45. *The English Drama to 1642*. Two terms. Three hours a week.
48. *Modern Drama*. One term. Three hours a week.
53. *Recent English Poetry*. One term. Three hours a week.
54. *Recent American Poetry*. One term. Three hours a week.
58. *American Folk Literature*. One term. Three hours a week.



59. *Literary Criticism*. Two terms. Three hours a week.  
 60. *Chaucer and his Age*. Two terms. Three hours a week.  
 61. *Shakespeare*. Two terms. Three hours a week.  
 63. *Milton*. One term. Three hours a week.  
 78a. *Emerson, Thoreau, and Whitman*. One term. Three hours a week.  
 78b. *Poe, Hawthorne, and Melville*. One term. Three hours a week.  
 81. *Old and Middle English*. Two terms. Three hours a week.  
 82. *The English Language*. One term. Three hours a week.

**Group II.** Graduate courses designed primarily for first-year students or students beginning work in a field new to them. Not all of these can be offered, but persons interested in particular courses should address inquiries to the Department of English. If enough students apply, rooms and hours for a course will be arranged.

100. **Bibliography and Method.** An introduction to Graduate Research in English. Fall and spring terms. Professor BALD.

A survey of the principal sources of information and of the various techniques used in literary research. Recommended for all students entering upon graduate study.

101. **Old English Literature.** Fall and spring terms. Associate Professor FRENCH.

102. **Middle English Literature.** Fall and spring terms. Associate Professor FRENCH.

A survey of English literature from 1150 to 1500, with special attention to literary and textual problems; the Arthurian traditions in England; the metrical romances; the dialects.

104. **Medieval Literature.** Fall and spring terms. Associate Professor JONES.

A survey of European literature from the fourth to the fourteenth century, with special emphasis upon the evolution from classical into modern forms and subjects.

107. **Elizabethan Dramatic Literature.** Spring and summer terms. Associate Professor ADAMS.

First term: plays, playhouses, and stagecraft in the years 1559-1660. Second term: representative plays by Shakespeare's contemporaries.

108. **Elizabethan Non-dramatic Literature.** Fall and spring terms. Associate Professor NUNGEZER.

A study of representative prose and poetry from Erasmus to Bacon.

109. **Shakespeare.** Fall and spring terms. Professor BALD.

110. **Seventeenth Century Literature.** Spring and summer terms. Associate Professor ADAMS.

112. **Scottish Literature.** Fall and spring terms. Professor THOMPSON.

From Allan Ramsay to the present, with emphasis upon balladry and other contributions of Scottish letters to the romantic tradition in England and America.

114. **Eighteenth Century Literature.** Fall and spring terms. Associate Professor SALE.

A study of certain aspects of the literature of the century, designed primarily for those who have some knowledge of the period.

116. **The Romantic Movement.** Fall and spring terms. Professor BALD.

A study of the background of Romanticism, followed by a detailed examination of the work in poetry and prose of several of the leading figures of the movement.

135. **Studies in Victorian Literature.** Fall and spring terms. Professor \_\_\_\_\_.

140. **American Literature.** Fall and spring terms. Professor THOMPSON.

142. **Theories of Criticism and Interpretation.** Summer and fall terms. Associate Professor SALE.

145. **The Technique of the Novel.** Summer and spring terms. Associate Professors SALE and SIMMONS.

150. **Dramatic Structure.** Fall and spring terms. Associate Professor MYERS. A study of dramatic history and theory, with reading of representative plays. This course is supplementary to English 23 and 48, which should precede or accompany it.

154. **Recent Poetry.** Fall and spring terms. Associate Professor FRENCH.

**Group III.** Graduate seminaries designed for advanced students, or other students who have had exceptional preparation. The purpose of these seminaries is to bring to the student's attention possible fields for research, and to give advanced instruction in methods of research. These courses are subject to change from year to year. Places of meeting and hours are to be arranged with the professors in charge.

201. **Old English.** Professor \_\_\_\_\_.

202. **Middle English.** Associate Professor FRENCH.

208. **Elizabethan Literature.** Associate Professor NUNGEZER.

210. **Topics in Dramatic History before 1700.** Associate Professor ADAMS and Professor BALD.

215. **The English Novel.** Associate Professors SALE and SIMMONS.

216. **The Romantic Period.** Professor BALD.

240. **American Literature.** Associate Professor MYERS and Professor THOMPSON.

250. **Dramatic Structure.** Associate Professor MYERS.

## GERMANIC LANGUAGES AND LITERATURES

### GERMAN

*Professors* P. R. POPE, A. L. ANDREWS, H. SCHNEIDER, and V. LANGE.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

German Literature 1, 2, 3, 4

Germanic Philology 1, 2, 3, 4

In the advanced courses in this subject the work is twofold, literary and philological. The history of German literature from the earliest period to the present day is sketched in outline lecture courses with collateral reading. Special topics are selected for detailed study such as the epic and lyric poetry of the Middle High German period, the literature of the Reformation, the classical period, the drama of the nineteenth century, and contemporary literature. The courses offered in philology include the study of Gothic and of Old and Middle High German. They also afford an introduction to the science of language.

The seminaries in German literature and philology aim to impart the principles and methods of investigation. A teachers' course deals with classroom methods and theories of instruction in the modern languages.

All the work in German is greatly facilitated by an exceptional library equipment. The nucleus was formed by the acquisition of the Zarncke library, one of the largest collections of rare books for the study of German literature and philology ever brought to America. With constant enlargements the library has become one of the most serviceable in the country. The German Seminary Room in the University Library contains books for ready reference, including philological journals and reviews.

Candidates for advanced degrees in German are expected to have an adequate knowledge of French and Latin. A fellowship in German is awarded annually.

1. *Course for Beginners.* A one-term course, given every term. Six hours a week.

1a. *Course for Beginners.* First term of a two-term course, given every term. Three hours a week.

- 1b. *Course for Beginners*. Second term of a two-term course, given every term; follows 1a. Three hours a week.
- 3a. *Intermediate Course*. First term of a two-term course, given every term. Three hours a week.
- 3b. *Intermediate Course*. Second term of a two-term course, given every term; follows 3a. Three hours a week.
- 4a. *Elementary Composition and Conversation*. First term of a two-term course, given every term. Three hours a week.
- 4b. *Elementary Composition and Conversation*. Second term of a two-term course, given every term; follows 4a. Three hours a week.
5. *Modern German Texts*. A one-term course, given every term. Three hours a week.
7. *German Literature from Goethe to the Present*. A two-term course, summer and fall terms. Two hours a week.
8. *Scientific German*. A one-term course, given every term. Three hours a week.
10. *Advanced German Composition and Conversation*. A two-term course, fall and spring terms. Three hours a week.
11. *Schiller's Life and Works*. A one-term course, summer term. Three hours a week.
13. *Goethe's Life and Works, including Faust*. A two-term course, fall and spring terms. Three hours a week.
15. *Survey of German Literature*. A two-term course, fall and spring terms. Three hours a week.
16. *Contemporary German Literature*. A one-term course, spring term. Three hours a week.
17. *Nineteenth Century Drama*. A one-term course, spring term. Three hours a week.
18. *Lessing's Life and Works*. A one-term course, fall term. Three hours a week.
19. *German Lyric Poetry from Goethe to George*. A one-term course, summer term. Three hours a week.
20. *The German Novel from Goethe to the Present*. A one-term course, spring term. Three hours a week.
- [21. *Bibliographical Introduction to the History of German Literature*. A one-term course, spring term. Two hours a week. Not given in 1944-45.]
- [25. *Wagner's Life and Works*. A one-term course, spring term. Three hours a week. Not given in 1944-45.]
35. **German Romanticism**. A one-term course, fall term. Two hours a week. Associate Professor LANGE. By appointment.
- [36. *Friedrich Nietzsche*. A one-term course. Two hours a week. Associate Professor LANGE. Not given in 1944-45.]
37. **Middle High German**. A one-term course, spring term. Three hours a week. Professor ANDREWS. By appointment.
- [40. *Teachers' Course in Methods*. A one-term course, summer term. Two hours a week. Not given in 1944-45.]
42. **Gothic**. A one-term course, fall term. Three hours a week. Professor ANDREWS. By appointment.  
This course will serve as a general introduction to Germanic philology.
43. **Old High German**. A one-term course, spring term. Three hours a week. Prerequisite, German 37. Professor ANDREWS. By appointment.  
A study, mainly linguistic, of the oldest German texts. It should be preceded by the course in Gothic.
49. **Seminary in German Literature**. A one-term course, spring term. Two hours a week. Associate Professor SCHNEIDER. By appointment.
52. **Seminary in Germanic Philology**. A one-term course, fall term. Two hours a week. Professor ANDREWS. By appointment.

## SCANDINAVIAN

*Professor* HALLDOR HERMANNSSON.

**Approved Major and Minor Subjects** (key to symbols on p. 42)

Danish, Norwegian, Swedish Literature 3, 4  
 Modern Icelandic Literature 2, 3  
 Old Norse-Icelandic Language and Literature 1, 2  
 Old Norse-Icelandic Literature 2, 3, 4

The Fiske Icelandic Collection of the University Library, comprising about 20,000 books and pamphlets, offers excellent facilities for advanced work in Old Norse-Icelandic language and literature, Norse mythology and heroic legends, runology, and early Scandinavian history, as well as in Modern Icelandic language and literature. The Library also has a small collection of books on the other modern Scandinavian languages and literatures to which some additions are made annually.

1. **Old Icelandic.** Throughout the year. T Th S 11. Library, Greek and Latin Seminary.
2. **Modern Icelandic.** Summer term. Three hours a week. Hours to be arranged.
3. **Danish and Dano-Norwegian.** Fall term. Three hours a week. T Th S 11.
4. **Swedish.** Spring term. Three hours a week. T Th S 12.
5. **Old Norse-Icelandic Literature.** Summer term. Two hours a week. W F 12.
- [6. **Modern Scandinavian Literature.** Second term. Two hours a week. Not given in 1944-45.]
7. **Early Scandinavian Civilization and History.** Spring term. Two hours a week. W F 12. Prerequisite, Course 5. Given in alternate years.

## SPEECH AND DRAMA

*Professors* A. M. DRUMMOND, H. A. WICHELNS, HARRY CAPLAN, W. H. STANTON, R. H. WAGNER, C. K. THOMAS, G. B. MUCHMORE, and H. D. ALBRIGHT.

**Approved Major and Minor Subjects** (key to symbols on p. 42)

*Division of Rhetoric and Public Speaking*

Rhetoric and Public Speaking 1, 2, 4  
 Principles of Public Address 3, 4  
 History of Public Address 3, 4  
 Classical Rhetoric 3, 4  
 Medieval Rhetoric 3, 4

*Division of Dramatic Production*

Drama and the Theatre 1  
 Dramatic Production 2, 3, 4  
 Playwriting 2, 3, 4  
 Theatre Techniques 2, 3, 4

*Division of Phonetics*

Speech and Phonetics 2, 3, 4

The chief aim of graduate work in rhetoric and in dramatic production is to develop competent investigators and teachers for colleges and universities. In many cases, the work will require more than the minimum periods of residence. Ordinarily, residence in this University during two academic years will be necessary for the attainment of the doctorate.

Properly qualified students may select Speech Training and Phonetics as a major subject for the Master's degree; as a minor subject for either degree.

Candidates for the Doctor's degree whose major interest is in Rhetoric, that is, in the principles, history, and criticism of public address, will usually choose one



minor subject from the field of literary history and criticism or from that of the social sciences.

Candidates for the Doctor's degree whose major interest is in Drama and the Theatre will be required to take Dramatic Literature as a minor subject, unless they have already pursued systematic study in dramatic literature, and such candidates must expect to be in residence two years and one summer beyond the requirements for the Master's degree. If preparing for general teaching, candidates will be advised to take additional courses in Public Speaking and Speech Training.

Candidates for the Master's degree in Dramatic Production will require at least one academic year and one summer session of residence.

The degree of Master of Fine Arts in Drama will be granted to candidates showing special aptitude in the practical phases of Dramatic Production or Playwriting. Their program must include suitable studies in related Fine Arts; two years of residence will normally be required; and a major practical project in the second year will be the thesis.

Opportunities for theatre practice of which students will be expected to avail themselves are afforded by various branches of THE CORNELL UNIVERSITY THEATRE, as follows: in the *Laboratory Theatre*, for public presentations of the work of graduate students in Dramatic Interpretation and Acting; in the *Studio Theatre*, for production of the work in Playwriting; and in the *Summer Theatre*, for intensive work in all phases of theatre practice. *Director of the University Theatre*, A. M. DRUMMOND.

7. **Discussion.** Spring term. Associate Professor WAGNER. T II; Th II-1.

[13. **Advanced Argumentation.** Associate Professor WAGNER. Not given in 1944-45.]

[16. **Forms of Public Address.** Professor WICHELNS. Not given in 1944-45.]

21. **History of Public Address.** A two-term course, fall and spring terms. Professor WICHELNS. M Th 2-3; 15.

23. **Theories of Public Address.** Fall term. Associate Professor WAGNER. T 2-4.

[24. **Public Opinion and the Method of Argument.** Professor WICHELNS. Not given in 1944-45.]

[25. **British Rhetoric and Oratory.** Associate Professor WAGNER. Not given in 1944-45.]

32. **Phonetics and Speech Training.** Fall term. Associate Professor THOMAS. T Th S II.

[33. **Regional and Historical Phonetics.** Associate Professor THOMAS. Not given in 1944-45.]

34. **Principles of Phonetics.** Spring term. Associate Professor THOMAS. T Th S II.

36. **Principles and Methods of Speech Correction.** A two-term course, fall and spring terms. Associate Professor THOMAS. Hours to be arranged.

41. **Dramatic Production: Direction.** Fall term. Professor DRUMMOND. M W F II. Morse, Stage Laboratory.

Dramatic interpretation and the related principles of stage direction and production.

42. **Advanced Dramatic Interpretation and Acting.** Spring term. Professor DRUMMOND. W 2-4.

A practical course in direction, rehearsal, and acting, leading to public presentations in the Laboratory Theatre; special attention to oral interpretation.

44. **Advanced Dramatic Production.** Summer term. Professor DRUMMOND. T 2-4, and an hour to be arranged. Morse, Stage Laboratory.

Laboratory practice in the presentation and production of plays.

45. **Dramatic Production: Stagecraft.** Spring term. Assistant Professor ALBRIGHT. M W II. Laboratory, T 1:40-4, or as arranged. Morse, Stage Laboratory.

Stage production; problems and practice in construction and design.

45a. **Dramatic Production: Stage Lighting.** Spring term. Assistant Professor Albright. Hours to be arranged.

[46. *Stage Design and Theatre Crafts*. Not given in 1944-45.]

[48. **History of the Theatre**. Professor DRUMMOND. Not given in 1944-45.]

[49b. **Playwriting**. A two-term course, fall and spring terms. Professor DRUMMOND. Not given in 1944-45.]

91. **Theatre Practice**. A two-term course; may be entered summer, fall, or spring term. Professor DRUMMOND or Assistant Professor ALBRIGHT. Hours to be arranged.

Projects correlated with the work of the University Theatre.

[**Studies in Greek and Roman Rhetoric and Oratory**. Professor CAPLAN. See Greek 33. Not given in 1944-45.]

**Dramatic Literature**. See English 48 and 61.

**Fine Arts**. See especially Fine Arts 1a, 1b (History of Painting and Sculpture); Philosophy 8a, 8b; Music 5, 10.

#### *Seminary Courses*

[60. **Rhetorical Criticism**. Associate Professor WAGNER. Not given in 1944-45.]

[62. **Philosophy of Rhetoric**. Professor WICHELNS. Not given in 1944-45.]

63. **Speech Training**. A two-term course, fall and spring terms. Associate Professor THOMAS. Hours to be arranged.

General phonetics; theory of voice and speech.

66. **Theories of Dramatic Production**. Fall term. Professor DRUMMOND. T Th 12.

The chief theories of dramatic production in relation to aesthetic principles.

[67. **Dramatic Art**. A two-term course. Professor DRUMMOND. Not given in 1944-45.]

68. **Modern Theories of Stage Presentation**. Fall and spring terms. Professor DRUMMOND. Hours to be arranged.

**Dramatic Structure**. See especially English 150, 250. Associate Professor MYERS.

#### ROMANCE LANGUAGES AND LITERATURES

*Professors* J. F. MASON, LAURENCE PUMPELLY, G. I. DALE, B. L. RIDEOUT, and P. J. THOMAS.

#### **Approved Major and Minor Subjects** (key to symbols on p. 42)

French Language 1, 2, 3, 4

French Literature 1, 2

French Philology 1, 2, 3, 4

Medieval French Literature 3, 4

French Literature of the Sixteenth Century 3, 4

French Literature of the Seventeenth Century 3, 4

French Literature of the Eighteenth Century 3, 4

French Literature of the Romantic Period 3, 4

Modern French Literature 3, 4

Contemporary French Literature 3, 4

General History of French Literature 3, 4

Italian 1, 2, 4

Spanish Language 1, 2, 3, 4

Spanish Literature 1, 2, 3, 4

Spanish Literature of the Renaissance 1, 2, 3, 4

Spanish Literature of the Golden Age 1, 2, 3, 4

Modern Spanish Literature 1, 2, 3, 4

Spanish Literature of the 18th Century 3, 4

Spanish Literature of the 19th Century 3, 4

The collection of French and Spanish books in the University Library is very large, and offers excellent facilities for advanced work. Objects of special pride are the unrivalled Dante and Petrarch collections, the gift of the late Willard Fiske, who likewise presented to the University a unique collection of Rhaeto-Romance works. Smaller collections of Portuguese, Provençal, and Catalan books are also to be found in the University Library. The seminary library contains several thousand volumes including many sets of bound periodicals. A university fellowship in Romance languages (of the value of \$400 and free tuition) is annually awarded. This fellowship is ordinarily awarded only to an applicant who has had one year or more of graduate study.

The courses of study in this department are divided into three categories: those intended primarily for undergraduates, those intended alike for undergraduates and graduates, and those intended primarily for graduates. A working knowledge of Latin is especially desirable for all candidates for advanced degrees in this department. All candidates for the degree of Doctor of Philosophy must satisfy the language requirement in French and German before beginning to earn the fourth term of residence credit (see page 24). A graduate student in Romance languages should have completed some formal course of study in the language and literature of the language which he intends to select as his major subject, and should have adequate preparation for advanced work in his minor subjects.

A candidate for the degree of Master of Arts whose major subject is in Romance Languages is expected to present for the approval of the chairman of his Special Committee, within two weeks after registration day, an outline of the work planned for the year. The thesis must, before May 1, be submitted for the criticism of the chairman of the candidate's Special Committee. If not already taken, a course in the philology of the language which constitutes their major subject is required of graduate students in their first year of study.

Candidates for the degree of Doctor of Philosophy are expected to follow advanced courses given in the field in which their major subject lies and to take up such work as will give a comprehensive view of the fields in which their minor subjects lie. It is intended that the last year of preparation for this degree shall be spent chiefly upon the thesis. Further information may be obtained from the professors in this department.

#### FRENCH

*Professors MASON and PUMPELLY; Associate Professors RIDEOUT and THOMAS.*

- 1a. *First Course for Beginners*; fall term. Three hours a week.
- 1b. *First Course for Beginners*; spring term. Three hours a week.
- 3a. *Second Course*; summer term; repeated in fall term. Three hours a week.
- 3b. *Second Course*; fall term; repeated in spring term. Three hours a week.
- 5a. *Written and Spoken French*; summer term; three hours a week.
- 5b. *Written and Spoken French*; summer term. Three hours a week.
- 6a. *Freshman French: Reading and Composition*; fall term; repeated in spring term. Three hours a week.
- 6b. *Freshman French: Reading and Composition*; fall term; repeated in spring term. Three hours a week.
7. *Written and Spoken French*; summer term; repeated in fall and spring terms. Three hours a week.
9. *Written and Spoken French*; summer term; repeated in fall and spring terms. Three hours a week.
- [10. *French Civilization*. Not given in 1944-45.]
15. *Modern French Literature*; summer term. Three hours a week.
16. *History of French Literature*; a two-term course, fall and spring. Three hours a week.
- [17. *Literature of the Seventeenth Century*. Not given in 1944-45.]
- [18. *Literature of the Eighteenth Century*. Not given in 1944-45.]
- [19. *The Romantic Movement in French Literature*. Not given in 1944-45.]
- [20. *Modern French Literature*. Not given in 1944-45.]
21. *Contemporary French Literature*; a two-term course, fall and spring. Three hours a week.

22. *French Phonetics*; spring term. Two hours a week.

[23. *French Historical Grammar*; fall term. Credit two hours. Prerequisite, one year of Latin. Professor PUMPELLY. T Th 10. *Goldwin Smith* 283. Not given in 1944-45.]

Lectures on the historical development of French from its origins to the present. Primarily for students intending to teach French.

24. *French Philology*; a two-term course. fall and spring. Credit three hours a term. Prerequisites, French 5a or equivalent, French 23 and entrance Latin. Professor PUMPELLY. T 10, Th 2. *Goldwin Smith* 283.

Lectures on the historical development of the French language, with a detailed phonological and morphological study of the *Chanson de Roland*.

30. *French for Teachers*; fall term. Three hours a week.

[31. *Literature of the Sixteenth Century*. Not given in 1944-45.]

[35. *Contemporary France*. Not given in 1944-45.]

[41. *Old French Texts*. Spring term. Credit two hours. Professor ————. Hours to be arranged. Not given in 1944-45.]

[43. *Old Provençal Philology and Literature*. Spring term. Credit two hours. Professor ————. Hours to be arranged. Not given in 1944-45.]

47. *Modern French Seminary*. A two-term course, fall and spring. Credit two hours. Professor MASON. T 2:30. Library, French Seminary.

A topic in French literary history is studied by means of lectures, readings, reports, individual and collective research. The course serves as an introduction to methods of literary history.

#### ITALIAN

Professor PUMPELLY.

1a. *Elementary Course*; fall term. Three hours a week.

1b. *Elementary Course*; spring term. Three hours a week.

[5. *Second Course*. Not given in 1944-45.]

[15. *Dante*. Not given in 1944-45.]

#### PORTUGUESE

Professor DALE.

1a. *First Course for Beginners*; fall term. Three hours a week.

1b. *First Course for Beginners*; spring term. Three hours a week.

#### SPANISH

Professor DALE.

1a. *First Course for Beginners*; summer term; repeated in fall term. Three hours a week.

1b. *First Course for Beginners*; fall term; repeated in spring term. Three hours a week.

3a. *Second Course*; summer term; repeated in fall term. Three hours a week.

3b. *Second Course*; spring term. Three hours a week.

6a. *Freshman Spanish: Reading and Composition*; summer term; repeated in fall term. Three hours a week.

6b. *Freshman Spanish: Reading and Composition*; fall term; repeated in spring term. Three hours a week.

7a. *Intermediate Composition*; fall term. Three hours a week.

7b. *Intermediate Composition*; spring term. Three hours a week.

8. *Spoken Spanish*; summer term; repeated in fall and spring terms. One hour a week.

10. *History of Spanish Literature*; a two-term course; fall and spring. Three hours a week.

[17. *Cervantes*. Not given in 1944-45.]

18. *The Spanish-American Novel*; summer term. Three hours a week.



19. *The Nineteenth Century Spanish Novel*; a two-term course, fall and spring. Three hours a week.

[20 *Latin-American Culture*. Not given in 1944-45.]

[41. **Old Spanish**; a two-term course, fall and spring. Credit two hours a term. Professor DALE. W 2:15. Library, Spanish Seminary. Not given in 1944-45.]

A philological and morphological study of Old Spanish texts, with special emphasis on the *Poema del Cid*.

[42. **Calderón and Alarcón**; a two-term course, fall and spring. Credit two hours a term. Professor DALE. W 2:15. Library, Spanish Seminary. Not given in 1944-45.]

Selected plays by each author will be analyzed in an effort to determine their contributions which are not in the Lope tradition.

[43. **The Picaresque Novel**; a two-term course, fall and spring. Credit two hours a term. Professor DALE. W 2:15. Library, Spanish Seminary. Not given in 1944-45.]

A detailed study will be made of one picaresque novel.

## SLAVIC

Associate Professor E. J. SIMMONS.

## Approved Major and Minor Subjects (key to symbols on p. 42)

Russian Language and Literature 1, 2, 3, 4

Polish Language and Literature 1, 2, 3, 4

Slavic Philology 1, 2, 3, 4

Graduate work in Slavic is directed towards a thorough knowledge of the Russian language and literature and some knowledge of at least one other Slavic language. A candidate for the higher degrees will also be expected to obtain substantial background information on Russian political and social history.

**Group I.** Undergraduate courses: graduate students taking these courses are expected to do extra work in order to achieve graduate credit. For a full description of these courses see the *Announcement of the College of Arts and Sciences*.

1a. *Elementary Semi-Intensive Russian*. Fall term. Credit six hours.

2a. *Second-Year Semi-Intensive Russian*. Fall term. Credit six hours.

5. *Introduction to Russian Literature and Culture*. Two-term course, fall and spring terms. Credit three hours a term.

7. *Dostoevski*. Fall term. Credit three hours.

**Group II.** Designed primarily for graduate students.

[6. **Pushkin**. Credit three hours. Representative readings and interpretation of Pushkin's poetry and prose. Associate Professor SIMMONS. T Th S at 10. Goldwin Smith. Not given in 1944-45.]

[20. *Polish*. Elementary Polish. Two-term course, fall and spring. Credit three hours a term. Mr. PERTZOFF. Goldwin Smith. Hours to be arranged. Not given in 1944-45.]

20. *Polish*. Elementary Polish; two-term course, fall and spring. Credit three hours a term. Mr. PERTZOFF. Goldwin Smith. Hours to be arranged.

[30. **Old Church Slavic**.]

[31. **Mediaeval Russian Literature**.]

(Attention is called to the following two programs to be offered in the summer term:

1. *Intensive Study of the Russian Language* (two courses, elementary and advanced, fifteen hours a week, twelve weeks, credit twelve hours).

2. *Intensive Study of Contemporary Russian Civilization* (six courses: Russian history, government and international relations, economics, literature, social institutions and life, and a group of workshop seminars. Twelve weeks, total credit twelve hours).

## SUSAN LINN SAGE SCHOOL OF PHILOSOPHY

Professors G. WATTS CUNNINGHAM, GEORGE H. SABINE, E. A. BURTT, HAROLD R. SMART, RICHARD ROBINSON, and RALPH W. CHURCH.

The Susan Linn Sage School of Philosophy was founded through the generosity of the late Henry W. Sage, who endowed the Susan Linn Sage Professorship and gave in addition \$200,000 to provide permanently for instruction and research in philosophy.

The *Philosophical Review*, supported by the University and issued under the auspices of the Sage School, is a bi-monthly journal devoted to the interests of philosophy, including logic, metaphysics, ethics, aesthetics, the history of philosophy, and the philosophy of religion. By the terms of its establishment, the *Review* is an absolutely free organ of philosophical scholarship, not devoted to the propagation of any doctrine. The *Cornell Studies in Philosophy* are a series of monograph studies, published from time to time under the editorial supervision of the professors of the School. They offer a channel for the publication of studies begun as dissertations for the doctorate or of other research. Seventeen monographs have been issued.

The instruction offered to graduate students presupposes such undergraduate courses in the subject as would be taken by a student in the College of Arts and Sciences of Cornell University who had elected philosophy as a major subject. Those who have not had equivalent preparation are expected to make up their deficiencies outside the work required for an advanced degree.

The Sage School provides opportunity for advanced study to two classes of graduate students: (1) those whose chief branch of research is in allied fields but who desire to supplement this with a minor in philosophy; (2) those whose major interest is in some branch of philosophy.

1. Graduate students having a major interest in literature or the arts, in history or social studies, or in mathematics or a branch of experimental science, are permitted to choose a minor in philosophy with such emphasis as best suits their needs. For such students the School endeavors to outline a plan of philosophical study (in courses or directed reading) which will form a natural supplement to their field of research.

2. Students whose major interest is in philosophy are required (a) to gain a general knowledge of the whole subject including its history, and (b) to select some aspect or subdivision of it for intensive study and research. The following subjects may be chosen as majors and minors: aesthetics, ethics, history of philosophy, logic and epistemology, metaphysics, and philosophy of religion. Students are encouraged to choose one minor in a subject other than philosophy.

The Sage School offers a Graduate Prize in Philosophy, having an annual value of about twenty-five dollars, for the best essay embodying the results of research. See page 39 above.

The School offers also three Susan Linn Sage Fellowships in Philosophy, having an annual value of \$600 each. It reserves the right, however, to divide one or more of these fellowships into two scholarships of \$300 each. Both scholarships and fellowships carry free tuition in the Graduate School in addition to the stipend.

### Approved Major and Minor Subjects (key to symbols on p. 42)

Aesthetics 1, 2, 3, 4  
Ethics 1, 2, 3, 4  
History of Philosophy 1, 2, 3, 4  
Logic and Epistemology 1, 2, 3, 4  
Metaphysics 1, 2, 3, 4  
Philosophy 4  
Philosophy of Religion 1, 2, 3, 4

The following courses are primarily for undergraduates, though some of them may be taken by graduate students on permission of the instructors. For detailed information concerning them consult the *Announcement of the College of Arts and Sciences*.

1. *Philosophical Classics*. Given each term. Three hours a week.
2. *Logic*. Given each term. Three hours a week.
3. *Problems of Philosophy*. Fall term. Three hours a week.
4. *Ethics*. Spring term. Three hours a week.
5. *History of Philosophy*. A two-term course, fall and spring terms. Three hours a week.
- 8a. *Aesthetics: Psychology of Art*. Fall term. Three hours a week.
- 8b. *Aesthetics: Philosophy of Art*. Spring term. Three hours a week.
10. *Modern Political Theory*. Spring term. Three hours a week.
13. *The Philosophy of Religion*. Fall term. Three hours a week.
14. *History of Religions*. Summer term. Three hours a week.
15. *Philosophy of Science*. A two-term course, fall and spring terms. Three hours a week.
16. *Advanced Logic*. A two-term course, fall and spring terms.
17. *Advanced Study*. Given each term. Credit 2-5 hours. Prerequisite at least one elementary course in philosophy and permission of the instructor. Hours to be arranged. All members of the staff. Consult Mr. CUNNINGHAM.

19. **Advanced Readings in Aesthetics**. A two-term course, fall and spring terms. Professor CHURCH. To be given at the discretion of the instructor. Hours by appointment. Goldwin Smith 220.

Readings to be selected in accordance with the interests and preparation of the student.

*Primarily for Graduates*

[20. **Contemporary Philosophy**. A two-term course, fall and spring terms. Professor BURTT. M W F 9, or hours to be arranged. Goldwin Smith 220. Not given in 1944-45.]

Main tendencies of contemporary philosophy, especially British and American.

**Symbolic Logic**. (See Mathematics.)

23. **Philosophy of Religion. Advanced Course**. Summer term. Professor BURTT. To be given at the discretion of the instructor. Th 2-4. Goldwin Smith 218.

A study of special topics in the field. The seminar method will be used.

25. **Plato and Aristotle**. A two-term course, fall and spring terms. Only the spring term (Aristotle) will be given in 1944-45. For upperclassmen and graduates. Credit three hours a term. Associate Professor ROBINSON. T Th S 11. Goldwin Smith 220. Given in alternate years.

A philosophical study of the two greatest ancient thinkers, with substantial readings from their works in translation.

28. **Ethical Theory**. Fall term. Associate Professor ROBINSON. M W F 10. Goldwin Smith 220.

A rapid reading of examples of the main types of modern ethical theory.

29. **The Philosophy of Value**. Spring term. Professor ————. M W F 10, or hours to be arranged. Goldwin Smith 220.

A study of Naturalist, Realist, and Idealist theories of value.

30. **Empiricism and Rationalism**. A two-term course, fall and spring terms. Professor CHURCH and Associate Professor SMART. M W F 2, or hours to be arranged. Goldwin Smith 220.

The general history of the two schools with a critical analysis of the main works of Descartes, Leibniz, Locke, and Hume.

[32. **The Critical Philosophy of Kant**. A two-term course, fall and spring terms. Professor SABINE and Associate Professor SMART. F 3, or hours to be arranged. Goldwin Smith 220. Not given in 1944-45.]

A reading of the principal works of the Critical Period.

[33. **The Philosophy of Hegel**. A two-term course, fall and spring terms. Professor CUNNINGHAM. W 11-1, or hours to be arranged. Goldwin Smith 220. Not given in 1944-45.]

A critical analysis of the philosophy of Hegel with special emphasis on the *Phenomenology* and the *Logic*.

39. **Seminar in Contemporary Philosophy.** A two-term course, fall and spring terms. Professor CUNNINGHAM. To be given at the discretion of the instructor. W 11-1, or hours to be arranged. Goldwin Smith 220.

Topic for 1944-45: Meaning, Fact and Value.

40. **Seminar in Logic.** A two-term course, fall and spring terms. Associate Professor SMART. To be given at the discretion of the instructor. T 2, or hours to be arranged.

Topic for 1944-45: Problems in contemporary logic.

[42. **Seminar in Ancient and Medieval Philosophy.** A two-term course, fall and spring terms. Prerequisite, Philosophy 25. Associate Professor ROBINSON. Time and place to be arranged. Not given in 1944-45].

43. **Seminar in Political Theory.** A two-term course, fall and spring terms. Professor SABINE. To be given at the discretion of the instructor. F 2:30, or hours to be arranged. Goldwin Smith 218.

44. **Seminar in Epistemology.** A two-term course, fall and spring terms. Professor BURTT. To be given at the discretion of the instructor. M 3:30, or hours to be arranged. Goldwin Smith 218.

Topic for 1944-45: Are philosophical statements either true or false?

45. **Seminar in Aesthetics.** A two-terms course, fall and spring terms. Professor CHURCH. To be given at the discretion of the instructor. Hours to be arranged. Goldwin Smith 220.



## HISTORY AND THE SOCIAL SCIENCES

The subjects of history, economics, and government have been united since 1887 in the PRESIDENT WHITE SCHOOL OF HISTORY AND POLITICAL SCIENCE, which bears the name of the first president of the University in especial recognition of the gift of his valuable collection of historical literature to the University Library.

The aims of the President White School are threefold: first, the advancement of knowledge by investigation and publication in the fields of history, economics, politics, jurisprudence, and social science; second, the training of scholars and teachers in these departments of study; third, the training of men and women for the public service, for business, and for professions such as law and journalism.

### ECONOMICS

*Professors* DONALD ENGLISH, P. T. HOMAN, M. S. KENDRICK, R. E. MONTGOMERY, P. M. O'LEARY, and H. L. REED; *Assistant Professors* G. P. ADAMS, JR., and J. G. B. HUTCHINS.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Economic History 1, 2, 3, 4

Economic Theory and its History 1, 2, 3, 4

*Note.* Every candidate for the Ph.D. or A.M. degree who does not elect Economic Theory and Its History as a major or a minor subject will be held for certain required work in that subject.

Labor and Industrial Relations 1, 2, 3, 4

Money, Banking, and International Finance 1, 2, 3, 4

Organization and Control of Industry 1, 2, 3, 4

Public Finance 1, 2, 3, 4

#### Requirements for the Degree of Ph.D. in the Several Fields of Study

\* **ECONOMIC THEORY AND ITS HISTORY.**—When offered as a major: (1) a good general knowledge of the history of economic thought including the classical school and its critics, the more recent important schools of thought, and the principal contemporary theorists; (2) familiarity with the methods of economic analysis and with controversial areas of thought; (3) a detailed knowledge of some period or school together with necessary historical and intellectual background thereto; (4) a knowledge of social and intellectual history sufficient to form a background for an understanding of the development of economic thought.

When offered as a minor: Parts 1, 2, and 4 of above requirement.

**MONEY, BANKING, AND INTERNATIONAL FINANCE.**—When offered as a major: (1) a detailed understanding of the theory and history of money; monetary system of the U. S.; theory and history of banking; present banking system of the U. S.; foreign exchange; monetary aspects of cyclical fluctuations; (2) an understanding of leading monetary systems of the world; modern central banking theory and practice; banking systems of Canada, England, France, and Germany; international movement of capital.

When offered as a minor: Part 1 of above requirement.

**ECONOMIC HISTORY.**—When offered as a major: (1) a comprehensive knowledge of the evolution of agriculture, industry, and commerce in ancient and medieval times together with an understanding of contemporaneous economic ideas; (2) a comprehensive knowledge of economic history of modern times (in Western World) together with an understanding of intellectual and political movements which have influenced the development of modern economic institutions; (3) a detailed knowledge of at least one special phase of economic history; (4) a knowledge of the bibliography of economic history and ability to appraise the more important generalizations of economic history.

When offered as a minor: Parts 2 and 3 of above requirement.

**LABOR AND INDUSTRIAL RELATIONS.**—When offered as a major: A good general knowledge of the following divisions of the field of Labor and Industrial Relations and the literature pertaining to each: (1) trade unionism, collective bargaining and industrial arbitration; (2) history, theory, and application of labor law; (3) labor management and personnel problems; (4) the national income, its sources and distribution; (5) labor movements and dissenting or protesting economic thought; (6) social insurance. As a background the candidate should have a grasp of the general field of labor conditions and problems, evolution of the wage system, basic material with respect to wage trends, physical production trends, distribution of wealth and income, and the general field of social legislation, together with demonstrated ability to apply quantitative and theoretical methods to problems in the field of industrial relations.

When offered as a minor: two or three of the divisions listed above.

**ORGANIZATION AND CONTROL OF INDUSTRY.**—When offered as a major: (1) a good general knowledge of the organization of industry; (2) an understanding of the problems of control arising in connection with transportation, public utilities, and industrial combinations; (3) a detailed knowledge of organization and problems of control in one of the above three general areas of industry; (4) a knowledge of accounting and corporation finance and, in specific cases, of statistics; (5) a knowledge of constitutional law.

When offered as a minor: Part 1 and a knowledge of corporation finance, accounting, and the problems of control in one general area of industry; and a *detailed* knowledge of accounting or corporation finance or the problems of control in one general area of industry.

**PUBLIC FINANCE.**—When offered as a major: (1) a thorough knowledge of the principles and problems of public expenditures and revenues, and of governmental financial policies; (2) an adequate grasp of the facts concerning federal, state, and local public finance in the U. S.; (3) an understanding of these facts in terms of the problems which arise out of them; (4) ability to evaluate ways and means of solving these problems; (5) a broad understanding of the place of public finance in the economic and political order; (6) such specialized knowledge as may be needed for the preparation of a thesis. [Candidates should be grounded in accounting, statistics, finance, and government. Knowledge of the law of taxation, comparative systems of public finance, financial history, and social and political ethics is desirable.]

When offered as a minor: Parts 1 and 5 of the above requirements.

### Requirements for the Degree of A.M. in the Several Fields of Study

Graduate students offering any of the several fields in economics as a major or minor for the A.M. degree should consult with members of the Department of Economics to ascertain the exact requirements. In general, the major requirements for the A.M. degree are substantially the equivalent of the minor requirements for the Ph.D. degree.

#### *For Undergraduates and Graduates*

11. *Money, Currency, and Banking.* Three hours a week.
12. *Commercial Banking and the Federal Reserve System.* Three hours a week.
13. *Financial History of the United States.* Three hours a week.
15. *Trade Fluctuations.* Three hours a week.
- 21a. *Accounting.* Three hours a week.
- 21b. *Accounting.* Three hours a week.
31. *Corporation Finance.* Three hours a week.
- 32a. *Public Control of Business.* Three hours a week.
- 32b. *Public Control of Business.* Three hours a week.
34. *Economics of Transportation.* Three hours a week.
41. *Labor Conditions and Problems.* First term. Three hours a week.
42. *Trade Unionism and Collective Bargaining.* Second term. Three hours a week.

44. *Public Policy and Industrial Relations*. Three hours a week.  
 45. *The Economics of Dissent*. Two hours a week.  
 46. *Legal and Constitutional Aspects of Labor Problems and Social Insurance*. Three hours a week.  
*Taxation*. Three hours a week.  
 52. *Federal Taxation*. Three hours a week.  
 [61a. *Economic History Since 1750*. First term. Three hours a week. Not given in 1944-45.]  
 [61b. *Economic History Since 1750*. Second term. Three hours a week. Not given in 1944-45.]  
 [71. *International Trade and Commercial Policy*. Three hours a week. Not given in 1944-45.]  
 [72. *International Finance*. Three hours a week. Not given in 1944-45.]  
 [74. *International Economic Organization*. Three hours a week. Not given in 1944-45.]  
 81. *Economics of Enterprise*. Three hours a week.  
 82. *Economic Analysis*. Three hours a week.  
 [83. *History of Modern Economic Thought*. Three hours a week. Not given in 1944-45.]

*Primarily for Graduates*

The following seminar courses usually meet for two hours a week throughout the year. The subject matter dealt with changes from year to year and registration for them may be repeated. None of these seminars will be given in 1944-45.

110. **Money and Credit**. Professor REED.  
 130. **Control of Industry**. Professor O'LEARY.  
 140. **Labor Economics**. Professor MONTGOMERY.  
 150. **Public Finance**. Professor KENDRICK.  
 160. **Economic History**. Assistant Professor HUTCHINS.  
 170. **International Economics**.  
 180. **Economic Theory**. Professor HOMAN.

GOVERNMENT

*Professors R. E. CUSHMAN, H. W. BRIGGS, F. M. WATKINS, and ELIAS HUZAR; and Doctor D. B. TRUMAN.*

**Approved Major and Minor Subjects** (key to symbols on p. 42)

- American Governmental Institutions 1, 2, 3, 4  
 Constitutional Law 1, 2, 3, 4  
 International Law and Relations 1, 2, 3, 4  
 Political Theory 1, 2, 3, 4  
 Comparative European Government 1, 2, 3, 4

*Note.* Other subjects may be chosen in consultation with members of the department.

Graduate courses in Government afford an opportunity to students to carry on research in that field. As preparation for such work a familiarity with the essentials of American political institutions and of the principal systems of European government is assumed, as well as at least an elementary knowledge of American and English or European history. For 1944-45 research in Government will be directed primarily in the fields of American Constitutional Law, Political Theory, and International Law and Relations, although topics relating more generally to American or European governmental institutions and political problems may also be selected.

The attention of students desiring to do graduate work in the various fields of public law is directed to the opportunities open to them in the Law School. The courses in that School in Administrative Law, Constitutional Law, International Law, Jurisprudence, Municipal Corporations, Law of Public Utilities, and Trade

Regulations, may be elected by graduate students with the consent of the professors in charge. (See *Announcement of the Law School*.) The members of the faculty of the Law School are willing to cooperate in directing the researches of students in their several fields, and to serve as members of the Special Committees of such students.

1. *American Government*. Summer term, to be repeated in fall term. Three hours a week.

2. *Comparative Government*. Fall term, to be repeated in spring term. Three hours a week.

[3. *State and Local Government*. Three hours a week. Not given in 1944-45.]

[4. **American Party Politics**. Credit three hours. Not given in 1944-45.]

[5. **Pressure Politics and Propaganda**. Credit three hours. Not given in 1944-45.]

[6. **Municipal Government**. Credit three hours. Not given in 1944-45.]

[7. **Public Administration**. Credit three hours. Not given in 1944-45.]

9. **Introduction to International Relations**. Fall term. Three hours a week. Professor BRIGGS. M W F 9. Boardman 122.

A survey of nationalism, internationalism, imperialism, and the racial, political, economic, and geographical factors in modern international relations.

[10. **Recent and Contemporary Political Theory**. Credit three hours. Not given in 1944-45.]

[11a. **Comparative Constitutional Government**. Credit three hours. Not given in 1944-45.]

[11b. **Comparative Dictatorial Government**. Credit three hours. Not given in 1944-45.]

14a and b. **International Law**. Fall and spring terms. Credit three hours a term. Professor BRIGGS. M W F 11. Boardman 320.

A systematic study of the nature, development, and judicial application of the principles of international law. Cases, readings, discussions.

[15. **International Organization**. Credit three hours. Not given in 1944-45.]

[16a. **Contemporary American Foreign Policy: The Latin American Policy of the United States**. Credit three hours. Not given in 1944-45.]

16b. **Contemporary American Foreign Policy: The Far Eastern Policy of the United States**. Spring term. Credit three hours. Professor BRIGGS. M W F 9. Boardman 122.

An analysis of the relations of the United States with China, Japan, and the European Powers with Far Eastern interests, primarily since 1898.

20. **Constitutional Law: The American Federal System**. Fall term. Credit three hours. Open to upperclassmen. Professor CUSHMAN. T Th S 11. Boardman 122.

Judicial interpretation of the constitution: the nature of judicial review; separation of governmental powers; relations between state and national government; construction of national powers.

21. **Constitutional Law: Fundamental Rights and Immunities**. Spring term. Credit three hours. Open to upperclassmen. Professor CUSHMAN. T Th S 11. Boardman 122.

Privileges and immunities of citizenship; protection of civil and political rights; the obligation of contracts; due process of law and the equal protection of the law.

22. **Seminary in Constitutional Problems**. Fall and spring terms. Credit two hours a term. Open to graduate students and qualified seniors. Professor CUSHMAN. Students will be admitted upon consultation with the instructor.

24. **Seminary in International Law and International Organization**. Fall and spring terms. Credit two hours a term. Open to graduate students and qualified seniors. Professor BRIGGS. Students will be admitted upon consultation with the instructor.



## HISTORY

*Professors* M. L. W. LAISTNER, CARL STEPHENSON, F. G. MARCHAM, C. W. DE KIEWEIT, P. W. GATES and C. P. NETTELS; *Associate Professor* KNIGHT BIGGERSTAFF, and *Miss* GUSSIE GASKILL.

**Approved Major and Minor Subjects** (key to symbols on p. 42)

American History 1, 2, 3, 4  
 Ancient History 1, 2, 3, 4  
 English History 1, 2, 3, 4  
 Far Eastern History 1, 2, 3, 4  
 Medieval History 1, 2, 3, 4  
 Modern European History 1, 2, 3, 4

A graduate student in history should have a sufficient knowledge of general history and of geography. He should be able to speak and write good English. He should have a reading knowledge of French, of German, and of any other language necessary for the thorough study of his special subject. For work in Medieval History he would need a knowledge of Latin, and for Ancient History both Latin and Greek. It is highly desirable that he should have had the necessary linguistic training as an undergraduate; but deficiencies in this respect may sometimes be made up after entering upon graduate work.

The University Library contains little short of two hundred thousand volumes dealing with history. It has been from the outset the policy of the University, while providing adequately for the symmetrical growth of the Library, to acquire private collections of books which eminent scholars have through a lifetime of study built up as their tools of research. Thus, for the study of Oriental History, Cornell has been endowed with the EISENLOHR COLLECTION on the history of Egypt, with the WASON COLLECTION on the history and the civilization of China, and with that of President White on the history of Palestine. For the study of the Graeco-Roman world, it acquired that of Charles Anthon. For the Middle Ages, it has notable bodies of books on the birth of the Papal state, on the rise of the Carolingian empire, and in general on the relations of Church and State. For the Renaissance, it can boast the unrivaled FISKE COLLECTIONS on Dante and Petrarch and the world of their time. For the age of the Reformation, for the history of superstition and persecution (notably for Inquisition and Index, for the story of witchcraft, for the beginnings of the sciences, for the rise of tolerance), it is equipped with the riches of the PRESIDENT WHITE LIBRARY; and for the study of the French Revolution that library has no equal on this side of the Atlantic, if anywhere outside of France. For the history of America, the University possesses the library of the historian Jared Sparks, with the MAY COLLECTION on American Slavery and the SCAIFE COLLECTION on the Civil War. Professor GOLDWIN SMITH enriched it with his working library of English history; it obtained that of Professor Tuttle on Prussia; from Professor Fiske came one singularly complete on Iceland. In a multitude of other fields it has been found possible to gather for the special student materials for exhaustive research. Many of these collections are endowed with special funds for their increase; and all have been steadily built up with an eye to the needs of the mature student of history.

Three fellowships and a scholarship are annually awarded to graduate students of history. The President White Fellowship in Modern History has a value of \$500. It may be granted as a travelling fellowship. The fellowship in American History amounts to \$400. The stipend of the George C. Boldt Fellowship in history is \$1,000. The Graduate Scholarship in History amounts to \$200. Holders of fellowships and graduate scholarships are, with the exception of the Boldt Fellowship, exempt from the payment of tuition. There are several assistantships in history, which are filled preferably by the appointment of graduate students.

Fellowships are ordinarily awarded only to applicants who have had one year or more of graduate study. It will hardly be worth while for persons who have not had a year of graduate study to apply unless they can submit written work of superior quality.

A seminary is conducted in each of the major fields of history and each professor is willing to direct research in his special field.

General courses are offered in ancient, medieval, modern European, and English history, and in American history both political and economic. These are intended for undergraduates, but, if supplemented by individual work, one or another of them may sometimes serve the purposes of a graduate student.

#### AMERICAN HISTORY

Professors P. W. GATES and C. P. NETTELS.

82. *American History, 1607-1850.* Fall and spring terms.

83. *American History, 1850 to the Present.* Summer term.

89. **American History: History of the West.** Fall and spring terms. Three hours a week. Prerequisites, History 82, 83. Professor GATES. M W F 12.

[91. **Recent American History.** First term. Prerequisites, History 82, 83, or the equivalent. Associate Professor GATES. M W F 12. Not given in 1944-45.]

92. **American Colonial History.** One term during year. Professor NETTELS.

[93. **Economic History of the United States.** Second term. Associate Professor GATES. M W F 12. Not given in 1944-45.]

99. **Seminary in American History.** One or more terms during the year. Two hours a week. Professor NETTELS. Hours to be arranged.

100. **Seminary in American History.** One or more terms during the year. Two hours a week. Associate Professor GATES. Hours to be arranged.

#### ANCIENT HISTORY

Professor M. L. W. LAISTNER.

2a. *Greek Civilization.* Summer term. Three hours a week.

2b. *Roman Civilization.* Fall term. Three hours a week.

[3. **Greek History, 500-323 B.C.** First term. M W F 11. Not given in 1944-45.]

4. **The Hellenistic Age.** Spring term. M W F 9.

[5. **The Roman Republic, 133-30 B.C.** Boardman 321. Not given in 1944-45.]

[6. **The Roman Empire, 30 B.C.-180 A.D.** Not given in 1944-45.]

[8. **Seminary in Greek and Roman Historiography.** Throughout the year. Not given in 1944-45.]

14. **Seminary in Roman Historical Inscriptions.** Two terms. Fall and spring terms. M 2-4 University Library, Classical Seminary. A reading knowledge of Latin is essential.

#### ENGLISH HISTORY

Professor F. G. MARCHAM.

61a and b. *English History.* A two-term course, fall and spring terms.

[65. **English Constitutional History since 1485.** Throughout the year. Not given in 1944-45.]

66a. *History of England under the Tudors.* Spring term. Three hours a week.

[67 and 68. *History of England from the Eighteenth Century to Present.* Throughout the year. Three hours a week. Not given in 1944-45.]

69. **Seminary in Tudor and Stuart History.** One or two terms during the year. Study of materials for research in Tudor and Stuart history and some of the leading historical problems of the period.

#### FAR EASTERN HISTORY

Associate Professor KNIGHT BIGGERSTAFF and Miss GUSSIE GASKILL.

[15. **Chinese History.** Throughout the year. Associate Professor BIGGERSTAFF. Not given in 1944-45.]

18a and b. **Modern History of the Far East, 19th and 20th Centuries.** A two-term course, fall and spring terms. Associate Professor BIGGERSTAFF, M W F 8. A study of the political, social, and economic background of international relations in Eastern Asia.

20. **Seminary in Modern Chinese History.** One or two terms during the year. Associate Professor BIGGERSTAFF and Miss GASKILL.

#### MEDIEVAL HISTORY

Professor CARL STEPHENSON.

21. *Medieval History.* Fall term.

[22. **The Rise of the Universities.** First term. T Th 10. Not given in 1944-45.]

[23. **Social and Economic History of the Middle Ages.** Second term. T Th 10. Not given in 1944-45.]

[24. **English Constitutional History to 1485.** First term. T Th 10. Not given in 1944-45.]

26. **Seminary in Medieval History.** One or two terms during the year. Prerequisite, reading knowledge of Latin; German and French desirable. Hours to be arranged.

#### MODERN EUROPEAN HISTORY

Professor C. W. DE KIEWIET and Professor CARL STEPHENSON.

42a. *Modern History, 1600-1850.* Summer term.

[42b. *Recent European History, 1870-1944.* Not given in 1944-45.]

[43. **France in the 17th and 18th Centuries.** Throughout the year. Professor DE KIEWIET. Not given in 1944-45.]

**Seminary in Modern European History.** Professor DE KIEWIET. Hours to be arranged.

#### SOCIOLOGY

##### SOCIOLOGY AND ANTHROPOLOGY; RURAL SOCIOLOGY

Professors W. A. ANDERSON, LOUIS GUTTMAN, SVEND RIEMER, R. L. SHARP, and JOSEPHINE STRODE. [On leave: Professors L. S. COTTRELL, JR., F. F. STEPHAN, and J. L. WOODWARD.]

##### Approved Major and Minor Subjects (key to symbols on p. 42)

Sociology 1, 2, 3, 4

Rural Sociology 1, 2, 3, 4

Anthropology 2, 3, 4

Statistics 2, 3, 4

##### Requirements for the Degree of Ph.D.

*Note.* If the major for the Ph.D. degree lies in either of the first two fields, not more than one of the other two may be selected as a minor.

**General Sociology.** When offered as a major for the Ph.D. degree: (1) a thorough knowledge of the field of sociological theory and its history; (2) a thorough knowledge of the methodology of sociological research; and (3) a detailed knowledge of at least three of the following sub-fields in sociology: criminology, social psychology, population, social pathology, urban sociology, rural sociology, the family, educational sociology, sociology of law, social anthropology, statistics.

When offered as a minor for the Ph.D. degree: a general knowledge of part (1) of the above requirement and a satisfactory knowledge of one or two sub-fields.

**Rural Sociology.** When offered as a major for the Ph.D. degree: (1) a thorough knowledge of the field of sociological theory and its history; (2) a thorough knowledge of the methodology of sociological research; (3) a thorough knowledge of rural sociology and of the research in this field; and (4) a detailed knowledge of at least two of the following sub-fields in sociology: social psychology, population, the

family, educational sociology, social anthropology, urban sociology, social pathology, criminology.

When offered as a minor: a general knowledge of parts 1 and 3 of the above requirement, and a satisfactory knowledge of one or two of the sub-fields under part 4.

Graduate students who desire to major in rural sociology should have had a considerable personal experience with rural life and rural institutions, and a knowledge of sociology, psychology, and economics. Introductory courses in general sociology, rural sociology, and economics are prerequisite to graduate courses.

**Anthropology.** When offered as a minor for the Ph.D. degree, the requirements are substantially the equivalent of the major requirements for the A.M. degree.

**Statistics.** When offered as a minor for the Ph.D. degree: (1) the completion of an approved sequence of courses including a full year in Sociology 172; (2) completion of a research project which demonstrates that the candidate is able to select methods appropriate to the problem and to employ advanced statistical methods.

#### *Requirements for the Degree of A.M. or M.S.*

**General Sociology and Rural Sociology.** Graduate students offering General Sociology or Rural Sociology as a major or minor for the master's degree should consult the professors concerned to ascertain the exact requirements. In general, the major requirements for the master's degree are substantially the equivalent of the minor requirements for the Ph.D. degree.

**Anthropology.** When offered as a major: (1) a general knowledge of the factual, theoretical, and methodological contributions of anthropology to the historical and comparative study of man and his behavior; (2) a more detailed knowledge of the field of cultural anthropology with special emphasis upon ethnology, including the archaeology and ethnography of some one continental area, and social anthropology, including the analysis and comparison of particular cultures. When offered as a minor: Part (1) of above requirement.

**Statistics.** When offered as a major, the requirements are the same as for the minor of the Ph.D. degree. When offered as a minor, either part (1) or part (2) of the requirements for the Ph.D. degree.

The following courses are offered in the department of Sociology and Anthropology (SA) and Rural Sociology (RS) as indicated:

#### GENERAL SOCIOLOGY

SA2. *Introduction to Sociology.* Summer term, to be repeated in fall term. Credit three hours.

RS1. *General Sociology.* Fall, to be repeated in the spring term. Credit three hours.

SA3. *Man and Culture.* Spring term. Credit three hours. Associate Professor SHARP. M W F 10. McGraw 201.

SA6. *Introduction to Social Research.* Fall term. Credit three hours. Open to sophomores, juniors, and seniors. Assistant Professor RIEMER. M W F 11. McGraw 201.

SA7. *Introduction to Statistics.* Spring term. Credit three hours. Open to sophomores, juniors, and seniors; enrollment limited to fifty. Assistant Professor GUTTMAN. M W F 11. McGraw 201.

SA10. *The Family.* Spring term. Credit three hours. Assistant Professor RIEMER. T Th S 11. McGraw 201.

SA20. *Social Pathology.* Summer term. Credit three hours. Mr. NOLAND. T Th S 11. McGraw 201.

SA21. **Criminology.** Fall term. Credit three hours. Assistant Professor RIEMER. A study of the various factors making for law violation and of society's methods for dealing with the criminal and the juvenile delinquent.



**Social Psychology.** A two-term course, fall and spring terms. Credit three hours a term. Prerequisite, Sociology 1, Sociology 2, Social Science B, or permission of the instructor. Assistant Professor WHITE. Fee for materials, \$1 each term.

The first term is devoted to the study of the human personality, its development, functioning, and social adjustment. Detailed case studies are used. The second term is devoted to the study of the psychological processes in collective behavior: group solidarity and disintegration, public opinion, race prejudice, class conflict, nationalism, war, etc. The course is designed for students interested in the applied fields of social work, clinical and personnel work, political psychology and public opinion as well as for those interested in teaching and research in the psychological and social sciences. Terms may be elected separately.

**SA40. Population Problems.** Fall term. Credit three hours. Mr. NOLAND. T Th S 11. McGraw 201.

Population growth, distribution, and migration; the problem of population quality; problems of race relations; population changes resulting from the war.

**SA41. Urban Society.** Fall term. Credit three hours. Prerequisite, Sociology 2, Social Science B, or equivalent. Assistant Professor RIEMER.

A study of the city as a social organization. History and present patterns of city development. Urban attitudes and customs.

**SA42. Social Planning.** Spring term. Credit three hours. Prerequisite, consent of the instructor. Assistant Professor RIEMER.

Sociological aspects of home, neighborhood, city, and regional planning.

**SA71. Methods of Statistical Analysis.** A two-term course, fall and spring terms. Credit four hours a term. Prerequisites: for the first term, Mathematics 65a, 30, or equivalent, or enrollment therein; for the second term, Mathematics 65b or equivalent, or enrollment therein. Assistant Professor GUTTMAN.

The analysis of frequency distributions of qualitative and quantitative variables: graphic representation, averages, dispersion, sampling and tests of significance, analysis of variance, regression, correlation, elementary multivariate analysis—including the problem of index numbers in economics and of scale construction in sociology and psychology.

**SA110. Seminar: Research in the Family.** Spring term. Credit two hours. Assistant Professor RIEMER.

[SA130. **Seminar: Research in Social Psychology.** Fall term. Credit two hours. Professor COTTRELL. Not given in 1944-45. See Psychology 122.]

**SA142. Seminar: Social Aspects of Housing.** Fall term. Credit two hours. Assistant Professor RIEMER.

**SA172. Seminar: Advanced Statistical Methods.** A two-term course, fall and spring terms. Credit two hours a term. Prerequisite, course 71 or equivalent. Assistant Professor GUTTMAN.

The topic or topics for the seminar will be decided by a consensus of the students. The theory of statistical inference (fundamental sampling problems), multiple factor analysis, reliability and validity of scales, the theory of statistical prediction, and other topics are among those that might be chosen.

**RS207. Sociological Theory.** A two-term course, fall and spring terms. Credit three hours a term. Alternates with course RS208. Given in alternate years. Prerequisite, consent of the instructor. Professor ANDERSON. T Th S 9. Warren 302.

A course devoted to the critical analysis of sociological theories from the time of Auguste Comte to those of present-day sociologists.

[RS208. **Systematic Sociology.** A two-term course, fall and spring terms. Credit three hours a term. Given in alternate years. Professor ANDERSON. Not given in 1944-45.]

[RS209. **Seminar.** Spring term. Credit two hours. Given in alternate years. Not given in 1944-45.]

## ANTHROPOLOGY

SA60. **Social Anthropology.** A two-term course, fall and spring terms. Credit three hours a term. Associate Professor SHARP. M W F 12. McGraw 201.

Problems in the comparative and historical study of cultures, both primitive and complex; environments and technologies; social structures, familial, political, economic, religious, and associational; ritual and symbolic behavior; culture and personality; cultural interests and the problems of divergent interests within and between cultures.

SA64. **Cultures of Asia.** Fall term. Credit three hours. Prerequisite, consent of the instructor. Associate Professor SHARP. M W F 10. McGraw 201.

A study of the cultures or representative ethnic groups in eastern Asia, including India and Indonesia, their origins, relationships with each other, and reactions to Western Civilization.

[SA65. *The American Indian.* Spring term. Credit three hours. Prerequisite, consent of the instructor. Associate Professor SHARP. Not given in 1944-45.]

SA68. *Physical Anthropology and Human Evolution.* Spring term. Credit three hours. Professor PAPEZ and instructors. M W F 11. (See Zoology 223).

SA160. **Seminar in Anthropology.** Throughout the year. Hours and credit to be arranged. Prerequisite, consent of the instructor. Associate Professor SHARP.

## RURAL SOCIOLOGY

RS1. *General Sociology.* Fall, to be repeated in the spring term. Three hours a week. Laboratory fee, \$1.

RS12. *Rural Sociology.* Fall term. Credit four hours. Laboratory fee, \$1.

RS111. **Rural Community Organization.** Spring term. Credit three hours. Prerequisite, courses 1 and 12 or the permission of the instructor. Lectures and discussions, T Th S 10. Warren 302. Professor \_\_\_\_\_.

The application of sociology to the practical problems of community organization. The course covers three main divisions: the use of community organization as a tool for guiding social change; a critical study of New York State rural-community organizations; methods of making organizations effective through developing rural leadership, analyzing community needs, building community programs, and coordinating programs.

RS112. *Rural Recreation.* Spring term. Credit three hours.

RS123. *Practice in Social Work Agencies.* Fall and spring terms.

RS124. **Social Case Work I.** Fall term. Credit three hours. Prerequisite, course 1, one course in psychology, and Sociology 10, or equivalents. M W F 9. Warren 340. Assistant Professor STRODE.

Introduction to the history, principles and practice of social case work. Discussion and analysis of case studies. Fee for materials, \$1.

RS125. **Social Case Work II.** Spring term. Credit three hours. Prerequisite, course 124. M W F 9. Warren 340. Assistant Professor STRODE. Laboratory fee, \$1.

Study of case-work problems and procedures. Analysis of rural case studies in the fields of old age assistance, child welfare, youth adjustment, public health, family welfare, and rehabilitation of the handicapped. Fee for materials, \$1.

RS126. **Skills in Case Work.** Fall term. Credit three hours. Prerequisite, course 124. M W F 8. Warren 340. Assistant Professor STRODE.

Analysis of the skills involved in the case-work process. Special projects arranged to demonstrate their functioning and to give students facility in their use.

RS132. **Rural Leadership.** Spring term. Credit two hours. Prerequisite, course 1 and permission of instructor. Th 2. Warren 302. Professor \_\_\_\_\_.

A seminar course in which leadership is studied from both sociological and psychological points of view.

RS133. **Group Leadership.** Spring term. Credit three hours. M W 12, and hour to be arranged. Warren 302. Extension Assistant Professor DUTHIE.

A consideration of the factors involved in group formation, the relationships

of the leader to the group, and the group members to each other. The place of the program in group work and the process of program formation are described, with special reference to work with 4-H clubs, scouts, and juvenile groups.

[RS211. **The Rural Community.** Fall term. Credit two hours. Given in alternate years. Prerequisite, courses 1 and 12 or their equivalent. Professor ————. Not given in 1944-45.]

A study of the historical development of the rural community; a comparative study of types of rural communities; the rural community as a sociological group and its place in society; methods of community development and organization.

RS212. **Rural Sociology.** Fall term. Credit four hours. Prerequisite, course 1. Lectures, discussions, and special reports. This is the same as course 12, with a one-hour discussion period for graduate students only. T Th S 11, and one hour to be arranged. Warren 325. Professor ————.

A study of the groups, organizations, and institutions found in rural society, their structure and function, and a consideration of means for the improvement of rural social organization.

RS213. **Research in Rural Social Organization.** Fall, to be repeated in spring term. Hours and credits to be arranged. Professor ANDERSON.

RS217. **Seminar in the History of Research in Rural Sociology.** Spring term. Credit two hours. Hours to be arranged. Given in alternate years. Professor ANDERSON.

## ANIMAL SCIENCES

NOTE—*Laboratory space is limited and is often overtaxed, especially in courses which admit both graduate students and undergraduates. Graduate students who desire to enroll in such courses are warned to make application for space well in advance of the beginning of instruction. This holds particularly of the second term, since the College of Agriculture holds its preregistration for undergraduates in January. Failure to arrange for laboratory space in advance will probably result in exclusion from courses.*

Graduate work in Animal Sciences at Cornell University is distributed through many Departments in the Colleges of Agriculture, Arts and Sciences, and Veterinary Medicine. In this *Announcement* little cognizance is taken of college or departmental organization. The various fields of study in which students may elect to pursue their work, for the Master's or Doctor's degree are listed alphabetically. After selecting his major field the student should consult the professor in charge (who may become chairman of his special committee) as to the most appropriate minor field or fields. The requirements in each field depend largely on the previous training of the student, and the professor in charge will outline the courses of study and the nature of the thesis or essay that will be required. In each case, however, a candidate for an advanced degree will be expected to have had adequate undergraduate training in the fields in which he plans to specialize.

The laboratory and field equipment and the library facilities available to graduate students in the Animal Sciences at Cornell are those of a major university where the members of the faculty are engaged in research. Each department has its special facilities in keeping with the nature of the research undertaken, and all enjoy a large central library as well as smaller departmental libraries. Since so many departments and buildings on the campus are involved, attention is called in the alphabetical arrangement to the location of the main office of each field of work.

In some fields, work during the summer, either in the Summer Session or under Personal Direction, is permitted.

In certain fields there are a limited number of temporary fellowships for special work. In the general field of Animal Biology there is one fellowship with a stipend of \$400 and a scholarship with a stipend of \$200, each of which carries free tuition. One of the Henry Strong Denison Fellowships in Agriculture is awarded in the field of animal sciences. This fellowship has a stipend of \$1,000, but does not carry free tuition. The fellowships and the scholarship are awarded annually.

In the Department of Psychology the Sage Fellowship is usually awarded to a candidate who has completed at least two years of graduate study; the Sage Scholarship to first- or second-year graduates.

Approved major and minor subjects are listed under the respective fields; the key to the numbers will be found on page 42.

### ANIMAL BREEDING

Rice Hall; *Professors* F. B. HUTT, S. A. ASDELL, G. O. HALL, A. L. ROMANOFF, G. W. SALISBURY, J. H. BRUCKNER.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Animal Breeding 1, 2, 3, 4

Before entering upon graduate work the student should have had courses in general biology or zoology, comparative anatomy, animal or human physiology, organic and inorganic chemistry. For students in the Department of Poultry Husbandry some training or experience in that field is necessary.

The following courses are offered in the Departments of Animal Husbandry (A.H.), Poultry Husbandry (P.H.), and Plant Breeding (P.B.), as indicated. Students are expected to take certain courses in animal physiology, embryology,



cytology, and histology, and are usually advised to select at least one of these subjects for their minor requirements.

P.H. 20. *Poultry Breeds, Breeding, and Judging*. First term. Credit three hours.

P.H. 30. *Poultry Incubation and Brooding*. Second term. Credit two hours.

A.H. 20. *Animal Breeding*. First term. Two lectures and one laboratory a week.

P.B. 101. *Genetics*. Fall term. Credit four hours.

P.B. 201. **Advanced Genetics**. Spring term. Credit three hours. Prerequisites Plant Breeding 101 and Botany 124. Assistant Professor CUSHING. M F 8-10. Plant Science 146. Laboratory work to be arranged. Laboratory fee, \$3; deposit, \$2.

Group discussions of advanced principles of genetics, with special attention to methods of analysis as illustrated in problems on both hypothetical and experimental data. Laboratory studies on the artificial production of mutations in *Drosophila* and some plants, with as complete a genetic analysis of these as time permits.

P.B. 211. **Statistical Methods of Analysis**. Fall term. Credit two hours. Associate Professor LIVERMORE. Th 1:40-4. Plant Science 233. Laboratory fee, \$2.

A discussion of statistical methods for the study of variation, correlation, curve fitting, experimental error, the analysis of variance and covariance; and the application of these methods to problems in biology and related fields.

[A.H. 120. **Problems in Animal Breeding**. Fall term. Prerequisite, Animal Husbandry 20 or Plant Breeding 101. Associate Professor SALISBURY. T Th 11. Wing E. Given in alternate years, not in 1944-45.]

A consideration of the problems involved in the improvement of the larger farm animals and the application of genetics in their solution.

A.H. 125. **Endocrinology, Reproduction, and Lactation**. Spring term. Prerequisite, a course in human or veterinary physiology. Credit two hours. Professor ASDELL. M W 10. Wing A.

A general course in endocrinology, with more detailed consideration of the endocrine processes involved in reproduction and lactation.

A.H. 126. **Problems in Animal Physiology**. Fall term. Registration by permission. Professor ASDELL. Times to be arranged. Given in alternate years.

Assigned reading and conferences on growth, reproduction, and lactation in mammals.

[P.H. 120. **Poultry Genetics**. Spring term. Credit two hours. Prerequisites, Zoology 1, Plant Breeding 101, and permission of the instructor. Professor HUTT. W F 8. Given in alternate years, not given in 1944-45.]

Inheritance in domestic birds, the application of genetic principles to poultry breeding, disease resistance, hybrid vigor, cytology, sex and secondary sex characters.

P.H. 220. **Animal Genetics**. Fall term. Prerequisites, Plant Breeding 101 and permission of the instructor. Professor HUTT. Not given every year and not unless five or more students wish to take the course.

Assigned readings and conferences on inbreeding, hybridization, disease resistance, lethal genes, genetic sterility, sex, heredity in laboratory animals, domestic animals and man, sire indices, and other topics. Designed to acquaint the student with the literature and methods of research in animal genetics.

[P.H. 229. **Seminar in Animal Breeding**. Professors HUTT, ASDELL, and staff. Not given in 1944-45.]

Discussion of current literature and special topics of interest to workers in this field.

#### ANIMAL NUTRITION

Dairy Building; Professors L. A. MAYNARD, L. C. NORRIS, S. A. ASDELL, F. B. MORRISON, G. F. HEUSER, W. A. ADOLPH, L. L. BARNES, J. K. LOOSLI, and G. H. ELLIS.

## Approved Major and Minor Subjects (key to symbols on p. 42)

## Animal Nutrition 1, 2, 3, 4

(See also Foods and Nutrition 1, 2, 3, 4; Martha Van Rensselaer Hall, *Professors HELEN MONSCH, CATHERINE PERSONIUS, MARION PFUND, HAZEL HAUCK, FAITH FENTON, MILLICENT HATHAWAY, GRACE STEININGER, CHARLOTTE YOUNG, L. A. MAYNARD, and J. K. LOOSLI, under Home Economics, page 175.*)

In order to enter upon graduate study in animal nutrition as a major field the student should have had courses in general biology or zoology, introductory chemistry, analytical chemistry, organic chemistry, human or animal physiology, physics, and animal breeding or genetics. In the course of their graduate study candidates for the doctor's degree are expected to acquire training in biochemistry, physiology, histology, physical chemistry, and biometry, and are generally advised to select one of these fields as a minor.

The following courses are offered in the departments of Animal Husbandry (A.H.) and Poultry Husbandry (P.H.), as indicated:

A.H. 10. *Livestock Feeding*. First or second term. Three lectures and one laboratory period a week.

P.H. 110. *Poultry Nutrition*. Second term. Two lectures and one laboratory period a week.

A.H. 110. *Principles of Nutrition*. Fall term. Credit 3 hours. Prerequisites, a course in physiology and in organic chemistry. Professor MAYNARD. Lectures, M W F 10. Wing B.

The chemistry and physiology of nutrition and the nutritive requirements for growth, reproduction, lactation, and other body functions.

A.H. 111. *Laboratory Work in Nutrition*. Fall term. Credit 3 hours. Must be preceded by or accompanied by course 110. Registration by permission. Professor ADOLPH. M W F 1:40-4. Dairy Industry Building 160. Laboratory fee, \$10; breakage deposit, \$5.

This course is designed to familiarize the student with the application of chemical methods to the solution of fundamental problems of nutrition.

A.H. 213. *Biochemistry of Lactation*. Spring term. Credit one hour. Prerequisite, A.H. 110. Associate Professor LOOSLI. One meeting a week at an hour to be arranged. Given in alternate years.

A discussion of the biochemistry of the processes involved in milk secretion and of the composition of milk as related to diet and to the blood precursors.

P.H. 210. *Experimental Methods in Poultry Nutrition*. Fall term. Credit one hour. Registration by permission. Professor NORRIS. Discussion and laboratory period, W 1:40-5. Rice. Given if desired by a sufficient number of students. Not given every year. Laboratory fee, \$5.

A critical consideration of the domestic fowl as an experimental animal and of the experimental methods used in conducting research projects in poultry nutrition.

[A.H. 214. *Special Topics in Animal Nutrition*. Prerequisites, A.H. 110 and Biochemistry 314. Registration by permission. Professor MAYNARD and Associate Professor LOOSLI. Spring term. Credit one hour. One meeting a week at an hour to be arranged. Given in alternate years, not in 1944-45.]

A presentation and discussion of the knowledge and techniques of special fields of animal nutrition.

A.H. 215. *History of Nutrition*. Fall term. Credit one hour. Prerequisites, A.H. 110 and permission to register. Professor ————. One meeting a week at an hour to be arranged. Dairy Industry Building 160.

Lectures and conferences on the nutrition of animal species from the invertebrates to man, with special emphasis upon the fundamental discoveries in such fields as growth, comparative biochemistry, and physiology that have been synthesized into the modern science of nutrition.

219. *Seminar in Animal Nutrition*. Fall and spring terms. Credit one hour each

term. Registration by permission. Professors MAYNARD, NORRIS, and HAUCK. Weekly conferences, M 4:15. Dairy Industry Building 160.

A consideration of the experimental data on which the principles of animal nutrition are based, and a critical review of current literature.

## BIOLOGICAL CHEMISTRY

Dairy Building; *Professor SUMNER, Assistant Professor GORTNER and Doctor SOMERS.*

## Approved Major and Minor Subjects (key to symbols on p. 42)

Biochemistry 1, 2, 4

314. *Biochemistry for Undergraduates.* Fall term. Three lectures a week.

314a. *Biochemistry Laboratory for Undergraduates.* Fall term. Three afternoons a week.

316. **Food Chemistry and Nutrition.** Fall term. Credit two hours. Primarily for students in the School of Chemical Engineering. Prerequisite, Chemistry 305 and 310 or Chemistry 375. Lecture and discussion periods, T Th 10. Olin Hall. Assistant Professor GORTNER.

A study of the chemistry of the essential nutritive substances, with special emphasis upon the factors affecting their stability, and of the functions of these substances in maintaining optimum nutritional status.

317. **Food Processing and Nutrition.** Spring term. Credit two hours. Prerequisite, course 316 or Animal Husbandry 110. Lecture and discussion periods, T Th 10. Olin Hall. Assistant Professor GORTNER.

A study of the principles of food preservation, of the chief manufacturing processes used in preserving foods and of the effect of food processing upon the maintenance of nutritive value.

320. **Biochemistry, Advanced Lecture Course.** Fall term. Credit three hours. Prerequisites, one term of Chemistry 305 and one term of Chemistry 310, or the equivalent, including introductory courses in qualitative and quantitative analysis. Professor SUMNER. Lectures, M W F 9-10. Wing B.

The biological and physical chemistry of lipids and carbohydrates.

321. **Biochemistry, Advanced Laboratory Course.** Fall term. Credit two hours. Prerequisite, or parallel, course 320 or 322. Professor SUMNER. Laboratory, M W 1:40-4. Dairy Building 175. Laboratory fee, \$15; breakage deposit, \$5. Laboratory experiments with lipids and carbohydrates.

322. **Biochemistry, Advanced Lecture Course.** Spring term. Credit three hours. Prerequisites, one term of Chemistry 305 and one term of Chemistry 310, or the equivalent, including introductory courses in qualitative and quantitative analysis. Professor SUMNER. Lectures, M W F 9-10. Dairy Building 218.

The biological and physical chemistry of proteins, enzymes, and related substances.

323. **Biochemistry, Advanced Laboratory Course.** Spring term. Credit two hours. Prerequisite, or parallel, course 320 or 322. Professor SUMNER. Laboratory, M W 1:40-4. Dairy Building 175. Laboratory fee, \$15; breakage deposit, \$5. Laboratory experiments with proteins and enzymes.

324. **Biochemistry Seminar.** First and second terms. Credit one hour. Registration by permission. Professor SUMNER. Hours to be arranged. Dairy Building. Discussion of new research articles, recent books, and new developments.

325. **Biochemistry, Research Work.** Throughout the year. Prerequisites, courses 321 to 323 inclusive. Professor SUMNER. Laboratory hours to be arranged. Dairy Building 175. Laboratory fee, \$3 a credit hour; breakage deposit, \$3.

330. **Plant Biochemistry.** Spring term. Credit two hours. Given in alternate years. Prerequisite, courses 320 and 322. Time and place to be arranged.

Lectures and discussions of biochemical topics of particular interest to students in plant sciences.

## ENTOMOLOGY AND LIMNOLOGY

Comstock Hall: *Professors* W. E. BLAUVELT, J. C. BRADLEY, R. W. LEIBY, ROBERT MATHESON, C. E. PALM, E. F. PHILLIPS, P. A. READIO, T. R. HANSBERRY, H. H. SCHWARDT, L. B. NORTON, W. A. RAWLINS, and T. C. WATKINS; and *Doctors* F. H. BUTT, W. T. M. FORBES, and R. L. PATTON; at Geneva, *Professors* P. J. CHAPMAN, L. A. CARRUTH, H. GLASGOW, and F. Z. HARTZELL.

## Approved Major and Minor Subjects (key to symbols on p. 42)

Apiculture 1, 2, 3  
 Insect Ecology 1, 2, 3  
 Economic Entomology 1, 2, 3  
 Insect Embryology 1, 2, 3  
 Entomology 4  
 Limnology and Fisheries 1, 2, 3  
 Medical Entomology 1, 2, 3  
 Insect Morphology and Histology 1, 2, 3  
 Parasitology 1, 2, 3  
 Insect Physiology 1, 2, 3  
 Insect Taxonomy 1, 2, 3  
 Insect Toxicology 1, 2, 3

In order to undertake graduate study the student should not only be prepared in the fundamentals of Animal Biology but also have or acquire a foundation in the particular phase of this subject which he intends to pursue and should have a reading knowledge of French and German.

In the summer, members of the staff are prepared to direct the research of graduate students in connection with the Summer Session of Cornell University. Undergraduate courses 12, 15, 30, 41, 122, 131 and either 185 or 16, are accounted a part of a preparation for graduate study in entomology:

- 12. *General Entomology*. Fall term. Credit three hours. Laboratory fee, \$2.50.
- 15. *Wing Venation and Evolution*. Spring term. Credit one hour.
- 30. *Taxonomy of Insects*. Spring term. Credit two hours. Laboratory fee, \$3.
- 122. *Insect Morphology, Anatomy, and Histology*. Fall and spring terms. Credit three hours a term. Laboratory fee, \$3.
- 131. *The Phylogeny and Classification of Insects*. Fall term. Credit four hours.
- 185. *Insect Physiology*. Fall term. Credit three hours.
- 16. *Insect Ecology*. Fall term. Credit three hours. Laboratory fee, \$3.50.
- 41. *General Economic Entomology*. Spring term. Credit three hours. Laboratory fee, \$3.

Course 61 is also recommended for certain phases of the work.

61. *General Beekeeping*. Spring term. Credit three hours. Laboratory fee, \$2.50.

Descriptions of the above courses will be found in the *Announcement of the College of Agriculture*.

16. **Insect Ecology**. Fall term. Credit three hours. Prerequisites, Biology 1 or Zoology 1, and Entomology 12. Professor PALM. Lecture T Th 9. Comstock 145. Laboratory, Th 1:40-4. Comstock 110. Laboratory fee, \$3.50.

A general study of insects in relation to their environment. Attention is given to life-history studies in the field and insectary; the role that insects play in different natural associations; the relations between structure, instinct, habitat, and ways of living. Photographing insects in the field and laboratory is included as a part of the course.

122. **Insect Morphology, Anatomy and Histology**. Fall and Spring term. Credit three hours a term. Prerequisite, course 12. Dr. BUTT. Lecture, T 10. Comstock 145. Laboratory, M W 1:40-4. Comstock 270. Laboratory fee, \$3.

A thorough study of external and internal anatomy of insects. Laboratories will include gross dissection and histological studies of internal organs of representative insects.

123. **Insect Embryology and Post Embryonic Development**. Spring term.



Credit two hours. Prerequisites, courses 12 and 122. Dr. BUTT. Lecture and laboratory, hours by appointment. Comstock 270. Laboratory fee, \$3.

Lectures with assigned reading and reports by students.

124. **Insect Histology. Technique.** Fall term to be repeated in the Spring term. Credit two hours. Prerequisites, courses 12 and 122. Dr. BUTT. Two laboratories a week by appointment. Comstock 265. Laboratory fee \$3.

The technique of preparing, sectioning, and mounting insect tissues for study.

241. **Advanced Economic Entomology.** Spring term. Credit three hours. Prerequisite, course 41. Professor READIO. Lecture, M 11. Comstock 145. Laboratories, F 1:40-4 and S 8-10:30.

A course for the student intending to work in the field of economic entomology. The lectures consist of discussions of the principles and methods of insect control; the laboratories consist of practical exercises in the use of materials and methods of insect control in the orchard, vegetable garden, and greenhouse.

[51. **Parasites and Parasitism.** Spring term. Credit two hours. Prerequisite, Biology 1 or Zoology 1. Professor MATHESON. Lecture, Th 9. Comstock 245. Practical exercises, Th or F 1:40-4. Comstock 200. Laboratory fee \$2.

A consideration of the origin and biological significance of parasitism, and of the structure, life, and economic relations of representative parasites. Not given in 1944-45.]

52. **Medical Entomology.** Spring term. Credit two or three hours. Prerequisite, Zoology 1 or Biology 1. Lecture, Th 9. Comstock 245. Laboratory, Th or F 1:40-4. One extra laboratory period a week for three hours credit. Comstock 200. Professor MATHESON.

This course deals with insects and other arthropods that are the causative agents of disease in man and animals, or are the vectors, or intermediate hosts, of disease-producing organisms. Laboratory fee, \$2 or \$3.

261. **Advanced Beekeeping.** Fall term to be repeated in the Spring term. Credit four hours a term. Professor PHILLIPS. M F 11-12:50. Comstock 17.

A technical course covering investigations, especially those of a scientific character, in all phases of apiculture. Special consideration is given to the study of beekeeping regions, with particular reference to conditions in New York.

Designed for advanced students preparing to teach or to do research in apiculture.

118. **The Techniques of Biological Literature.** Fall term. Credit three hours. Professor BRADLEY. Lectures, M F 11. Comstock 300. Library work by assignment.

A critical study of the biologist's works of reference. Practice in the use of generic and specific indices and bibliographies, and in the preparation of the latter; methods of preparing technical papers for publication; zoological nomenclature. This course, of a technical nature, is intended to aid students specializing in zoology or entomology in their contact with literature.

131. **The Phylogeny and Classification of Insects.** Fall term. Credit four hours. Prerequisites, Entomology 30 and must be preceded or accompanied by Entomology 15 and 122. Professor BRADLEY and Mr. PATE. Lecture, W F 10; Laboratory, T Th 1:40-4. Comstock 300. Laboratory fee, \$3.

Lectures on the evolution and classification of the orders and families of insects, living and extinct, and on their comparative morphology and bionomics; a laboratory study of the taxonomic literature on insects (exclusive of the larger orders of Holometabola) and of the classification and characters of representative genera and species. For continuation see courses 133 and 134.

[133. **Taxonomy of the Holometabola: Coleoptera and Diptera.** Spring term. Credit three hours. Given in alternate years. Not given in 1944-45.]

134. **Taxonomy of the Holometabola: Lepidoptera and Hymenoptera.** Spring term. Credit three hours. Prerequisites, Entomology 30 and 122; should be preceded by Entomology 15, 122, and 131. Professor BRADLEY, Dr. FORBES, and Mr. PATE. Lecture, W 10. Laboratory, T Th 1:40-4. Comstock 300. Laboratory fee, \$3. Given in alternate years.

Lectures on the classification, comparative morphology, and the bionomics of the Lepidoptera and Hymenoptera; a laboratory study of the taxonomic literature and of the classification and characters of representative genera and species of these orders. This course, together with course 133, is a continuation of course 131.

15. *Wing Venation and Evolution*. Fall term. Credit one hour. Must be preceded or accompanied by course 12. Required of all students who plan to take advanced work in entomology. Lecture, T 12, and an additional one and one-half hours during Tuesday morning, by arrangement. Comstock 300. Professor BRADLEY and Mr. PATE.

A laboratory study of evolutionary series as illustrated by progressive modification of the wings of insects.

[185. *Insect Physiology*. Fall term. Credit four hours. Prerequisites, Chemistry 102 or 104, Physics 3 and 4, *Insect Morphology* 122. Dr. PATTON. Lectures, M W 9 Comstock 145. Laboratory, T Th 1:40-4. Comstock 265. Laboratory fee, \$2.50. Not given in 1944-45.]

An introductory course for upperclassmen and graduate students. The physiology of insect systems is discussed and demonstrated by a series of laboratory exercises.

#### RESEARCH

300. *Research*. Throughout the year. Prerequisite, permission to register from the professor under whom the work is to be taken. Comstock Hall. Fee to be determined by the nature of the work.

300a. *Insect Ecology*. Professor PALM.

300b. *Insect Morphology, Histology, and Embryology*. Dr. BUTT.

300c. *Taxonomy*. Professors BRADLEY (all orders), MATHESON (Diptera), HOOD (Thysanoptera), and Dr. FORBES (Lepidoptera).

300d. *Economic Entomology*. Professors MATHESON, READIO and PALM; Assistant Professors LEIBY, SCHWARDT, HANSBERRY, and RAWLINS, WATKINS; at Geneva, Professors GLASGOW, CHAPMAN and HARTZELL.

300e. *Medical Entomology and Parasitology*. Professor MATHESON.

300f. *Apiculture*. Professor PHILLIPS.

300g. *Limnology and Fisheries*. Doctor WEBSTER.

[300h. *Insect Physiology*. Dr. PATTON. Not given in 1944-45.]

300i. *Insect Toxicology*. Assistant Professors HANSBERRY and NORTON.

#### RESEARCH AT THE NEW YORK STATE EXPERIMENT STATION

In addition to the foregoing, graduate research in certain fields of Applied Entomology is also available at Geneva, New York. For further information see pages 191ff.

#### SEMINARIES

*Jugatae*. Fall and Spring terms. M 4:15-5:15. Comstock 145.

The work of an entomological seminar is conducted by the *Jugatae*, an entomological club that meets for a discussion of the results of investigations by its members.

*Seminar in Economic Entomology*. Fall and Spring terms. Required of graduate students in economic entomology. Professor READIO and WATKINS. W 4:15. Comstock 145.

*Seminar in Insect Toxicology*. Spring term. Open to qualified graduate students. Assistant Professors HANSBERRY and NORTON. Th 4:15. Comstock 145.

[*Seminar in Insect Behavior*. Fall term. Professor PHILLIPS. T F 4. Comstock 17. A discussion period for advanced students only.]

## GENERAL BIOLOGY

Roberts Hall: *Associate Professor HOOD.*

**Approved Major and Minor Subjects** (key to symbols on p. 42)

General Biology 4.

1. *General Biology.* Throughout the year. Credit three hours a term. Laboratory fee, \$3.50 a term.

7. *General Biology.* Throughout the year. Prerequisite, at least twelve hours in animal or plant sciences. Associate Professor HOOD. One conference period a week and a minimum of twelve hours in animal or plant sciences to be arranged.

For graduate students whose major field is outside of animal or plant sciences and who wish to obtain a more general knowledge of biological science than that offered in the various restricted fields. The conferences will deal with the unification of biological knowledge, discussion of theories and recent advances. Students who expect to teach in other fields may find the course useful in rounding out a cultural background.

## FISH CULTURE

Comstock Hall: *Doctor WEBSTER.*

Fish Culture 1, 2, 3, 4 (See under LIMNOLOGY AND FISHERIES, below)

## LIMNOLOGY AND FISHERIES

Comstock Hall: *Doctor WEBSTER.*

**Approved Major and Minor Subjects** (key to symbols on p. 42)

Fisheries 1, 2, 4

Limnology 1, 2, 4

The courses offered in this field require a certain background in other subjects. A student preparing to major in fresh-water biology or fisheries after graduation will find the following sequence of courses helpful: First year, Zoology 1; second year, Botany 1, Zoology 8 and 16, and Entomology 12; third year, Entomology 32, 171, and 173 and 174; fourth year, Entomology 172, Botany 115. Students are urged to obtain a grounding in Statistics; and Zoology 22 is recommended before graduation.

171. *Limnology.* Spring term. Credit three hours.

173. *Fishery Biology.* Fall term. Credit three or four hours.

[174. *Fish Culture.* Spring term. Credit three hours. Not given in 1944-45.]  
Descriptions of the courses mentioned above will be found in the *Announcement of the College of Agriculture.*

[172. *Advanced Limnology.* Fall term. Credit three hours. Prerequisite, permission to register. Lectures Th 11. Comstock 145. Laboratory, F 1:40-4, S one period by appointment. Comstock 110. Laboratory fee, \$7.50. Not given in 1944-45.]

A qualitative and quantitative treatment of the problem of the productivity of inland waters.

300g. *Research in Limnology and Fisheries.* Fall and Spring terms. Should be preceded or accompanied by courses 173, 174, and 171. Dr. WEBSTER. Hours, credit, and laboratory fees to be arranged.

Facilities are provided for laboratory and field work and conferences in problems related to fresh-water biology and fisheries.

[*Seminar in Fisheries.* Fall and spring terms. Time and place to be arranged. Not given in 1944-45.]

For the discussion by qualified students of the principles of fishery management.

## PSYCHOLOGY

Morrill Hall; *Professors* H. P. WELD, K. M. DALLENBACH, H. S. LIDDELL, R. M. OGDEN, A. L. WINSOR, F. S. FREEMAN, G. L. KREEZER, O. D. ANDERSON, T. A. RYAN, and R. K. WHITE and *Doctor* F. L. MARCUSE.

**Approved Major and Minor Subjects** (key to symbols on p. 42)

Applied Psychology 1, 2, 3, 4  
 Experimental Psychology 1, 2, 3, 4  
 History of Psychology 3  
 Physiological Psychology 1, 2, 3, 4  
 Psychobiology 1, 2, 3, 4  
 Psychology 1, 2, 3, 4  
 Social Psychology 1, 2, 3, 4  
 Systematic Psychology 3

The research department possesses a laboratory in Morrill Hall with rooms for general and individual research, for small animal research, for apparatus, for the library of periodical literature, and for meetings of the seminars. This laboratory also includes a workshop for the construction and assemblage of apparatus, and it contains the editorial offices of *The American Journal of Psychology*.

At the Cornell Behavior Farm, a farm of 100 acres near Ithaca, laboratories are equipped for investigations in neuro-endocrinology, the conditioned reflex, and the experimental neurosis.

1. *Elementary Psychology*. Credit three hours.
2. *The Special Psychologies*. Credit three hours.
3. *Introductory Laboratory*. Credit three hours.
4. *Intermediate Course in Psychology*. Credit three hours.
5. *Perception*. Credit three hours.
6. *Memory and Thinking*. Credit three hours.
7. *Animal Psychology*. Credit three hours.
- Social Psychology*. Credit three hours.
11. *Physiological Psychology*. Credit three hours.
12. *Legal Psychology*. Credit three hours.
13. *History of Experimental Psychology*. Credit three hours.
14. *Contemporary Psychology*. Credit three hours.
15. *Psychology of the Abnormal*. Credit three hours.
19. **Minor Research Problems**. Either for a single term or throughout the year. Credit three hours a term. Prerequisite, courses 1, 3, and the consent of the instructor. Professors WELD and LIDDELL, Assistant Professors ANDERSON, RYAN and WHITE. Hours to be arranged. Morrill, Psychological Laboratory.
- Experimental research or informal study in general, abnormal, animal, applied, physiological, and social psychology. The course is designed for students majoring in psychology who are prepared to undertake original investigation.
20. **The Correlational and Psychophysical Methods**. Second term. Credit three hours. Assistant Professor RYAN. M W F 2-4. Morrill, Psychological Laboratory.
22. *Genetic Psychology*. Credit three hours.
31. *Endocrinology and Behavior*. Credit three hours.
- [116. **Reading of German Psychology**. Not given in 1944-45.]  
 The accurate reading and translation of psychological texts and articles. The course presupposes a knowledge of grammar.
121. **Technique of Experimentation**. Fall term. Credit three hours. Professor WELD. T Th 2. Morrill, Psychological Laboratory.  
 A study of the principles and processes of psychological research.
129. **Seminary in Psychology**. Spring term. Professor WELD. Hours to be arranged. Morrill, Seminary Room.
132. **Neurotic Behavior in Animals and Man**. Spring term. Credit three hours. Professor LIDDELL. T Th S 11. Morrill, Seminary Room.



A review of recent experimental studies of the adjustment of the animal to its environment with particular reference to the conditioning of the various physiological functions. Consideration will be given to the limits of psychobiological adjustment in animals and man. The bearing of animal conditioning on the problem of war neuroses will be stressed. The class will participate in conditioned reflex experiments at the Cornell Behavior Farm.

**133. Informal Study and Research in Psychobiology.** Spring term. Hours to be arranged. Professor LIDDELL and Assistant Professor ANDERSON. Cornell Behavior Farm.

Students may participate in the investigations in progress at the Cornell Behavior Farm.

#### EDUCATIONAL PSYCHOLOGY

**Mental Measurements.** (Education 7) Fall term. Credit three hours. Prerequisite, a course in general or educational psychology, or human growth and development. Professor FREEMAN. T Th S 9. Goldwin Smith 234.

Development of the individual and group tests of intelligence and personality; principles underlying their construction and use; their use in schools, psychological clinics, and in other fields. The nature of mental abilities. The use of educational tests. Demonstrations in administering and interpreting tests.

**Experimental Educational Psychology.** (Education 8) Fall and spring terms. Credit and hours to be arranged. Consent of the instructor is required. Education 7 or its equivalent should normally precede this course. Professor FREEMAN.

The application of psychological and statistical methods to problems in education.

**Individual Differences.** (Education 18) Spring term. Credit three hours. Prerequisite, a course in general or educational psychology, or human growth and development. Professor FREEMAN. T Th 2-3:15 and a third hour to be arranged. Goldwin Smith 236.

The nature, causes, and implications of individual differences in abilities and behavior. Study and observations of atypical groups.

*Human Growth and Development.* (An Interdepartmental Course). Course A. Summer and Fall terms. Credit three hours; Prerequisite, a laboratory science preferably general biology or introductory zoology. Professor PAPEZ. Course B. Fall and Spring terms. Credit three hours; Prerequisite, Course A. Professor FREEMAN.

#### APPLIED PSYCHOLOGY

**50. Psychology of Inefficiency.** Fall term. Credit three hours. Prerequisite, Psychology I. Assistant Professor RYAN. T Th S 10.

A survey of the external and internal factors which affect the efficiency, speed, and accuracy of human work. Consideration will be given to sedentary or "mental" work as well as to physical work, in relation to fatigue, monotony, rest, sleep, and the effects of noise, light, temperature, narcotics, incentives, and social factors.

**51. Psychotechnology in Business and Industry.** Spring term. Credit three hours. Prerequisite, Psychology I. Assistant Professor RYAN, T Th S 10.

A study of experimental and statistical analyses of psychological problems in vocational selection, industrial production, personnel, advertising, selling, and market research.

**Personnel Administration.** (Hotel Administration 119) Spring term. Credit three hours. Prerequisite, Psychology I. Professor WINSOR. M W F 8. Plant Science 233.

**Seminar in Personnel Administration.** (Hotel Administration 219) Spring term. Credit two hours. Prerequisite, course 18. Open to qualified seniors and graduate students. Professor WINSOR. Th 4:15-6. Warren 340.

## ZOOLOGY

Professors H. B. ADELMANN, A. A. ALLEN, W. R. EADIE, P. W. GILBERT, PAUL KELLOGG, S. L. LEONARD, ROBERT MATHESON, J. W. PAPEZ, A. H. WRIGHT, and B. P. YOUNG; and *Doctors* AMY G. MEKEEL, and ANNA DUNHAM.

## Approved Major and Minor Subjects (key to symbols on p. 42)

Zoology 1, 2, 4  
 Invertebrate Zoology 1, 2, 3, 4  
 Vertebrate Zoology 1, 2, 3, 4  
 Neurology 1, 2, 3, 4  
 Ecology 1, 2, 3, 4  
 Histology and Embryology 1, 2, 3, 4  
 Ornithology 1, 2, 3, 4  
 Endocrinology 1, 2, 3, 4

In order to undertake graduate study the student not only should be prepared in the fundamentals of Zoology but also should have or acquire a foundation in the particular phase of this subject which he intends to pursue. The members of the staff are prepared to direct the research work of graduate students in connection with the Summer Session of Cornell University.

Attention is also directed to the fields of study and courses offered in the Department of Entomology (pp. 80 to 82.)

1. *Introductory Zoology*. Throughout the year. Three hours a week. Laboratory fee, \$3.

11. *Comparative Anatomy*. Through the year. Three hours a week.

3. *The Conservation of Wild Life*. Fall term. Credit two hours.

8. *Elementary Taxonomy and Natural History of Vertebrates*. Fall and Spring term. Credit three hours each term. Laboratory fee, \$4.

2. *Game Management*. Credit three hours.

9. *General Ornithology*. Credit three hours. One lecture and two laboratory periods a week. Laboratory fee, \$3.

131. *Techniques in Ornithology*. Credit three hours. Laboratory fee, \$3.

106. *Histology (Veterinary)*. Throughout the year. Four hours a week.

109. *Embryology (Veterinary)*. Two hours a week.

101. *The Tissues: Histology and Histogenesis*. Fall term. Four hours a week.

221. *Structure of the Human Body*. Fall term. Credit three hours.

223. *Physical Anthropology and Human Evolution*. Summer term. Credit three hours.

## HISTOLOGY AND EMBRYOLOGY

Stimson Hall; Professor H. B. ADELMANN.

Advanced work in histology and embryology is of necessity individual. Advanced students are sometimes recommended to take some one or more of the general courses in the subject. As preliminary to graduate work, students are expected to have had the courses in the tissues and one of the following: the organs, special histology, embryology. A year's work in zoology, biology, anatomy, or physiology may with advantage precede advanced work in this subject.

102. **The Organs: Histology and Development**. Fall term. Credit four hours. Prerequisite, course 101 or its equivalent. Professor ADELMANN and assistants. Lectures, W F 10. Stimson G-1. Laboratory, W F 1:40-4. Stimson 206. Laboratory fee, \$6.

A continuation of course 101. Courses 101 and 102 together give the fundamental facts of the microscopic structure and development of the body. There is also offered opportunity to gain knowledge of technique in the fixing, embedding, and sectioning of selected organs.

104. **Vertebrate Embryology**. Summer and spring terms. Credit five hours. Prerequisite, Biology 1 or Zoology 1. Professor ADELMANN and assistants. Lectures, T Th S 11. Stimson G-1. Laboratory, Section I, T Th 8-11; Section II, T Th 1:40-4. Stimson 206. Laboratory fee, \$6.50.

An introduction to general vertebrate embryology designed to provide a basis for the appreciation of biological problems. The material is treated comparatively

with particular emphasis on the development of the amphibian, the bird, and the mammal. A few invertebrate forms are used where desirable for illustration.

**107. Advanced Histology and Embryology.** Throughout the year. Credit three hours or more a term. Prerequisite, courses 101 and 102 or 104, or equivalent courses. Professor ADELMANN and instructor. Day and hours to be arranged. Stimson 206.

[115. **Experimental Embryology.** Credit two hours. Professor ADELMANN. The course will be conducted as a seminar. Lectures with reports by students dealing with the experimental analysis of developmental processes. Hours to be arranged. Stimson. Not given in 1944-45.]

**108. Seminar.** First and second terms. One hour each week. Time to be arranged.

For the discussion of problems in the field of histology, or embryology; for the review of current literature; for the presentation of original work by the members of the staff and those doing advanced work in the department.

Undergraduate course 101 may often be attended with advantage by graduate students. Satisfactory work in this and in 102 and 104 obviates the requirement of the Qualifying Examination.

#### ENDOCRINOLOGY

Stimson Hall; *Professor S. L. LEONARD.*

**140. Experimental Endocrinology.** Spring term. Credit two or three hours. Prerequisite, Zoology 1 or General Biology and Chemistry. Associate Professor LEONARD. Open to graduate students only. Lectures 2 hours. Stimson G-308. Laboratory 1 hour for a limited number of students. Hours to be arranged. Laboratory fee, \$4.50.

Lectures on comparative gross and microscopic anatomy of endocrine glands, and their physiology in the light of recent researches. The lectures in this course will cover the comparative anatomy (both gross and microscopic) of the vertebrate endocrine glands from the evolutionary and experimental view point. There will also be included the morphological and biochemical effects of the hormones, particularly the interglandular relationships centered around the pituitary gland. The bio-assay method of hormones will be given. The course will serve to prepare a student for research in this field or related fields, and to introduce him to the terminology and literature of the subject.

#### VERTEBRATE TAXONOMY AND ECOLOGY

Stimson Hall; *Professors A. H. WRIGHT and W. R. EADIE.*

**22. Ichthyology.** Credit three hours. Professor WRIGHT and ———. Lectures, T Th 8. Stimson G-25. Laboratory, F 1:40-4 or S 8-10:30. Stimson 225. Laboratory fee, \$4.

In the lectures, special emphasis is laid on the principal phases of fish life; the taxonomy, origin, and evolution of fossil and living groups; geographical distribution; and the literature and institutions of zoology. Laboratory periods are devoted to identifications and field trips. Not given in 1944-45.]

**23. Herpetology.** Fall term. Credit three hours. Professor WRIGHT, and Doctor DUNHAM. Lectures, T Th 8. Stimson G-25 or S 8-10:30. Stimson 225. Laboratory fee, \$4.

Lectures on amphibians and reptiles, their life histories, distribution, and taxonomy. Laboratory periods deal with identification and field trips.

**25. Mammalogy.** Spring term. Credit three hours. Assistant Professor EADIE. Lectures, T Th 8. Stimson G-25. Laboratory, F 1:40-4 or S 8-10:30. Stimson 225. Laboratory fee, \$4.

Discussion of principal phases of mammalian life: origin, distribution, habits, and literature. Laboratory periods are devoted to methods of field collecting, census taking, life history studies, preparation of skins and skeletons, and identification of North American species.

**112. Literature of Economic Zoology, Conservation, and Ecology.** Spring term

Credit one hour. Professor WRIGHT. Assistant Professor EADIE. T 7:30 p.m. Stimson 225. Limited to upperclass students and graduates.

The literature of economic zoology, ecology, limnology, oceanography, and kindred fields; fish and fisheries (for profit and pleasure); amphibians and reptiles, their uses; small and big game (commercial and sport); aquaria; zoological gardens; preserves; game farms; animals in relation to recreation, settlement, forestry, agriculture, and other industries; biologic resources, their exploration, conservation, utilization, and management.

67. **Seminar in Systematic Vertebrate Zoology.** Fall term. Professor WRIGHT. T 7:30 p.m. Stimson 225.

Life-zone plans of North America, 1917-1936. Distribution and origin of life in North America. Zoogeography of the Old World. Animal coloration. Other topics, to be announced.

#### INVERTEBRATE ZOOLOGY

Stimson Hall; *Associate Professor* B. P. YOUNG.

16. **Invertebrate Zoology.** Throughout the year. Credit three hours a term. Prerequisite, course 1 or equivalent. Associate Professor YOUNG. Lecture, W 8, Stimson G-1. Laboratory, T Th 1:40-4. Stimson 116.

Consideration is given to the bionomics, morphology, development, and phylogeny of the invertebrates, and to certain taxonomical and physiological aspects of the major groups. Not given in 1944-45.]

#### NEUROLOGY

Stimson Hall; *Professor* J. W. PAPEZ.

225. **Comparative Neurology.** Fall term. Credit three hours. Prerequisite, nine hours of Animal Biology. Professor PAPEZ. Hours to be arranged. Stimson 316.

A comparative study of the vertebrate nervous system based on dissections of brains of shark and dog, and sections of cat brain stem; of the chief nerve mechanisms that determine the form and structure of the nervous systems, their evolutionary and functional significance. One lecture and two laboratory periods. Laboratory fee, \$6.

226. **Cerebral Mechanisms.** Fall term. Credit three hours. Prerequisite, course 225. Professor PAPEZ. Given if desired by a sufficient number of students. Hours to be arranged. Stimson Hall 316.

A course of study of the cerebrum of lower mammals and the primates with special reference to the subcortical connections and levels, and functional significance of the various levels and cortical regions of the human brain. Laboratory fee, \$3.

#### ORNITHOLOGY

Fernow Hall; *Professors* A. A. ALLEN and P. P. KELLOGG.

Before registering for a major in Ornithology a student must have thorough training in biology, and in the majority of cases must expect to do summer work on his problem.

126. **Advanced Ornithology.** Fall term. Credit three hours. Prerequisite, course 9 or Vertebrate Taxonomy 8. Professor ALLEN. Lecture, W 11. Fernow 122. Laboratory and field work. T Th 1:40-4. Fernow 210. Laboratory fee, \$3.

The structure and classification of birds; geographical distribution; the literature and institutions of ornithology; identification of representative birds of the world. The first part of the term is devoted to field work on the fall migration and the identification of birds in winter plumage. Designed primarily for students specializing in ornithology or animal biology.

136. **Ornithology Seminar.** Throughout the year. M 7-30-9 p.m. Fernow Seminar Room. Required of all graduate students in Ornithology.

#### ZOOLOGY, ALL BRANCHES

400. **Research Problems.** Credit and hours to be arranged. Problems may be undertaken in any phase of zoology but the consent of the instructor concerned is a prerequisite.



## PLANT SCIENCES

NOTE—*Laboratory space is limited and is often overtaxed, especially in courses which admit both graduate students and undergraduates. Graduate students who desire to enroll in such courses are warned to make an application for space well in advance of the beginning of instruction. This holds particularly of the second term, since the College of Agriculture holds its preregistration for undergraduates in January. Failure to arrange for laboratory space in advance will probably result in exclusion from courses.*

### BACTERIOLOGY

Dairy Building; Professors J. M. SHERMAN, OTTO RAHN, C. N. STARK, GEORGES KNAYSI, and I. C. GUNSALUS; at Geneva, Professors R. S. BREED, H. J. CONN, G. J. HUCKER, C. S. PEDERSON, M. W. YALE, and A. W. HOFER.

**Approved Major and Minor Subjects** (key to symbols on p. 42)

Bacteriology 1, 2, 3, 4

(See also Pathogenic Bacteriology 1, 2, 3, 4, Moore Laboratory, Professors W. A. HAGAN, PETER OLAFSON, E. L. BRUNETT, and A. ZEISSIG, under VETERINARY MEDICINE, p. 185)

Before taking up graduate work in bacteriology, it is desirable that the student have general chemistry, qualitative and quantitative analysis, organic chemistry, and introductory courses in the biological sciences.

Formal courses open to undergraduate and graduate students are given in the following subjects:

1. **General Bacteriology.** Fall term. Credit six hours. Prerequisite, Chemistry 101. Professor SHERMAN, Associate Professor GUNSALUS, Assistant Professor NIVEN, and assistants. Lectures, M W F 11. Laboratory practice, M W F 1:40-4. Dairy Industry Building 218 and 301. Laboratory fee, \$15.

An introductory course; a general survey of the field of bacteriology, with the fundamentals essential to further work in the subject.

103. **Applied Bacteriology.** Spring term. Credit six hours. Prerequisite, course 1, quantitative analysis, and organic chemistry. Professor SHERMAN, Associate Professor GUNSALUS, and Assistant Professor NIVEN. Lectures, recitations, and laboratory practice, M W F 1:40-5. Dairy Industry Building 119 and 301. Laboratory fee, \$15.

An advanced course dealing with the important groups of bacteria which are of significance in water, milk, and foods, together with the methods used in the bacteriological analysis and control of these products.

105. **Higher Bacteria and Related Microorganisms.** Fall term. Credit four hours. Prerequisite, course 1. Professor KNAYSI and Mr. BELLAMY. Lectures, recitations, and laboratory practice, T Th 1:40-5. Dairy Industry Building 119 and 323. Laboratory fee, \$15.

A study of the higher bacteria, together with the yeasts and molds that are of especial importance to the bacteriologists.

106. **Soil Microbiology.** (Same as Agronomy 106.) Spring term. Credit three hours. Prerequisite, course 1, Agronomy 1, and Chemistry 201 or its equivalent. Lectures, M W 8. Caldwell 143. Laboratory, W or F 1:40-4. Caldwell 201. Professor J. K. WILSON.

A course in biological soil processes designed primarily for students specializing in soil technology or bacteriology. The laboratory work is supplemented by reports and by abstracts of important papers on the subject. Laboratory fee, \$5.

210. **Physiology of Bacteria.** Fall term. Credit two hours. Prerequisites, course 1 and at least one additional course in bacteriology. Professor RAHN. Lectures, T Th 8. Dairy Building 120.

An advanced course in the physiology of bacteria and the biochemistry of microbial processes.

210a. **Physiology of Bacteria, Laboratory.** Spring term. Credit three hours. Must be preceded or accompanied by course 210. Professor RAHN and assistant. M 11 and M W 1:40-5. Dairy Building. Laboratory fee, \$15.

An advanced laboratory course dealing with the biological principles of growth, fermentation, and death of bacteria.

211. **Taxonomy of Bacteria.** Spring term. Credit two hours. Prerequisites, course 1 and at least one additional course in bacteriology. Professor RAHN. Lectures, W F 11. Dairy Building 120.

An advanced course, dealing with the natural groups and variability of bacteria, with a study of the systems of nomenclature and classification.

212. **Selected Topics in Bacteriology.** A two-term course, fall and spring terms. Credit one hour a term. Professor RAHN. F 8. Dairy Industry Building 120.

213. **Morphology and Cytology of Bacteria.** Fall term. Credit three hours. Professor KNAVS. Lectures, T Th S 9. Dairy Building 119.

The morphology, cytology, and microchemistry of microorganisms.

221. **Seminary.** Throughout the year. Without credit. Required of graduate students specializing in the department. Professor SHERMAN. Hours to be arranged. Dairy Building.

Research problems may be selected in various phases of pure and applied bacteriology; taxonomy; physiology; technique; dairy bacteriology; food bacteriology; water and sanitary bacteriology; industrial fermentations. (For pathogenic bacteriology, see Animal Pathology and Bacteriology; for soil bacteriology, see Agronomy.)

#### RESEARCH AT THE NEW YORK STATE EXPERIMENT STATION

Work in Dairy, Soil, Fermentation, Food, and Systematic Bacteriology is also offered at Geneva. For further information see page 191.

#### BOTANY AND PLANT PHYSIOLOGY

*Professors* LEWIS KNUDSON, A. J. EAMES, L. W. SHARP, O. F. CURTIS, W. C. MUENSCHER, L. C. PETRY, L. F. RANDOLPH, D. G. CLARK, K. C. HAMNER, and R. T. CLAUSEN; at Geneva, *Professors* M. T. MUNN, and W. F. CROSIER.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Botany 2, 4

Cytology, 1, 2, 3, 4

Economic Botany 1, 2, 3, 4

Plant Morphology (including Anatomy) 1, 2, 3, 4

Paleobotany 1, 2, 3, 4

Plant Physiology 1, 2, 3, 4

Plant Taxonomy 1, 2, 3, 4

The laboratories of the department are in the Plant Science Building, one of the buildings of the College of Agriculture, and are well equipped with the necessary apparatus and collections for research. The herbarium contains abundant local and foreign material for taxonomic study.

The very rich flora about Ithaca and its accessibility make the location especially advantageous for all phases of botany, as materials may be easily obtained. Gardens and greenhouses are also available for the growing of experimental material.

The University Library and the library of the College of Agriculture are well equipped with special works and periodicals dealing with all phases of botanical science. Books in more constant use are available in connection with the laboratories.

Seminars are conducted in several of the fields listed above. The purpose of these various seminars is not only to keep abreast of the literature of the subject, but to furnish to the student an opportunity to gain experience in presenting the

results of his own research or in critically evaluating the work of others. Graduate students are expected to attend the seminars dealing with their special fields of work.

As a prerequisite for work in any phase of botany the student will be expected to have a knowledge of the fundamental features of botanical science. For work in paleobotany a knowledge of the fundamental features of both botany and geology is prerequisite.

A fundamental training in botany and chemistry is required of any student who expects to major in plant physiology. If it is not possible to obtain this training before entering upon graduate work at Cornell, then the student will be expected to broaden his knowledge in botany and chemistry after beginning graduate work.

The University conducts a Summer Session in which there is opportunity for graduate study and research in botany. A prospective student contemplating summer work in botany and plant physiology should correspond with the appropriate member of the staff before coming to Ithaca.

A fellowship carrying a stipend of \$400 and a scholarship with a stipend of \$200 are awarded in alternate years to graduate students in Botany. These awards carry exemptions from the payment of tuition. In 1943-44 the scholarship will be awarded. One of the Henry Strong Denison Fellowships in Agriculture is awarded annually in the field of the plant sciences. This fellowship has a stipend of \$1,000, but does not carry free tuition.

#### PLANT PHYSIOLOGY

*Professors* KNUDSON and CURTIS and *Associate Professor* CLARK.

31. *Introductory Plant Physiology*. Fall or Spring term. Credit four hours. Lectures, T Th 10. Plant Science 141. Laboratory, T Th 1:40-4. Assignment to laboratory section must be made at the time of registration. Laboratory fee, \$4; breakage deposit, \$3.

231. *Plant Physiology, Advanced Lecture Course*. A two-term course, fall and spring. Credit three hours a term. Prerequisite, training in botany and chemistry, to be determined in each case by the department. Professors KNUDSON and CURTIS. Lectures, M W F 10. Plant Science 141.

Lectures and discussions on physiological processes of plants and the factors influencing them and the relations of these processes to plant behavior.

232. *Plant Physiology, Advanced Laboratory Course*. A two-term course, fall and spring. Credit three hours a term. Prerequisite or parallel, course 231. Professors KNUDSON and CURTIS and Associate Professor CLARK. Laboratory, M 1:40-4, S 8-12:30. Plant Science 241. Laboratory fee each term, \$10; breakage deposit, \$5.

Principally a quantitative study of various phases of plant physiology. The student will apply chemical, physical, and bacteriological methods in the study of plant physiological processes.

233. *Seminar in Plant Physiology*. Fall and spring terms. Required of graduate students in Plant Physiology. Professors KNUDSON and CURTIS and Associate Professor CLARK. Conference, F 11. Plant Science.

The presentation and discussion of current contributions to plant physiology; reports on the research problems of graduate students and members of the staff.

**Research in Plant Physiology.** Professors KNUDSON and CURTIS, Associate Professor CLARK and Assistant Professor HAMNER.

#### PLANT ANATOMY

*Professors* EAMES and PETRY.

123. *Plant Anatomy*. Fall term. Credit four hours. Prerequisite, course 1 or the equivalent. Dr. BLASER. T 9-12:30; Th S 9-11:30. Lecture to be arranged within these periods. Plant Science 228. Laboratory fee, \$5.

A detailed study of the internal structure of vascular plants with emphasis on determination and interpretation.

**Research in Anatomy.** Professor EAMES.

## CYTOLOGY

*Professors SHARP and RANDOLPH.*

**124. General Cytology.** Fall term. Credit four hours. Prerequisite, Botany 1 or Zoology 1 or equivalent. Professor L. W. SHARP. Lectures, M W 9. Plant Science 143. Laboratory, M W or T Th 10-12:30. Plant Science 219. Assignment to laboratory section must be made at the time of registration. Laboratory fee, \$5.

The principal topics considered are cells and their components, nuclear and cell division, meiosis and fertilization, and the relation of these to problems of development, reproduction, and heredity. Both plant and animal materials are used. Microtechnic is not included.

**224. Advanced Cytology.** Spring term. Credit two hours. Prerequisites, Botany 124, Plant Breeding 101, and permission to register. Professor L. W. SHARP. Lecture, W 9. Plant Science 143. Laboratory and seminar, to be arranged.

An advanced course dealing mainly with recent researches in cytogenetics.

**Research in Cytology.** Professors SHARP and RANDOLPH.

## RESEARCH AT THE NEW YORK STATE EXPERIMENT STATION

Cytological research in relation to cultivated plants is also available at Geneva. For further information see page 192.

## MORPHOLOGY

*Professors EAMES and PETRY.*

(**Comparative Morphology of Fungi.** Given in the Department of Plant Pathology.)

**126. Morphology of Vascular Plants.** Fall and Spring terms. Credit three hours a term. Prerequisites, course 1 or its equivalent, and permission to register; first term prerequisite to second. Professor EAMES. Lecture, F 9. Plant Science 143. Laboratory, W 9-12:30; F 10-12:30. Plant Science 228. Laboratory fee, \$5.

An advanced course in the comparative morphology, life histories, and phylogeny of vascular plants.

**Research in Morphology.** Professors EAMES and PETRY.

## TAXONOMY

*Professors MUENSCHER, EAMES, and Associate Professor CLAUSEN.*

**13. Trees and Shrubs.** Fall term. Credit four hours. Prerequisite, course 1 or its equivalent. Associate Professor CLAUSEN. Lectures, T Th 9. Plant Science 143. Laboratory or field work, T Th 1:40-4. Plant Science 211. Laboratory fee, \$4; Breakage fee, \$5.

The identification of trees and shrubs in summer and in winter conditions. During the first part of the term the work on identification is done largely in the field. The work of the latter part of the term is a study of the classification of woody plants.

**117. Taxonomy of Vascular Plants.** Spring term. Credit four hours. Prerequisite, course 1 or its equivalent. Associate Professor CLAUSEN. Lectures, T Th 9. Plant Science 143. Laboratory, T Th 1:40-4. Plant Science 211. Laboratory fee, \$4; deposit, \$5.

A study of the kinds of seed plants and ferns, their classification into genera, families, and orders, and field work on the local flora. Emphasis is placed on wild plants, but the more commonly cultivated varieties receive some attention. Those desiring advanced work on special groups or problems may follow this with course 171.

**219. Advanced Taxonomy of Vascular Plants.** Fall term. Credit two hours. Prerequisite, course 117 or its equivalent and training in cytology and genetics. Associate Professor CLAUSEN. Lecture, T 11. Practice, Th 11. Plant Science 211.

A course designed particularly for students majoring in taxonomy. The lectures



deal with the three phases of taxonomic study; floristics, experimental taxonomy, and monography. The practice period affords practical experience in taxonomic methods. Laboratory fee, \$1.

**Research in Taxonomy.** Professor EAMES and MUENSCHER and Associate Professor CLAUSEN.

#### RESEARCH AT THE NEW YORK STATE EXPERIMENT STATION

Research in taxonomy of fruits and vegetables is also available at Geneva. For further information see page 192.

#### PALEOBOTANY

*Professors* PETRY and EAMES.

##### Research in Paleobotany.

#### ECONOMIC BOTANY

**55. Weeds and Poisonous Plants.** Fall term. Credit three hours. Prerequisite course 1 or its equivalent. Lecture, F 8. Laboratory, W F 1:40-4. Plant Science 353. Professor MUENSCHER and assistant.

Special emphasis is given to the habits, characteristics, and properties which make weeds and poisonous plants harmful or undesirable, the losses and injury produced by them, and the methods for their prevention, eradication and control. Field and laboratory practice in the identification of common weeds and poisonous plants is included. Laboratory fee, \$3.

**56. Seed Analysis.** Spring term. Credit one hour. Prerequisite Course 1 or its equivalent. Lectures and laboratory, F 1:40-4. Plant Science 353. Professor MUENSCHER and assistant.

A course designed for students in the applied plant science departments and those interested in preparing to be seed analysts. Practice will be given in making purity analyses and germination tests according to standard and official methods and recommendations. Opportunity will be provided for practice in the identification of weed seed impurities and the application of special treatments required for germinating dormant seeds. Laboratory fee, \$1.

**51. Economic Botany.** Fall term. Credit three hours. Lectures, T Th 8, Laboratory, M 1:40-4. Plant Science 353. Professor MUENSCHER and assistant.

A treatment of the source, distribution, cultivation and utilization of the principal economic plants of the world. Special emphasis is given to morphological and ecological characteristics of the crop plants that supply the chief sources of products utilized for foods, beverages, drugs, fibers and shelter. Laboratory fee, \$3.

**115. Aquatic Plants.** Spring term. Credit three hours. Prerequisite, course 1 or its equivalent. Lecture, M 9. Laboratory, M W 1:40-4. Plant Science 353. Professor MUENSCHER.

A study of the taxonomy and ecology of fresh-water plants, beginning with the algae and concluding with the aquatic angiosperms. Laboratory fee, \$4.

#### GENERAL BOTANY

*Professor* PETRY and instructors.

**1. General Botany.** Throughout the year. Two lectures and one laboratory period a week. Laboratory fee \$3.50.

#### OTHER COURSES

[**161. History of Botany.** Second term. No credit. Hours to be arranged. Plant Science 404. Not given in 1944-45.]

A course of lectures given by various members of the staff with the purpose of acquainting advanced students of botany with the historical development of their science.

171. **Special Problems in General Botany, Ecology, Economic Botany, Taxonomy, Morphology, Anatomy, Paleobotany, Cytology, and Physiology.** Throughout the year. Credit not less than two hours a term. Professors KNUDSON, EAMES, SHARP, CURTIS, PETRY, MUENSCHER, and RANDOLPH, Associate Professors CLARK and CLAUSEN, and Assistant Professor HAMNER. Hours by appointment.

Students engaged on special problems may register in this course. They must satisfy the instructor under whom the work is taken as to preparation for the problem chosen. The laboratory fee depends on the nature of the work and on the number of credit hours.

#### RESEARCH AT THE NEW YORK STATE EXPERIMENT STATION

In addition to the foregoing, graduate research in seed investigations is also available at Geneva. For further information see page 193.

#### GENERAL BIOLOGY

See under ANIMAL SCIENCES, p. 83.

#### PLANT BREEDING

Professors H. H. LOVE, F. P. BUSSELL, R. G. WIGGANS, J. R. LIVERMORE, H. M. MUNGER, S. S. ATWOOD and R. L. CUSHING; *Doctor* ERNEST DORSEY; at Geneva, *Professor* R. WELLINGTON.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Genetics 1, 2, 4

Plant Breeding 1, 2, 4

Statistical Methods of Analysis 1, 2, 4

Students who are chiefly interested in the application of genetical principles to crop improvement will doubtless prefer to register in *plant breeding*. Problems for research will involve studies of such characters as yield, quality, and disease and insect resistance. Those students for whom the theoretical aspects of genetics hold the greater appeal will register in *genetics*. Their research problems will usually stress gene analyses and chromosomal relationships. Statistical methods include the analysis of data from any field of research, and a study of experimental methods and field plot technique.

The laboratories of this department are supplied with calculating machines necessary for statistical investigations, and are equipped with cameras and accessories for photographic work. The departmental library contains the principal books and periodicals dealing with plant breeding, evolution, and genetics. The department has greenhouse room for the use of graduate students. A garden near the laboratories affords the necessary room for most of the plant material used by graduate students. For more extensive plantings, room is provided on the University farms.

It is advisable that the student, before entering upon graduate work, should have had the following courses or their equivalent: genetics, plant breeding, general botany or elementary zoology or biology, elementary plant, animal, or human physiology, introductory inorganic chemistry, and elementary organic chemistry. A student who has not had most of these subjects will ordinarily find it impossible to complete his graduate work in the minimum time.

Students majoring in plant breeding will ordinarily find it necessary to remain in Ithaca during the summer, or to make satisfactory arrangements for growing and studying elsewhere the plant materials used in connection with their research problems. Since the department has accommodations for only a limited number, prospective students will find it to their advantage to correspond with a member of the departmental staff some months prior to entering upon their work.

101. *Genetics*. Fall term. Credit four hours. Laboratory fee, \$3; breakage fee, \$2.

103. *Plant Breeding*. Fall term. Credit three hours. Laboratory fee, \$3.

150. *Special Problems*. Fall, spring, or summer terms. Credit one or two hours.

201. **Advanced Genetics.** Spring term. Credit three hours. Prerequisites, Plant Breeding 101 and Botany 124. Assistant Professor CUSHING. M F 8-10. Plant Science 146. Laboratory work to be arranged. Laboratory fee, \$3; breakage fee, \$2.

Group discussions of advanced principles of genetics, with special attention to methods of analysis as illustrated in problems on both hypothetical and experimental data. Laboratory studies on the artificial production of mutations in *Drosophila* and some plants, with as complete a genetic analysis of these as time permits.

211. **Statistical Methods of Analysis.** Fall term. Credit two hours. Associate Professor LIVERMORE. Th 1:40-4. Plant Science 233. Laboratory fee, \$2.

A discussion of statistical methods for the study of variation, correlation, curve fitting, experimental error, the analysis of variance and covariance, and the application of these methods to problems in biology and related fields.

212. **Special Problems in Statistical Methods.** Spring term. Non-credit course. Limited to graduate students who have had course 211 or similar work. Professor LOVE. Hours to be arranged.

A conference course dealing with the problems of plot technique and related topics, such as the design of experiments and interpretation of results.

**Seminary.** Fall and spring terms. Professors LOVE, BUSSELL, WIGGANS, LIVERMORE, MUNGER, S. S. ATWOOD and CUSHING, and Dr. DORSEY. W 11. Plant Science 404.

#### PLANT PATHOLOGY

*Professors* L. M. MASSEY, H. H. WHETZEL, DONALD REDDICK, M. F. BARRUS, H. M. FITZPATRICK, CHARLES CHUPP, W. H. BURKHOLDER, F. M. BLODGETT, D. S. WELCH, K. H. FERNOW, A. G. NEWHALL, W. D. MILLS, C. E. F. GUTERMAN, A. B. BURRELL, K. G. PARKER, F. A. HAASIS, A. W. DIMOCK, and L. J. TYLER; at Geneva, *Professors* O. A. REINKING, W. O. GLOYER, J. M. HAMILTON, H. S. CUNNINGHAM, R. O. MAGIE, D. H. PALMITER, R. F. SUIT, and W. T. SCHROEDER.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Mycology 1, 2, 3, 4

Plant Pathology 1, 2, 3, 4

The laboratories of the department are fully equipped for teaching and research in this subject. Many pieces of apparatus for use in connection with specialized research problems are available and additional apparatus can be supplied whenever it is needed. Greenhouses having about 12,000 square feet of floor space afford facilities for experimental work and for the culture of diseased and healthy plants for class use. These houses are divided into compartments so that various artificial conditions of temperature and moisture can be maintained for diverse types of plants and kinds of experimental work. Field laboratories in important crop sections of the State are maintained through co-operation with growers. These laboratories provide certain graduate students who receive fellowships (several of which are usually available each year) with an opportunity of pursuing investigations on a large scale under most favorable commercial conditions.

The pathological herbarium includes a local collection of fungi and pathological materials and sets of well-known fungous exsiccata. The library contains most of the important works on plant pathology, mycology, and bacteriology, complete sets of the more important journals, many monographs, and practically all the experiment station literature on these subjects.

Candidates for the Doctor's degree should spend at least one season in the field in order to come into contact with the practical aspects of control problems. Students preparing for graduate work in plant pathology are urged to obtain a thorough knowledge of elementary physics and chemistry, including organic and physical chemistry, and of general botany, plant histology, and plant physiology. A reading knowledge of French and German is indispensable in phytopathological research and must be acquired before the beginning of the third semester of

graduate work. Candidates for advanced degrees must have fundamental training in the subjects enumerated above. Opportunity is afforded for further study in these subjects after entering the Graduate School, but a student availing himself of this opportunity can not expect to receive a degree in the minimum amount of time required for residence. Members of the staff are prepared to direct investigation in the various sub-divisions of the broader field. It is urged that prospective students correspond with a member of the departmental staff some months in advance of the time when they expect to enter upon their work.

1. *Elementary Plant Pathology*. Fall term. Professors WHETZEL and WELCH and Associate Professor L. J. TYLER. One lecture and two laboratories each week. For credit of 3 hours. Laboratory fee, \$4.50; Breakage fee, \$5.

200. *General Plant Pathology*. Fall term. For graduate students with their major or minor in Plant Pathology. Open also to qualified graduate students in other fields. Prerequisite, permission to register. Professors WHETZEL and WELCH, and Associate Professor TYLER. Lecture, T 11. Plant Science 336. Practice, three 3-hour periods weekly at the students' convenience. Laboratory fee, \$4.50; breakage deposit, \$5.

A course designed to give the entering graduate student an introduction to the basic features and techniques of the science of phytopathology and to provide an adequate foundation for successful prosecution of research in this field.

2. *Principles of Plant Disease Control*. Spring term. Professor WHETZEL and Associate Professor TYLER. Lecture, Th 8. Plant Science 336. Practice, T Th 1:40-4. Plant Science 342. Laboratory fee, \$4.50; breakage deposit, \$5.

A consideration of the principles and methods in plant disease control. Required of all graduate students.

13. *Diseases of Plants*. Fall term. Professor WELCH and members of the Plant Pathology staff. One lecture and two laboratories each week. For credit of 3 hours. Open to freshman. Laboratory fee, \$4.50; breakage fee, \$5.

201. *Advanced Plant Pathology*. A two-term course, fall and spring terms. Professor MASSEY. Lecture, T 9. Plant Science 336. Practice, T Th 10-12:30. Plant Science 304. Laboratory fee, each term, \$4.50; breakage deposit, \$3.

A presentation and analysis of the experimental and empirical knowledge of plant diseases. The phenomena of inoculation, incubation, infection, susceptibility, and host reactions are critically considered.

111. *Diseases of Trees and Shrubs*. Spring term. Prerequisite, course 1 or 200. Professor WELCH. Lecture, F 10. Plant Science 336. Practice, T Th 1:40-4. Plant Science 362. Laboratory fee, \$4; breakage deposit, \$3.

A course dealing with the diseases peculiar to woody plants, their recognition and treatment.

[121. *Comparative Morphology of Fungi*. Spring term. Credit four hours. Prerequisite, Botany 1 or the equivalent, and permission to register. Professor FITZPATRICK. Lecture, M W 11. Plant Science 336. Practice, M W 1:40-4. Plant Science 329. Laboratory fee, \$6; breakage deposit, \$3. Given in alternate years, not in 1944-45.]

An introductory course designed to acquaint the beginning student with the general field of mycology. Emphasis placed on morphology rather than on taxonomy.

221. *Mycology*. A two-term course, fall and spring terms. Credit five hours. Prerequisite, Botany 1 or the equivalent, and permission to register. Professor FITZPATRICK. Lecture, M W 11. Plant Science 336. Practice, M W 1:40-4 and one equivalent additional period to be arranged. Plant Science 329. Laboratory fee each term, \$6; breakage deposit, \$5. Given in alternate years.

A more intensive course than the preceding, and designed especially for students specializing in mycology or plant pathology. Emphasis is placed on morphology and taxonomy, but other aspects of mycology are embraced. Practice in identification of specimens is afforded in various groups, and field work is encouraged.

[222. *Advanced Mycology*. Fall term. Credit five hours. Prerequisite, course 221. Professor FITZPATRICK, Lecture, M W 11. Plant Science 336. Practice, M W



1:40-4 and one equivalent additional period to be arranged. Plant Science 329. Laboratory fee, \$6; breakage deposit, \$5. Given in alternate years, not in 1944-45.]

This course is designed chiefly for students majoring in mycology or in mycological phases of plant pathology. It supplements course 221, gives additional training in taxonomy and widens the students' horizon in the field as a whole. Emphasis is placed on field work, identification of specimens, herbarium practice, and library studies as a preliminary to research. Lectures deal with special topics.

231. **History of Plant Pathology.** A two-term course, fall and spring terms. Requires a reading knowledge of French and German. Professor WHETZEL. Designed especially for graduate students specializing in Plant Pathology.

241. **Research.** Professors MASSEY, WHETZEL, REDDICK, BARRUS, FITZPATRICK, CHUPP, BURKHOLDER, BLODGETT, WELCH, FERNOW, NEWHALL, MILLS, GUTERMAN, BURRELL, PARKER, HAASIS, DIMOCK, and TYLER. Laboratory fee, \$1.50 a credit hour. Breakage deposit, \$3.

242. **Seminary.** Members of the staff. Weekly.

243. **Literature Review.** Members of the staff. Bi-weekly.

# PHYSICAL SCIENCES

## ASTRONOMY

Professor R. W. SHAW and Doctors D. A. MACRAE and R. E. WILLIAMSON.

### Approved Major and Minor Subjects (key to symbols on p. 42)

Astronomy 1, 2, 4.

Astrophysics 1, 2, 4.

Candidates for the degree of Doctor of Philosophy in Astronomy or Astrophysics will be required to take one minor in Physics unless a divided major is granted. In special cases a major in Astronomy or Astrophysics may consist partly of selected courses in Physics. In such cases one minor need not be in Physics.

Candidates for the degree of Doctor of Philosophy, Master of Arts, or Master of Science with a major in Astronomy or in Astrophysics will be required to offer for admission the equivalent of Astronomy 187 and Astronomy 182.

Candidates electing a minor in the department may select such courses as meet their requirements provided the necessary prerequisites are offered.

Students with advanced standing in the sciences or in mathematics, but who do not desire to major or minor in astronomy, may be admitted after consultation with the professor in charge to such courses in astronomy as may seem desirable.

The Fuertes Observatory equipment includes a 12-inch equatorial by Brashear, an astronomical theodolite with circles reading to seconds of arc by Troughton and Simms, an astronomical transit and zenith telescope by Fauth, a Howard Sidereal Clock, chronographs and photographic equipment as well as smaller instruments. In addition, the Geodetic equipment includes a Mendenhall Half-second Pendulum Apparatus.

A substation of the Fuertes Observatory is located on the grounds of the Arizona State Teachers College at Flagstaff, Arizona. The equipment consists of an 8-inch Schmidt telescope of focal ratio 1.5. The department has under construction a 24-inch reflecting telescope which is to be erected at the Arizona station for the study of ultra-violet stellar spectra and galactic problems.

In addition to the Observatory and its equipment the Astronomy Department has a laboratory for elementary instruction, an astrophysics laboratory, an optical laboratory, a stellar statistics laboratory, a photographic dark room, a department library, and several offices in Rockefeller Hall.

180, 181. *Introductory Astronomy*. Three hours a week.

182. *Field Astronomy*. Two hours a week.

M-8, M-9. *Navigation*. Three hours a week.

A-10. *Air Navigation*. Three hours a week.

186. *Geodetic Astronomy*. Three hours a week.

187. *Advanced Astronomy*. Three hours a week.

189. *Informal Study*. Three hours a week.

190. **Astrophysics**. Credit three hours a term. Prerequisites, Mathematics 65 and the consent of the instructor. Associate Professor SHAW. Not given in 1944-45.]

A detailed study of present-day problems and progress in planetary, stellar, and nebular structure and constitution.

191. **Theoretical Astrophysics**. Credit three hours a term. Prerequisites, Astronomy 190 and Mathematics 200. Associate Professor SHAW. Not given in 1944-45.]

Theoretical interpretation of the internal constitution of stars, theory of line contours, radiative transfer in stellar envelopes, and special problems.

192. **Galactic Astronomy**; a two-term course, fall and spring. Credit three hours a term. Prerequisites, Mathematics 65 and the consent of the instructor. Dr. MACRAE.

A study of the Milky Way, its components, dimensions, age, motions, and relation to the universe. Attention will be given to the observations which are the source of our information. Applications of statistical mathematics to astronomical problems will be included.

193. **External Galaxies;** summer term. Credit three hours. Prerequisite, consent of the instructor. Dr. MACRAE.

A study of the forms, components, distances, and distribution of the extragalactic star systems. Our knowledge of the Magellanic Clouds the neighboring systems, the metagalaxy and the expanding universe from modern investigations.

195. **Astrophysics Laboratory.** Any term. Credit variable. Prerequisite, consent of the instructor. Staff.

The student will be given opportunity to familiarize himself with techniques involved in obtaining, reducing, and evaluating data of astrophysical interest. The laboratory work may be accompanied by lectures on method and technique.

[196. **Problems in Practical Astronomy.** Any term. Credit three hours a term. Prerequisite, Astronomy 186. Not given in 1944-45.]

197. **Celestial Mechanics.** Any term. Credit three hours a term. Prerequisite, Mathematics 200 and the consent of the instructor. Offered on demand.

A study of celestial mechanics, orbital theory, tidal theory, and the theory of rotating fluids with application to the structure of planets and stars. The content of the course will be chosen to meet the needs of the students.

199. **Advanced Study and Research.** Any term. Credit variable. Staff.

Extended study or research in subjects similar to those notes in Astronomy 189 (see catalogue of College of Arts and Sciences) or others selected with the consent of the instructor. Upon sufficient demand the work may be given formally.

## CHEMISTRY

*Professors* PETER DEBYE, A. W. BROWNE, T. R. BRIGGS, JACOB PAPISH, J. R. JOHNSON, M. L. NICHOLS, A. W. LAUBENGAYER, J. G. KIRKWOOD, W. F. BRUCE, J. L. HOARD, F. A. LONG, W. T. MILLER, S. H. BAUER, A. T. BLOMQUIST, *Doctors* HENRY TAUBE, THOR RUBIN; O. J. SWEETING, W. J. ARGERSINGER and A. L. JONES.

### Approved Major and Minor Subjects (key to symbols on p. 42)

Inorganic Chemistry 1, 2, 3, 4

Analytical Chemistry 1, 2, 3, 4

Organic Chemistry 1, 2, 3, 4

Physical Chemistry 1, 2, 3, 4

A graduate student who desires to take either a major or a minor subject in chemistry should select any one of the above branches.

A prospective graduate student is strongly advised to communicate, when applying for admission, with a member of the faculty in the branch of Chemistry in which he wishes to have his major subject. In general, members of the Special Committee should be chosen from different fields of Chemistry. It is desirable that candidates for the degree of Doctor of Philosophy select at least one minor subject outside of chemistry.

A graduate student who desires to take a minor subject in chemistry with some field other than chemistry as the major subject, will be required to offer introductory courses in inorganic chemistry, qualitative analysis, and quantitative analysis as preliminary to his graduate study. The work upon his minor subject in chemistry may be taken in any branch of the subject that he is qualified to pursue, and may comprise advanced courses selected from the subjoined list, with the approval of his Special Committee.

Graduate students intending to teach chemistry in secondary schools are advised to confer with the departmental Graduate Scholarship Committee regarding preparation for this work.

Candidates for the degree of Master of Arts, Master of Science, or Doctor of Philosophy, with major in Chemistry will be required to offer for admission the

equivalent of Introductory Inorganic Chemistry 102 and 104; Qualitative Analysis 205 and 206, or 210; Quantitative Analysis 220 and 221, or 225; Introductory Organic Chemistry 305 and 310 (one term); Introductory Physical Chemistry 405, and 410 (one term); they must also present the equivalent of two units of German.

Candidates for the degree of Doctor of Philosophy with major in Chemistry must have completed, before the beginning of the last year of residence, the equivalent of Advanced Quantitative Analysis 230, Introductory Organic Chemistry Laboratory 310 (second term), and Introductory Physical Chemistry Laboratory 410 (second term). Graduate students entering from approved universities may take, during their residence for the advanced degree, such of these required courses as they have not already pursued. If a graduate student lacks at entrance several of these preliminary courses, more than the minimum periods of residence may be necessary.

Every candidate is required to pass a departmental Qualifying Examination. This examination will comprise tests in the following four Divisions of Chemistry: (A) Inorganic and General, (B) Analytical, (C) Organic, and (D) Physical. The individual tests, each consisting of a written examination covering a period of two or three hours, will be given in the fall, on days set by the Committee on Qualifying Examinations. All students entering candidacy for the doctorate in chemistry are expected to take them at the time announced.

Successful completion of these examinations will show that the candidate is qualified to proceed in his graduate training at once. Failure in one or more of the examinations will necessitate thorough review of the work in elementary courses and satisfaction of the staff members of the Division concerned before the end of the first semester. The special committee of any candidate who has not thus given satisfactory evidence that he is qualified to proceed may refuse to allow him to continue for a second term as a candidate for the Ph.D. degree in Chemistry.

After the candidate has completed his minor subjects, he will be required to pass a general examination, both written and oral, on his major and minor subjects. Upon recommendation of the candidate's Special Committee, this examination may be taken toward the end of the term preceding his last year of residence. This procedure makes it possible for the candidate to devote his last year of residence to uninterrupted research on his thesis. At the close of his period of residence, and after the acceptance of his thesis, the candidate will be required to pass a final oral examination on the thesis and on related subjects.

As an alternative procedure, the general examination on major and minor subjects and on the thesis may be taken after the acceptance of the thesis.

Graduate students are required to register with the Department of Chemistry on the registration days at the beginning of each term. Entering students must consult with the chairman of the departmental Graduate Scholarship Committee at this time.

For a more detailed description of the courses in the various branches of chemistry, see the Announcements of the Colleges of Arts and Sciences and of Engineering.

All courses in Chemistry are open to properly qualified graduate or undergraduate students. It may be necessary for a graduate student in chemistry to take one or more of the courses designated by italics as primarily for undergraduates, either as prerequisite to his graduate work or as an essential part of his major and minor subjects.

Fellowships and scholarships are ordinarily awarded only for the last year of residence for the Doctorate. Teaching assistantships are open to entering graduate students.

All courses listed below are to be given in the Baker Laboratory of Chemistry.

#### INORGANIC CHEMISTRY

102 a and b. *General Chemistry*. Credit three hours a term. Open only to students who have not had chemistry.

104 a and b. *General Chemistry*. Credit three hours a term. For students who have had a course in chemistry.



130 a and b. **Advanced Inorganic Chemistry.** Fall term, to be repeated in spring term. Credit three hours a term. Prerequisite or parallel courses, Chemistry 405 and 410. Professor LAUBENGAYER.

The elements are discussed in the order in which they appear in the Periodic System, with special attention to the bearing of atomic structure on the properties of elements and their compounds and on the relations between the groups. The less familiar elements are treated in detail and the stereo-chemistry of inorganic substance is considered.

135. **Advanced Inorganic Chemistry.** Fall term, to be repeated in spring term; Prerequisites, Chemistry 305 and 310. Professors BROWNE and LAUBENGAYER and assistants. Day and hour to be arranged. Baker 178 and 122.

Laboratory practice. The preparation, purification, properties, and reactions of inorganic compounds including those of the rarer elements.

Chemistry 135 is designed to accompany Chemistry 130, but either course may be taken separately.

[140. **Selected Topics in Advanced Inorganic Chemistry.** Credit two hours. Professor BROWNE. Not given in 1944-45.]

165. **Chemistry of the Rare Elements.** Fall term. Credit two or more hours. Prerequisite, Chemistry 130. Professor PAPISH and assistant. Hours to be arranged. Baker 318.

Laboratory practice. Extraction, recovery, and purification of the rare elements, and preparation of their salts. Chemical analysis of the rare elements.

195. *Research for Seniors.* Summer, fall, spring terms. Credit two or more hours a term.

#### ANALYTICAL CHEMISTRY

[201. *Introductory Analytical Chemistry.* Summer term. Credit four hours. Not given in 1944-45.]

203. *Introductory Qualitative Analysis.* Fall term, to be repeated in spring term. Credit five hours.

205. *Introductory Qualitative Analysis.* Summer term. Credit three hours.

206. *Introductory Qualitative Analysis.* Summer term. Credit three hours. Deposit, \$25.

[210. *Introductory Qualitative Analysis.* Shorter course. Credit three hours. Not given in 1944-45.]

220. *Introductory Quantitative Analysis.* Summer, fall, spring terms. Credit three hours.

221. *Introductory Quantitative Analysis.* Summer, fall, spring terms. Credit three hours. Deposit, \$25.

225. *Introductory Quantitative Analysis.* Shorter course. Summer, fall, spring terms. Credit four hours. Deposit, \$25.

230. *Advanced Quantitative Analysis.* Spring term. Credit three hours.

235. **Advanced Quantitative Analysis.** Spring term. Credit two hours. Prerequisite, first term of Chemistry 405. Professor NICHOLS. M W 12. Baker 207.

A theoretical discussion of selected topics in quantitative analysis including sampling, indicators, potentiometric and conductometric titrations, together with the development and present status of various analytical methods.

250. *Gas and Fuel Analysis.* Credit three hours. [Not given in 1944-45.]

270. **Special Methods of Quantitative Analysis.** Summer, fall, spring terms. Credit two or more hours. Prerequisites, Chemistry 230 and 235. Professor NICHOLS and assistants. Day and hour to be arranged. Baker 277.

Laboratory practice in the application of special methods such as indirect analysis, conductometric and potentiometric titrations, etc., to quantitative analysis and the analysis of special materials. The study of the important methods and special forms of apparatus used in scientific gas analysis. Electrochemical methods for the determination of silver, lead, copper, tin, nickel, cobalt, zinc, iron, etc.; the analysis of alloys and ores.

Within certain limits the work may be selected to suit the requirements of the individual student.

275. **Quantitative Microanalysis.** Fall term. Credit three or more hours. Prerequisite, course 230 and special permission. Professor NICHOLS. Hours to be arranged. Baker 358.

Laboratory practice in typical methods of both organic and inorganic quantitative microanalysis.

280. **Emission Spectroscopy in Chemical Analysis.** Spring term. Credit variable. Prerequisite, special permission. Professor PAPISH and Dr. BAUER. Laboratory hours to be arranged. Baker 396. Conference, to be arranged. Fee, \$15.

The construction and use of spectroscopic equipment; spectrum excitation; qualitative and quantitative spectrochemical analysis.

295. *Research for Seniors.* Summer, fall, spring term. Credit two or more hours a term.

#### ORGANIC CHEMISTRY

305 a, b. *Introductory Organic Chemistry.* Summer term, repeated in fall and spring terms. Credit 3 hours.

310 a, b. *Introductory Organic Chemistry.* Summer term, repeated in fall and spring terms. Credit 3 hours. Deposit \$40.

315 a, b. **Advanced Organic Chemistry.** A two-term sequence, summer, fall terms, first term to be repeated in spring term. Credit two hours a term. Prerequisites, Chemistry 305, 310, and 340, or the consent of the instructor. Assistant Professors BLOMQUIST and BRUCE. T Th 9. Baker 177.

Lectures. Summer, spring terms, survey of the more important classes of organic compounds and their reactions. Fall term, discussion of general topics (tautomerism, molecular rearrangements, stereochemistry, mechanisms of reactions). Students may register for either term separately.

320. **Advanced Organic Chemistry.** Summer term, to be repeated in fall and spring terms. Credit two to six hours a term. Prerequisites, Chemistry 305 and 310. Assistant Professors BLOMQUIST and BRUCE, and Dr. SWEETING, and assistants. Day and hour to be arranged. Baker 208. Conference, F 12. Baker 206.

Laboratory practice. An advanced course in the preparation of organic compounds. The original literature is consulted, and the student is required to repeat some extended and important piece of work, and to compare his results with those published.

325. **Special Topics in Organic Chemistry.** Summer term, to be repeated in fall and spring terms. Credit two hours a term. Prerequisite, Chemistry 315 or 340. Assistant Professor BLOMQUIST and BRUCE and Dr. SWEETING. M W 11. Baker 207.

Lectures. A presentation and discussion of special fields and current theories of organic chemistry.

[330. **Chemistry of High-polymers.** Credit two hours. Prerequisite, Chemistry 315 or 340, and 405 or 406. Assistant Professor MILLER. Not given in 1944-45.]

[335. **Physical Aspects of Organic Chemistry.** Credit two hours. Prerequisite, Chemistry 315 or 340. Professor JOHNSON and Assistant Professor MILLER. Baker 207. Not given in 1944-45.]

340. **Identification of Organic Compounds.** Summer, fall, spring terms. Credit three hours. Prerequisites, Chemistry 305 and 310 with marks of 75 or better, or consent of the instructor. Dr. SWEETING and assistants. Lectures and conferences, T Th 10. Baker 207. Two laboratory periods, M T W or Th 1:40-4. Baker 350.

The classification reactions of organic compounds and the preparation of solid derivatives are applied to the identification of unknown organic substances.

345. **Biochemical Aspects of Organic Chemistry.** Fall term. Credit two hours. Prerequisite, Chemistry 315 or 340. Assistant Professor BRUCE. T 4:15. Baker 204.

A discussion of the organic chemistry of natural products, including plant and animal pigments, vitamins, hormones, etc.

375. *Elementary Organic Chemistry.* Summer, fall, spring terms. Lectures and laboratory, six hours credit. For students preparing for the study of medicine. Deposit, \$25.

395. *Research for Seniors*. Summer, fall, spring term. Credit two or more hours a term.

## PHYSICAL CHEMISTRY

[401. *Principles of Physical Chemistry*. A two-term course. Credit three hours a term. Lectures and laboratory. Primarily for students in the biological sciences. Not given in 1944-45.]

405. *Introductory Physical Chemistry*. A two-term course, summer, fall and spring terms. Credit three hours a term. Lectures. It is advisable, but not obligatory that course 410 accompany this course.

406. *Physical Chemistry*. A two-term course, fall, spring terms. Credit three hours a term. Lectures.

410. *Introductory Physical Chemistry*. Summer, fall, spring terms. Credit three hours a term. Prerequisite or parallel course, Chemistry 405 or 406. Laboratory practice and recitations.

If one term only is taken, registration for the second term is advised.

420. *Advanced Physical Chemistry*. Fall term. Credit three hours. Prerequisite, Chemistry 405. Associate Professor HOARD. Lectures and recitations. M W F 12. Baker 7.

Exposition of the principles of physical Chemistry from the mathematical standpoint, with emphasis on the solution of simple problems.

425. *Applications of the Phase Rule*. Term to be announced. Credit two hours. Prerequisite, Chemistry 405 or an elementary knowledge of the phase rule as applied to systems of one and two components. Professor BRIGGS. Lectures, T Th 11. Baker 7.

The study and interpretation of typical phase diagrams, especially in systems of two and three components, followed by a brief treatment of systems containing four or more components. Special attention will be given to metal alloy diagrams, to equilibria in saturated salt solutions, and to the problem of indirect analysis.

430. *Colloid Chemistry*. A two-term course; terms to be announced. Credit two hours a term. Prerequisite, Chemistry 405 or 406. Professor BRIGGS. Lectures, T Th 10. Baker 7.

First term: the properties of surfaces, including the adsorption of gases by solids, adsorption from solutions, liquid films, and contact catalysis. Second term: general properties of colloidal solutions and suspensions.

435. *Chemistry of Solids*. Spring term. Credit three hours. Prerequisite or parallel course, Chemistry 405 or 406, or special permission. Associate Professor HOARD and Professor MASON. Hours to be arranged.

A general discussion of the formation and growth of metallic and chemical crystals, their physical and chemical behavior, and the relationships between lattice structure and chemical constitution.

[440. *Molecular Spectra*. Spring term. Credit three hours. Open to qualified students by permission. Assistant Professor BAUER. Not given in 1944-45.]

Brief review of atomic spectra. Description of the various types of molecular spectra; the rotation and vibration of diatomic molecules, electronic states, and electronic transitions. A résumé of continuous and diffuse molecular spectra, with reference to the subject matter considered in photochemistry. Normal coordinate treatment of the vibrations of polyatomic molecules and the analysis of their Raman and infra-red absorption spectra. Discussion of the relations between molecular structure and molecular constants.

445. *Introductory Electrochemistry*. Term to be announced. Credit three hours. Lectures and laboratory. Prerequisite, Chemistry 405 or 406. Deposit, \$15. Professor BRIGGS and assistant. Lectures, M W 12. Baker 7. Laboratory: hours to be arranged following first lecture. Baker 1A.

Theory of electrolysis and of the voltaic cell, including theory and practice of electromotive force measurements, transference, ion activities, and oxidation-reduction.

450. **Applied Electrochemistry.** Term to be announced. Credit three hours. Prerequisite, Chemistry 405 or 406. Professor BRIGGS. Lectures: T Th S 11. Baker 7.

Theory of electrolysis and electromotive force. Electrolytic refining and extraction of metals; electroplating; electrolytic preparation of organic and inorganic compounds; electrothermal electrolysis; storage cells; brief survey of electrothermics. Given provided at least six students register for the course.

[455. **Kinetics of Chemical Reactions.** Fall term. Credit two hours. Prerequisite, Chemistry 405. Associate Professor LONG. Not given in 1944-45.]

460. **Chemical Physics.** Fall term. Credit three hours. Open to seniors and graduate students majoring in chemistry or physics. Professor DEBYE. M W F 10.

An elementary presentation of the principles involved in describing the structure and behavior of matter; atomic structure and the periodic table; interatomic forces; structure of solids; electrons in metals; temperature equilibrium and statistics.

465. **Advanced Laboratory Practice in Physical Chemistry.** Throughout the year. Credit variable, but not to exceed six hours a term. Prerequisite, determined in each case by the professor in charge. Professors BRIGGS and KIRKWOOD, Associate Professor HOARD, and Assistants. Hour and place to be arranged.

470. **Thermodynamics.** Fall, spring terms. Credit three hours a term. Prerequisites, Chemistry 405 or 406, or special permission. Professor KIRKWOOD. M W F 9.

Development of the general equations of thermodynamics from the first and second laws. Exposition of the concepts of entropy and free energy. Applications to the study of physico-chemical equilibria in gases, liquids, solids, and liquid solutions. Problems.

475. **Theory of Solutions.** Term to be announced. Credit three hours. Prerequisite, Chemistry 470. Professor KIRKWOOD.

Exposition of modern theories of electrolyte and non-electrolyte solutions. Presentation of the Debye-Hückel theory and the calculation of the thermodynamic functions of electrolyte solutions from interionic forces. The Bjerrum theory of ion association. Correlation of the properties of non-electrolyte solutions with molecular distribution and intermolecular forces. Discussion of transport phenomena in solution including electrolytic conductance, diffusion, and viscous flow.

480. **Statistical Mechanics.** Fall term. Credit three hours. Prerequisite, first term Chemistry 470. Professor KIRKWOOD. Given in alternate years.

Exposition of the equilibrium theory of statistical mechanics from the standpoint of the Gibbs canonical ensemble. Mechanical interpretation of the principles of thermodynamics, with application to simple thermodynamic systems.

490. **Introductory Quantum Mechanics with Chemical Applications.** Term to be announced. Credit three hours. Open to qualified students by permission. Professor KIRKWOOD. Hours to be arranged. Given in alternate years.

Elementary presentation of the principles of quantum mechanics. Development of the basic ideas underlying the quantum mechanical theory of the chemical bond.

495. *Research for Seniors.* Summer, fall, spring term. Credit two or more hours a term.

[1000. **Non-Resident Lectures on the George Fisher Baker Foundation.** T Th 12. Baker 177.]

#### NON-RESIDENT LECTURESHIP

The George Fisher Baker Non-Resident Lectureship in Chemistry at Cornell University was established early in the year 1926 by a gift from Mr. Baker, the income to be used by the University for the benefit and advancement of teaching and research in Chemistry and allied sciences. Under this plan the University invites eminent men of science to come to Cornell, each for one or two semesters, to present the most recent advances, and the methods and results of their own investigations, in the fields in which they have won distinction. A private office



and research laboratory are placed at the disposal of the Non-Resident Lecturer, and he is thus enabled to carry forward investigational work while in residence at Cornell.

The Non-Resident Lecturers under the George Fisher Baker Foundation deliver two lectures a week, and hold a colloquium. In some cases they also conduct experimental research with a few advanced students.

### GEOLOGY AND GEOGRAPHY

*Professors* O. D. VON ENGELN, C. M. NEVIN, A. L. ANDERSON and J. D. BURFOOT, JR.

It is at present impossible to list the graduate courses which may be given. A student desiring graduate work in geology should correspond with the department in advance of registration.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Regional Geography 1, 2  
 Mineralogy 1, 2, 3, 4  
 Economic Geology 1, 2, 3, 4  
 Paleontology 1, 2, 3, 4  
 Petrology 1, 2, 3, 4  
 Metamorphism 1, 2, 3, 4  
 Geomorphology 1, 2, 3  
 Glacial Geology 1, 2, 3, 4  
 Structural Geology 1, 2, 3, 4  
 Stratigraphy 1, 2, 3, 4  
 Sedimentation 1, 2, 3, 4  
 Commercial Geography 4  
 Physical Geography 2, 3, 4  
 Geology 4  
 Geography 4

Under the general title of geology are included dynamic and structural geology, physical, regional, and economic geography, geomorphology, glaciology, mineralogy, crystallography, petrology, paleontology and stratigraphic geology, and economic geology.

Graduate work in Geology may include, in addition to work done in Ithaca, the opportunity to spend part of the time in investigation under approved direction in the field away from Ithaca.

The University Library has a most extensive collection of private publications, magazines, and geological society transactions, as well as files of North American, European, and other geological survey reports. In the Geological Department there is the entire library of the late Professor H. S. Williams and a collection of over 60,000 authors' separates.

Special rooms are available for graduate students for carrying on research. The department is provided with apparatus for different kinds of photographic work, and for polishing and sectioning ores, minerals, and rocks.

100. *Introductory Geology*. Three hours a week. Laboratory fee, \$3.

### SEDIMENTATION AND STRUCTURAL GEOLOGY

*Professor* NEVIN.

A student taking a major in this branch of geology must first have had at least elementary work in such other branches of geology as the professor in charge may prescribe.

102. **Structural Geology**. Credit three hours. Prerequisite, Geology 100. *Professor* NEVIN.

Geologic structures and their causes. A basic course for all students majoring in this branch of geology.

103. **Sedimentation.** Credit three hours. Prerequisite, Geology 100. Professor NEVIN.

The principles involved in the formation of sediments. Laboratory work consists of experimentation with sedimentary processes and field investigations.

502. **Petroleum Geology.** Credit three hours. Professor NEVIN.

107. **Geologic Surveying.** Given in the summer field school. Credit six hours. Professor NEVIN.

106. **Special Work in Structural Geology and Sedimentation.** Professor NEVIN.

Directed reading and original investigation adapted to the needs of the student. Credit variable.

#### GEOMORPHOLOGY AND GLACIAL GEOLOGY

*Professor* VON ENGELN.

The region around Ithaca affords excellent and varied illustrations of physiographic and glacial phenomena. For many years the teachers and advanced students of geomorphology and glacial geology have been engaged in investigation of the local field problems, and there is further opportunity of this kind. The main laboratory is well equipped with topographic maps and photographs; the collection of relief models is notably complete; and there is an experimental laboratory with apparatus and facilities for carrying on a variety of experiments in the development of land forms, etc. The work in this branch also includes an introductory course in economic geography. This, in correlation with physical geography and geomorphology, may be the preparation for advanced regional study and investigation. For teachers of Physical Geography in the secondary schools who wish to secure a Master's degree a definite program with a thesis subject appropriate to their needs has been outlined. Such work can be pursued in successive Summer Session terms.

200. **Geomorphology.** Three hours a week. Prerequisite, Geology 100. Professor VON ENGELN.

The technology of geomorphological description and interpretation of land forms with regard to process and stage and the adjustment of topography to structure. The precepts of the German school are given consideration.

206. **Commercial Geography.** Three hours a week.

205. **Glaciers and Glaciation.** Credit three hours. Prerequisite, Geology 100. Professor VON ENGELN.

Living glaciers and the phenomena of the glacial period. One or more Saturdays devoted to all-day excursions in the spring. Mapping and interpretation of glacial deposits.

208. **Advanced Physiography and Regional Geography.** Prerequisites, an adequate background of course work in geology, especially in physiography and related subjects. Professor VON ENGELN. Hours by arrangement. Physiography Laboratory.

Particular problems, especially those of glaciology and the relation of geological structure to topography and physiographic history. In general students with a minor in physiography are expected to undertake work in this course.

209. **Seminar.** Prerequisites, as for course 208. Professor VON ENGELN. Usually Monday afternoon 4. Physiography Laboratory.

Reviews of current literature or of the original literature on some topic within the field of this branch of the department.

#### MINERALOGY, CRYSTALLOGRAPHY, AND PETROLOGY

*Assistant Professor* BURFOOT.

The laboratory equipment is relatively good as regards petrographic microscopes, apparatus for chemical and physical investigations of rocks, and apparatus for special crystallographic determinations. There are also collections of rocks and study collections of minerals, including the Benjamin Silliman, jr., collection, acquired before the opening of the University in 1868.

Special graduate courses in this division are not offered, but advanced work is adapted to the needs of the individual. Some of the less special courses are, however, so dependent on a rather advanced knowledge of physics or chemistry or of both that they are to be considered as requiring the maturity of graduates, although open also to undergraduates with sufficient preparation.

Any bracketed course in this branch of the Department may be given in any year if it is desired by a sufficient number of students.

Each major and minor in this branch of the Department will be required to be familiar with such subjects and readings as the professor in charge may prescribe.

These requirements will be adapted to the needs of the student and to the degree for which he is a candidate.

**311. *Elementary Mineralogy.*** Two lectures and one laboratory a week. Laboratory fee, \$4.50.

**316. *Metamorphic Geology.*** Credit three hours. For advanced students. Prerequisite, permission of instructor. Registration with department before beginning of course required. Assistant Professor BURFOOT.

A general survey of the field of metamorphic geology with especial emphasis on processes and criteria. Metamorphic differentiation, the facies classification of metamorphic rocks, and retrogressive metamorphism are among the subjects considered. Special suites illustrating these phenomena are used.

**317. *Optical Mineralogy.*** Credit three hours. Prerequisite, Geology 311. Registration with department before beginning of course required. Professor BURFOOT.

The theory and use of the microscope in the determination and study of minerals and rocks. The commoner rock-forming minerals are studied in fragments and in thin-sections.

**318. *Petrology.*** Credit three hours. Prerequisite, Geology 317. Registration with department before beginning of course required. Assistant Professor BURFOOT.

A consideration of the commoner kinds of igneous rocks, of various classifications used, and of the general principles of petrology including the origin of and the conditions under which igneous rocks are formed. In the laboratory, rock types are studied in thin-sections under the petrographic microscope.

**319. *Sedimentary Petrography.*** Credit three hours. Prerequisite, Geology 317. Registration with department before beginning of course required. Assistant Professor BURFOOT.

The methods of investigating the mineral composition, texture, and other physical characteristics of sedimentary rocks, and some of the applications of these methods to geologic problems.

**320. *Advanced or Special Work in Mineralogy, Crystallography, or Petrology.*** Throughout the year. Credit variable. Prerequisite, variable. Assistant Professor BURFOOT. Day and hour to be arranged. McGraw.

Adapted to the needs of the individual student.

**321. *Seminar.*** Credit one hour a term. Assistant Professor BURFOOT. M 4:15. Mineralogy Laboratory, McGraw. Given if desired by a sufficient number of students.

#### PALEONTOLOGY AND STRATIGRAPHIC GEOLOGY

The University is so situated that excellent exposures of Devonian formations are at its very door, and the typical sections of New York State which are of fundamental importance in American Paleozoic geology are within short excursion range. The most important of these are the Rochester and Niagara gorges, Trenton Falls and the Helderberg escarpment, the Chemung Valley, and the coal fields of northern Pennsylvania.

Facilities are afforded to those desiring to study the later formations, since the department has collections made in the West Indies, Central and South America, as well as different parts of the United States and Europe. There is also the Newcomb collection (10,000 species) of recent shells; and a wealth of conchological literature in the geological and the general library.

401. *History of Life*. Credit three hours.
492. **Stratigraphy**. Credit three hours. Prerequisites, Geology 102, 103, 403. Two week-end field trips of two days each to be arranged.
- Consideration of the fundamental factors upon which stratigraphic correlation and nomenclature are based.
403. **Introductory Paleontology**. Credit three hours a term. Prerequisite, Geology 100.
406. **Paleontologic and Stratigraphic Problems**. Credit variable. Prerequisite, 403. Conferences and reports to be arranged. McGraw 28.
- An informal study course arranged to fit the needs of the student.
407. **Paleobotany**. One hour a week.

## ECONOMIC GEOLOGY

*Associate Professor* ANDERSON.

The work in economic geology is designed to familiarize the student with the origin, occurrence, and distribution of the mineral products of economic value, and also with the practical application of geological principles. The laboratory contains an excellent study collection of economic materials from the United States, Canada, Mexico, Europe, and Africa, including ores, fuels, clays, abrasives, building stones, etc., most of these representing suites of materials collected by members of the staff of instruction on geological trips. This collection is supplemented by maps and models.

In addition to the collections, the economic geology laboratory has facilities for general work and research on economic materials; the equipment for metallographic work on ores is excellent.

The work of graduate instruction consists in part of lectures and in part of special work arranged to suit the needs of the individual student. Students who are registered for a major subject in economic geology are expected to engage in research, which should preferably be based on field work.

Excursions may readily be taken to the anthracite regions of Pennsylvania; to the iron, slate, cement, and talc regions near Easton, Pa.; to the metal mines of the Adirondacks, etc. Field trips of greater or less length are taken to some of these localities every year.

500. **General Economic Geology**. Credit three hours a term. Associate Professor ANDERSON. Laboratory fee, \$3.

511. **Advanced or Special Work in Economic Geology**. Throughout the year. Credit variable. Prerequisite, dependent on the nature of the work. Associate Professor ANDERSON. Day and hour to be arranged. McGraw.

512. **Economic Geology Seminar**. Throughout the year. Associate Professor ANDERSON.

## MATHEMATICS

*Professors* W. A. HURWITZ, W. B. CARVER, R. P. AGNEW, J. B. ROSSER, B. W. JONES, V. S. LAWRENCE, JR., W. W. FLEXNER, R. J. WALKER, J. H. CURTISS, and MARK KAC; *Doctors* THEODORE HAILPERIN, A. R. TURQUETTE.

**Approved Major and Minor Subjects** (key to symbols on p. 42)

Algebra 1, 2, 3  
 Mathematical Analysis 1, 2, 3  
 Geometry 1, 2, 3  
 Applied Mathematics 1, 2, 3  
 Mathematics 1, 2, 4

If mathematics (as distinct from one of its subdivisions) is chosen as major subject, the minor subject or subjects must be chosen from some other field or fields of study.

It is recommended that when the major subject for the degree of Ph.D. is in the field of mathematics, at least one minor subject be chosen from some other field.



The graduate work provides instruction in the principle branches of mathematics and furnishes preparation and material for independent investigation. Only a portion of the whole field can be covered by the courses given in a single year. The courses are changed, therefore, from year to year in order to meet the needs of students.

In addition to the regular instruction, individual guidance and advice are offered to any student who wishes to follow a particular line of inquiry.

Students who take mathematics as a major subject for an advanced degree must have completed previously the equivalent of the elementary course in analytic geometry and calculus, and further study in at least one more advanced subject, as for example, differential equations, advanced calculus, modern algebra, or projective or advanced analytic geometry.

The Oliver Mathematical Club, composed of teachers and advanced students, meets weekly, and has for its object the systematic presentation by the members of some specified mathematical theory of recent development, and of reports on articles in recent journals and on results of special reading and investigations. Discussion and reading groups or seminars are also frequently organized to meet other special interests, sometimes with the co-operation of teachers and students in fields other than Mathematics.

The equipment consists of a collection of about three hundred surfaces, including the various forms of the cyclides, the Kummer surface, the surface of centers, and minimum surfaces; plaster models illustrating positive, negative, and parabolic curvature, and constant measure of curvature; plaster models illustrating the theory of functions, among them models of simply and multiply connected surfaces, and of several forms of Riemann surfaces, and models representing the real parts of algebraic, exponential, logarithmic, and elliptic functions; wooden and glass models of crystals and polyhedra, wire and thread models of twisted curves and ruled surfaces, and skeleton frames for minimum surfaces.

The library has a large collection of books on pure and applied mathematics, including collected works of mathematicians, complete sets of all the important mathematical journals, transactions, and other publications of scientific societies, and doctoral theses from the leading American and European universities.

The Erastus Brooks Fellowship of \$600 is awarded annually in the field of Mathematics. The fellowship is ordinarily awarded only to applicants who have had one year or more of graduate study.

It is expected that the following and some other courses will be offered. For possible additional courses and changes in these courses, consult the Announcement and Supplementary Announcements of the College of Arts and Sciences. The courses mentioned in brackets will not be given in 1944-45, but are given from time to time.

1. *Elementary Concepts of Mathematics*. A two-term course. Fall and spring terms. Three hours a week.

[2. *Cryptanalysis*. Three hours a week. Not given in 1944-45.]

5. *Solid Geometry*. Summer term, to be repeated in fall and spring terms. Three hours a week.

10. *College Algebra*. Summer term, to be repeated in fall and spring terms. Three hours a week.

15. *Plane Trigonometry*. Summer term, to be repeated in fall and spring terms. Three hours a week.

16. *Spherical Trigonometry and Map Projections*. Summer term, to be repeated in fall and spring terms. Three hours a week.

[20. *Elementary Course in Higher Mathematics*. Two terms. Three hours a week. Not given in 1944-45.]

55a, b. *Analytic Geometry and Calculus*. A two-term course. Each part given each term. Five hours a week.

60a, b, c, d. *Analytic Geometry and Calculus*. A four-term course. Each part given each term. Three hours a week.

65a, b, c. *Analytic Geometry and Calculus*. A three-term course. Each part given each term. Three hours a week.

- [70. *Calculus*. Three hours a week. Not given in 1944-45.]  
 [90. *Teachers' Course*. Three hours a week. Not given in 1944-45.]  
 [224. *Engineering Mathematics*. Three hours a week. Not given in 1944-45.]

## ALGEBRA

140. **Theory of Numbers**. Fall term. Prerequisites, Mathematics 65b or the equivalent. Associate Professor JONES. T Th S 11. White 121.

A study of properties of divisibility, linear and quadratic congruences, primitive roots and other topics.

160. **Groups, Rings, and Fields**. Spring term. Prerequisite, Mathematics 65b or the equivalent. T Th S 11.

An elementary course dealing with the simpler theorems of group theory and their extension to rings and fields.

- [Symbolic Logic. Not given in 1944-45.]  
 [The Theory of Fields. Not given in 1944-45.]  
 [Foundations of Mathematics. Not given in 1944-45.]  
 [Modern Algebra. Not given in 1944-45.]  
 [Algebraic Numbers. Not given in 1944-45.]  
 [Theory of Equations. Not given in 1944-45.]  
 [Linear Algebras. Not given in 1944-45.]  
 [Determinants and Matrices. Not given in 1944-45.]  
 [Analytic Theory of Numbers. Not given in 1944-45.]

## ANALYSIS

200. **Elementary Differential Equations**. Summer term, to be repeated in fall and spring terms. Prerequisite, Mathematics 65c or the equivalent. T Th S 10. White 115.

215. **Advanced Calculus**. A two-term course. Prerequisite, Mathematics 65c or the equivalent. First part, fall term. M W F 11. Second part, summer term. M W F 11. Second part to be repeated in spring term M W F 11.

A careful study of limits, continuity, derivatives and Riemann integrals. Functions of several variables. Multiple and line integrals. The course is designed to furnish necessary preparation for advanced work in analysis and applied mathematics.

260. **Infinite Series**. A two-term course. First part, spring term. Prerequisite, Mathematics 215 or the equivalent. Professor Agnew. T Th S 9. White 111.

First term: The classic theory of convergence; study of series of various types. Second term: The modern theory of series with some account of recent research and outstanding problems.

- [Real Functions. Not given in 1944-45.]  
 [Complex Variables. Not given in 1944-45.]  
 [Integral Equations. Not given in 1944-45.]  
 [Calculus of Variations. Not given in 1944-45.]  
 [Theory of Almost Periodic Functions. Not given in 1944-45.]  
 [Measure and Integrals. Not given in 1944-45.]

## GEOMETRY

310. **Projective Geometry**. A two-term course, fall and spring terms. Prerequisite, Mathematics 65b or the equivalent. Professor CARVER. M W F 9. White 101.

A first course in projective geometry, including both synthetic and analytic methods.

- [Algebraic Curves. Not given in 1944-45.]  
 [Analytic Geometry of Space. Not given in 1944-45.]  
 [Theory of Lattices. Not given in 1944-45.]  
 [Geometry of Hyperspace. Not given in 1944-45.]  
 [Tensor Analysis. Not given in 1944-45.]  
 [Non-Euclidean Geometry. Not given in 1944-45.]  
 [Differential Geometry. Not given in 1944-45.]  
 [Riemannian Geometry. Not given in 1944-45.]

## APPLIED MATHEMATICS

400. **Probability and Statistics.** A two-term course. Second part, summer term. Prerequisite, first part. Assistant Professor KAC. T Th S 10. White 211.

420. **Vector Analysis.** Fall term. Prerequisite, Mathematics 65c or the equivalent. T Th S. 10.

The algebra and calculus of vectors, with applications.

480. **Differential Equations of Mathematical Physics.** A two-term course. Summer and fall terms. Prerequisite, Mathematics 215. Professor HURWITZ. T Th S 9. White 111.

The derivation of the differential equations, with appropriate boundary conditions, which arise in certain problems of mathematical physics; the mathematical properties of solutions, and the physical meanings of these properties.

- [Fourier Series. Not given in 1944-45.]  
 [Orthogonal Functions. Not given in 1944-45.]  
 [Potential Functions. Not given in 1944-45.]  
 [Mechanics. Not given in 1944-45.]  
 [Hydrodynamics and Elasticity. Not given in 1944-45.]  
 [Numerical and Graphical Methods. Not given in 1944-45.]  
 [Exterior Ballistics. Not given in 1944-45.]

## METEOROLOGY

Professor R. A. MORDOFF.

**Approved Major and Minor Subjects** (key to symbols on p. 42)

Meteorology 1, 2, 4

A broad field for investigation and research is offered in meteorology. The weather and climatic factors, in their relation to crop distribution and production and to engineering, transportation, economic and social problems, are suitable subjects for graduate study.

A graduate student in meteorology should have completed the elementary courses in meteorology and climatology, physics, mathematics, geology, and elementary statistics.

1. *Elementary Meteorology.* Fall term, to be repeated in spring term. Three hours a week. Laboratory fee, \$2.

2. **Climatology.** Fall term. Prerequisite, Meteorology 1 or the equivalent. Professor MORDOFF. M W 9. Plant Science 114.

A course covering general climatology and the various climates of the United States with emphasis on those of New York State.

221 **Research.** Fall term, to be repeated in spring term. Prerequisite, Climatology 2 or the equivalent. Professor MORDOFF. Hours by appointment. Original investigations in meteorology and climatology.

212 **Seminar.** Spring term. Prerequisite, Climatology 2 or the equivalent. Professor MORDOFF. Hours to be arranged. Plant Science 114.

Preparation and reading of reports on special topics. Abstracts and discussions of papers dealing with the current literature of meteorology and climatology.

## PHYSICS

*Professors* R. C. GIBBS, R. F. BACHER,\* L. L. BARNES, H. A. BETHE\*, J. R. COLLINS, G. E. GRANTHAM, H. E. HOWE, J. M. JAUCH, E. H. KENNARD\*, C. C. MURDOCK, L. G. PARRATT\*, B. ROSSI,\* H. S. SACK, L. P. SMITH, and D. H. TOMBOULIAN; *Doctors* W. A. BOWERS\*, C. W. GARTLEIN, K. I. GREISEN,\* M. G. HOLLAWAY\*, H. HURWITZ, JR., H. F. NEWHALL, G. F. TAPE\*, and J. W. TRISCHKA.

## Approved Major and Minor Subjects (key to symbols p. 42)

Physics 1, 2, 3, 4  
 Experimental Physics 1, 2, 3, 4  
 Theoretical Physics 1, 2, 3, 4  
 Applied Physics 1, 2, 3, 4  
 Mathematical Physics 3  
 Biophysics 3, 4

NOTES.—The major and both minor subjects for the Ph. D. should not be chosen inside the field of physics.

The major subject for the Ph. D. may be called Experimental Physics only if accompanied by Theoretical or Mathematical Physics as a minor, and Theoretical Physics only if accompanied by Experimental Physics as a minor.

Applied Physics as a major for the Ph. D. must be accompanied by a minor subject in the field of physics.

U 3, 4. *Introductory Physics*. Credit three hours.

U 7, 8. *Introductory Physics*. Credit four hours.

U 11, 12. *Introductory Physics*. Credit four hours.

U 21, 22. *General Physics*. Credit three hours.

U 41, 42. *Special Topics in Modern Physics*. Credit three hours.

U 55. *Introductory Physical Experiments*. Credit three hours. For pre-medical students and biology majors.

U 60. *Physical Experiments*. Credit three hours.

U NPH3. *Mechanics*. Credit three hours.

U NPH4. *Heat*. Credit four hours.

U NPH5-6. *Electrical Measurements*, Credit four hours in one term and one hour the next.

U 105. *Advanced Laboratory*. Credit three hours.

Announcement as to the term in which a course will be given will be made later if it is not indicated below.

NPH7. **Electricity and Magnetism**. One term. Credit three hours. Prerequisite, (or in parallel), Physics NPH5 and Mathematics 65c or the equivalent. Professor MURDOCK.

Electrostatic and electromagnetic fields, polarization of dielectrics and magnetic media, displacement current, plane electromagnetic waves, the Poynting vector.

NPH8-9. **Electricity and Magnetism**. Two terms. Credit five hours the first term and one hour the second term. Prerequisite NPH7. Professor MURDOCK, Professor COLLINS, Dr. TRISCHKA. First term, three classroom periods and two laboratory periods a week. Laboratory fee, \$10. Second term, one laboratory period a week. Laboratory fee, \$5.

Electrostatic field problems, Laplace's equations in zonal and cylindrical harmonics, electric images, coefficients of potential, capacity and induction; contact potential, thermoelectricity; metallic conduction; thermionic and photoelectric emission; gaseous conduction; oscillatory circuits, resonance, methods of frequency measurement; frequency characteristics of transformers and meters; oscillators, amplification, modulation, demodulation.

NPH10. **Wave Motion and Sound**. One term. Credit, five hours. Prerequisites, Physics NPH3, NPH4, and NPH5 and Mathematics 200. Professor COLLINS. Lectures and laboratory. Laboratory fee, \$10.

\*On leave.



Properties of deformable media; general properties of wave motion; a comparative study of elastic waves, waves on surfaces of liquids and sound waves; a detailed study of sound phenomena.

**NPH11. Analytical Mechanics and Thermodynamics.** (One term. Credit four hours. Prerequisites, NPH3, NPH4, and Mathematics 200 or the equivalent. Professor MURDOCK.

Analytical mechanics of material particles, systems of particles, and rigid bodies; oscillations, Lagrange's equations; first and second laws of thermodynamics, entropy, thermodynamic potentials, the entropy constant.

**NPH12. Electron Physics.** One term. Credit, three hours. Prerequisites, Physics NPH8 and NPH11. Professor GIBBS.

An introductory survey of atomic physics, primarily preparatory to applications in electronics but fundamentally important in other fields; properties of fundamental particles (electron, proton); photons and electron waves; atomic and molecular energy levels; nuclear structure.

**NPH13. Optics.** One term. Credit, five hours. Prerequisites, Physics NPH3, NPH4 and NPH5. Professor COLLINS. Lectures and laboratory. Laboratory fee, \$10.

Geometrical optics, photometry of optical systems; interference and diffraction phenomena; polarized light; application of thermal radiation to temperature measurement.

**NPH14. Electronics.** Credit two hours. Prerequisites, NPH8-9, NPH 10, and NPH12 or the equivalent. Dr. NEWHALL. One lecture and one laboratory period a week. Laboratory fee, \$5.

Fundamental electronics, including motion of electrons and ions in electromagnetic fields, gaseous conduction, the behavior of electrons in metals and related surface phenomena.

**NPH15. Electronics.** Credit, five hours. Prerequisite, NPH14 or the equivalent Professor SMITH and Dr. NEWHALL. Three lectures and two laboratory periods a week. Laboratory fee, \$10.

The generation, propagation, and reception of ultra high frequency radiation.

**201. Introduction to Theoretical Physics.** Part A: Fall term. Credit, three hours. Part B: Each term. Credit, two hours. Prerequisite, Physics NPH11 or the equivalent. Dr. HURWITZ. T Th S, 11.

Part A, lectures and problem work in analytical mechanics and associated topics such as hydrodynamics, elasticity, and statistical mechanics. Part B, Reading and problem work in the mechanics of rigid bodies and thermodynamics. In general the two parts should be taken in the same term.

**202. Introduction to Theoretical Physics.** Part A: Summer term. (Possibly also in Spring term). Credit, three hours. Part B: Each term. Credit, two hours. Prerequisite, Physics NPH7 or the equivalent. Dr. HURWITZ. T Th S, 11.

Part A, lectures and problem work in electrodynamics. Part B, reading and problem work in electrostatics and optics. In general the two parts should be taken in the same term.

**271. Introductory Quantum Mechanics.** One term. Credit, three hours. Prerequisites, Physics 201, and 202 or the equivalent. Professor JAUCH.

The Schrodinger equation. Uncertainty principle. Oscillator, rotator, hydrogen atom. Perturbation theory. Spin and relativity effects.

**272. Quantum Mechanics.** One term. Credit, three hours. Prerequisite, Physics 271. Professor JAUCH.

Theory of atomic spectra, periodic system of the elements, multiplet structure. Quantum theory of collisions; elastic scattering, excitation and ionization, energy loss of charged particles. Brief discussion of molecular structure and of the quantum theory of solids.

**300. Advanced Laboratory.** Each term. Credit, three hours a term. Prerequisite, Physics 105 or the equivalent. Professor COLLINS and Dr. TRISCHKA. Two laboratory periods a week with outside work in reading and computation. Laboratory open T W Th F afternoons. Rockefeller 301. Laboratory fee each term, \$10.

A course of experiments designed to broaden the student's acquaintance with the methods of physical measurements and their interpretation and to afford training in the use of modern physical equipment.

315. **Special Topics in Physics.** Reading or laboratory work in any branch of physics under the direction of some member of the staff.

320. **Special Topics Laboratory.** Prerequisites, Physics 105 or the equivalent and the consent of the instructor. Two laboratory periods a week and discussion periods as arranged. Laboratory fee, \$10 for each field.

Systematic laboratory work together with appropriate lectures and discussions will be offered in the following fields:

320c. **X-Rays.** One term. Credit, three hours. Dr. TRISCHKA. Operation of x-ray tubes; photographic, ionization and Geiger-Müller tube measurements; absorption, Compton effect, emission and absorption spectra, polarization, refraction, and reflection measurements.

320e. **Crystal Structure by X-Ray Diffraction.** One term. Credit, two or three hours. Professor MURDOCK.

Experimental techniques and methods of computation involved in the determination of structure by X-ray diffraction.

320f. **High Temperature Measurements.** Credit, two hours. Professor COLLINS. Application of radiation methods to the measurement of temperature.

405. **Mathematical Methods in Physics,** Summer term. Credit, three hours. Prerequisite, First term of Physics 405 or the equivalent. Professor SMITH.

The second term of a two-term course. Lectures and problem work designed to give the student a working knowledge of the principal mathematical methods used in advanced physics.

The following courses will be given when the conditions warrant, but probably not during the academic year 1944-45.

142 Heat

223 Theory of Electric Waves

233 Theoretical Optics

254 Kinetic Theory and Statistical Mechanics

320 Special Topics Laboratory

(a) Nuclear Physics

(b) Spectroscopy

(d) Electronics and Ionics (See NPH14)

(g) Microwaves (See NPH15)

452 Hydrodynamics and Aerodynamics

472 Quantum Mechanics of Spectra

476 Theory of Solids

477 Quantum Mechanics of Collisions } (See Physics 272)

478 Quantum Mechanics of Nuclei }

597 X-Ray and Electron Diffraction

598 X-Rays

640 Advanced Electronics and Ultra High Frequencies (See Physics NPH15)

711 Nuclear Physics

751 Cosmic Rays

# AGRICULTURE, INCLUDING FORESTRY

## AGRICULTURAL ECONOMICS

(BUSINESS MANAGEMENT, FARM MANAGEMENT, LAND ECONOMICS and FARM FINANCE, MARKETING, PRICES and STATISTICS, PUBLIC ADMINISTRATION and FINANCE.)

*Professors* G. P. SCOVILLE, E. G. MISNER, F. A. PEARSON, LELAND SPENCER, V. B. HART, M. P. RASMUSSEN, F. F. HILL, M. S. KENDRICK, M. C. BOND, WHITON POWELL, M. P. CATHERWOOD, S. W. WARREN, F. A. HARPER, L. C. CUNNINGHAM, W. M. CURTISS, T. N. HURD, and H. F. DEGRAFF; *Doctors* I. R. BIERLY and L. B. DARRAH.

Approved Major and Minor Subjects (key to symbols on p. 42)

Agricultural Economics 4  
Business Management 1, 2, 3, 4  
Farm Management 1, 2, 3, 4  
Land Economics and Farm Finance 1, 2, 3, 4  
Marketing 1, 2, 3, 4  
Prices and Statistics 1, 2, 3, 4  
Public Administration and Finance 1, 2, 3, 4

## BUSINESS MANAGEMENT

Attention is directed to the courses in administrative engineering in the College of Engineering, in economics in the College of Arts and Sciences, and in administration in the Department of Hotel Administration.

**120. Personal Financial Management.** Fall term. Credit three hours. Associate Professor CURTISS. Lectures, T Th 11. Warren 125. Discussion, T 1:40-4. Warren 240. Fee for materials furnished, \$2.

Planning an individual's financial program; sources and terms of credit; savings and investments; insurance of property and income; acquisition and disposition of property; provision for dependents.

**121. Financial Statements.** Fall term. Credit three hours. Professor POWELL. Lectures, M W 11, Warren 225. Discussion and quiz, W 2-4. Warren 201. Fee for materials furnished, \$2.

For persons who wish to understand and interpret the statements of financial condition and income of cooperatives and other businesses. Content of and relationship between balance sheet, operating statement, and statement of surplus; methods of valuing assets; analysis by means of ratios.

**122. Accounting Method.** Spring term. Credit three hours. Professor POWELL. Lectures, M W 8. Warren 225. Practice period, M 1:40-4. Warren 201. Fee for materials furnished, \$1.

For persons who wish to understand the records and procedures commonly used in keeping accounts of cooperatives and other businesses. Recording business transactions and deriving financial statements; analyses of costs and budgets.

**126 Farmers' Cooperatives.** Spring term. Credit three hours. Professor POWELL. Lectures, T Th 8. Warren 225. Discussion, Th 1:40-4. Warren 201. Fee for materials furnished, \$2.

What cooperatives have tried to do and what they have done; their special problems of organization, finance, and control.

**127. Business Law.** Fall term. Credit three hours. Mr. ALLAN H. TREMAN. Lectures, M W F 8. Caldwell 100.

Consideration is given chiefly to legal problems of particular interest to persons who expect to engage in business, including contracts, liens, mortgages, and negotiable instruments; ownership and leasing of property; wills; estates; inheritance taxation; and other practical problems.

## FARM MANAGEMENT

2. **Agricultural Geography.** Fall term. Credit three hours. Assistant Professor DEGRAFF. Lectures, W F 11. Warren 225. Laboratory, W 1:40-4. Warren 101. Fee for materials furnished, \$3.

Agriculture as a basic industry; significant developments in the growth of modern agriculture; the adjustment of agriculture to natural and to economic environment; crop and livestock production in New York State, the United States, and other countries; inter-regional trade in agricultural products.

102. **Farm Management.** Spring term. Credit five hours. Professor WARREN. Lectures, M W F 10. Laboratory, F 1:40-4. Warren 101. On days when farms are visited, the laboratory period will be 1:40-6. Fee for materials furnished and for transportation on trips, \$6.

Farming as a business; types of farming; factors affecting profits; forms of tenure and leases; methods of getting started in farming; choosing a farm; use of capital and credit; planning the organization and management of specific farms. One all-day trip and four half-day trips are taken to visit farms in nearby regions.

103. **Farm Records and Accounts.** Fall term. Credit three hours. Two lectures and one laboratory period a week. Fee for materials furnished, \$3.

Planning an accounting system designed to meet the needs of the individual farm and farmer; practice in keeping the records; training in the interpretation and analysis of farm records.

203. **Business Organization and Management of Successful New York Farms.** Fall term. Credit four hours. Prerequisite, course 102 or its equivalent. Professor SCOVILLE. F 1:40-4, S 8-10. Warren 101. Approximate transportation expenses for trips, \$20. Fee for materials furnished, \$2.

During the term some all-day trips are taken usually on Saturdays. Two two-day trips are taken, leaving Friday morning and returning Saturday night.

207. **Methods and Results of Research in Farm Management and Land Economics.** Fall and Spring terms. Credit two hours each term. Professors HILL and WARREN and other members of the departmental staff. Th 4-6. Warren 140.

A discussion of research problems in farm management and land economics. Opportunity will be given to study special problems suggested by members of the group.

209. **Comparative Agriculture.** Fall term. Credit three hours. Professor MISNER. Lectures, T Th 11. Warren 125. Laboratory, F 11-1. Warren 101. Fee for materials furnished, \$2.

Study of agriculture of the different countries of the world, with emphasis on the farm-management aspects.

## LAND ECONOMICS AND FARM FINANCE

181. **Land Economics.** Fall term. Credit three hours. Professor HILL. Lectures, T Th 8. Warren 125. Discussion and laboratory, T 1:40-4. Warren 140. One or two field trips are taken, the expenses of which do not exceed \$2.50. Fee for materials furnished, \$3.

Physical characteristics of land as related to land use; population, technological advance, institutions, and other factors as they affect land utilization; economics of land use; local, regional, and national land-use problems and policies, including tenancy, land valuation, credit, taxation, and conservation.

184. **Farm Finance.** Fall term. Credit three hours. Lecture, Th 10. Lecture and discussion, Th 1:40-4. Warren 125. Fee for materials furnished, \$1.

A study of the credit institutions which serve agriculture.

187. **Farm Appraisal.** Spring term. Credit two hours. Professor WARREN. Lecture and laboratory, T 1:40-6. Warren 101. Fee for materials furnished, \$1.

A study of factors governing the price of land; methods of land valuation; the appraisal of farms for use, for sale, for the purposes of making loans, and for taxation.



## MARKETING

**141. Marketing.** Fall term. Credit three hours. Professor HARPER. Lectures, W F 10. Warren 225. Laboratory and discussion, Th 1:40-4. Warren 240. Fee for materials furnished, \$2.

A general course dealing with problems of distribution of farm products. Characteristics of consumer-demand; factors to be considered in judging the best marketing plan from the standpoint of when, where, in what form, and through what channels to sell; public regulation and controls.

**142. Marketing Fruits and Vegetables.** Fall term. Credit four hours. Professor RASMUSSEN. Lectures, M W F 9. Warren 225. Laboratory, W 1:40-4. Warren 240. Fee for materials furnished, \$3.

A study of the economic factors involved in the marketing of fruits and vegetables. Regional and seasonal competition; areas of distribution; methods of handling; costs of marketing; types of marketing organizations; sales methods; transportation and carrier services; produce law and methods of credit rating; terminal problems; aspects of retailer and consumer-demand.

**143. Marketing Dairy Products.** Spring term. Credit four hours. Professor SPENCER. Lectures, M W F 9. Warren 225. Discussion period, one hour a week by arrangement. Fee for materials furnished, \$2.

A study of the marketing of fluid milk and other dairy products; facts and principles pertaining to demand, supply, prices, and costs of distribution. Special attention is given to wartime and post-war adjustments and to public regulation.

[146. **Milk Distribution and Public Regulation of the Milk Industry.** Spring term. Credit two hours. Professor SPENCER. Not given in 1944-45.]

Lectures and discussions principally by visiting lecturers, including persons connected with milk producers' associations, milk distribution enterprises, and milk control agencies.

**144. Marketing Poultry, Eggs, and Livestock.** Spring term. Credit three hours. Associate Professor CURTISS. Lectures, T Th 10. Warren 225. Laboratory, M 1:40-4. Warren 240. Fee for materials furnished, \$2.

A study of the economic factors involved in the marketing of eggs, poultry, hogs, cattle, sheep, and wool. Subjects considered include: areas of production; distribution channels; sales methods; market costs; cold-storage operations; legislation; demand; terminal market and consumption problems.

**147. Marketing Trip to New York City.** Spring term. Credit one hour. Given only if twenty or more students register. Enrollment limited to 40. Associate Professor CURTISS in charge. Representatives of other departments will cooperate in the course.

Five days of the spring recess will be spent in New York City inspecting and studying the marketing of dairy products, eggs, poultry, fruits, vegetables, livestock, and meat. A short series of introductory lectures will precede the trip—at hours to be arranged.

Fee for materials furnished, \$2. A \$5 deposit for bus hire and incidental expenses will be payable 10 days before the trip. Total cost of the trip need not exceed \$30 in addition to transportation to and from New York City.

**240. Research in Marketing.** Fall and Spring terms. Credit two hours a term. W 4-6. Warren 201.

Designed to be taken continuously by graduate students interested in marketing. Members of the staff will have charge in rotation.

Among the subjects to be considered are: the scope of marketing research; analysis of marketing problems; planning of projects; collecting and analyzing data; presentation of results; critical reviews of marketing research at various institutions.

## PRICES AND STATISTICS

Attention is directed to Mathematics 10 (Mathematics for students of economics and statistics) and to Mathematics 400 (Statistics), in the College of Arts and Sciences.

**111. Statistics.** Fall term. Credit three hours. Professor PEARSON. Lecture, M 8. Warren 125. Laboratory, M 1:40-4. Warren 25. Fee for materials furnished, \$3.

A study of the principles involved in the collection, tabulation, and interpretation of agricultural and marketing statistics. Analysis of statistical problems with an 80-column tabulating machine.

**112. Statistics.** Spring term. Credit three hours. Prerequisite, course 111. Lecture, M 8. Laboratory, M 1:40-4. Warren 125. Fee for materials furnished, \$3.

A continuation of course 111. A study of the application of probable error; sampling; gross, partial, and multiple correlation; curve fitting to problems in this field. Methods of using 80-column tabulating equipment for multiple-correlation analysis.

**115. Prices.** Spring term. Credit three hours. Professor PEARSON. Lectures, T Th 9. Laboratory, W 1:40-4. Warren 25. Fee for materials furnished, \$3.

A study of prices of farm products in relation to agricultural and industrial conditions.

**215. Prices.** Fall and Spring terms. Credit one hour a term. Professor PEARSON. Prerequisite, course 115. W 2-4. Warren B-17.

#### PUBLIC ADMINISTRATION AND FINANCE

Attention is directed to the courses in Government and to Economics 52 (Federal Taxation) in the College of Arts and Sciences.

**135. Local Government.** Fall term. Credit three hours. Two lectures and one laboratory a week. Fee for materials furnished, \$2.

Historical development, organization, and operation of local government. Particular attention is given to receipts, expenditures, and administration of counties, towns, and school districts in New York.

**138. Taxation.** Spring term. Credit three hours. Professor KENDRICK. Lectures, M W F 11. Warren 225. Fee for materials furnished, \$2.

A study of the principles and practices of public finance with emphasis on taxation. Among the topics examined are: the growth of public expenditures; the changing pattern of federal, state, and local taxation; general-property, inheritance, business, and personal income taxation; and the problem of war finance.

**235. Problems in Financial Administration.** Fall term. Credit three hours. Alternates with course 236. Time and room to be arranged. Fee for materials furnished, \$2.

Attention is given to a number of problems in governmental financial administration with special reference to New York, including accounting systems, budgetary procedure, borrowing procedure, and debt and tax limits.

**236. Problems in Public Administration.** Fall term. Credit three hours. Alternates with course 235. Time and room to be arranged. Fee for materials furnished, \$2.

Attention is given to a number of problems in public administration with special reference to New York including state and local planning, personnel administration, and administrative organization.

**238. Seminar in Public Finance.** Spring term. Credit two hours. Professor KENDRICK. W 2-4. Room to be arranged.

An examination of basic problems in public finance.

#### RURAL ECONOMY

**151. Public Problems of Agriculture.** Spring term. Credit two hours. Time and place to be arranged. Fee for materials furnished, \$1.

A discussion of some of the more important problems of agriculture that involve collective or governmental action.

**152. Current Problems of Agriculture.** Spring term. One lecture a week.

## DEPARTMENTAL SEMINAR

299. **Seminar.** Continues through Fall and Spring terms. Departmental staff. M 4. Warren 401.

## AGRICULTURAL ENGINEERING

Professors B. B. ROBB, H. W. RILEY, A. M. GOODMAN, J. C. McCURDY, B. A. JENNINGS, L. M. ROEHL, and F. B. WRIGHT.

**Approved Major and Minor Subjects** (key to symbols on p. 42)

Farm Structures 1, 2, 3, 4  
 Farm Equipment 1, 2, 3, 4  
 Agricultural Engineering 1, 2, 3, 4  
 Engineering of Soil Management 1, 2, 3, 4

The laboratories of the Department are well equipped for the usual types of investigations in the fields listed. Special equipment can generally be supplied when needed.

Students desiring to undertake work in Agricultural Engineering should have, first of all, adequate grounding in the fundamentals of the phase studied and ability to perceive the applications of these fundamentals, since the applications of engineering practices to agriculture, though of great economic importance, are usually successful in proportion as they are direct and simple. Firsthand knowledge of farm life and of rural conditions generally are most essential for some problems. Whether a student's preparation is adequate for any given line of advanced study can be determined only by special consideration of each case.

*Air Conditioning of Animal Shelters and Crop Storages.* For this work available equipment includes automatic recorder for 64 resistance thermometers, hand instruments for 48 stations, potentiometer for thermocouples, thermographs, hygrographs and hygrothermographs, anemometers, and other necessary equipment.

*Land Drainage.* The University farms, being of rolling topography and of various soil types and formations, afford, in their extensive and well-mapped drainage systems, unusual opportunities for advanced study.

1. *Farm Mechanics.* Either term. Three hours a week. Materials fee, \$1.
101. *Electricity on the Farm.* Second term. Three hours a week. Laboratory fee, \$2.50.
102. *Farm Power.* First term. Three hours a week. Laboratory fee, \$3.
103. *Field Machinery.* First term. Three hours a week. Laboratory fee, \$3.
10. *Household Mechanics.* Either term. Three hours a week. For women students. Laboratory fee, \$2.
21. *Farm Engineering.* Either term. Three hours a week. Laboratory fee, \$2.
- [121. *Farm Engineering, Advanced Course.* Second term. Two hours a week. Given in alternate years. Not given in 1944-45.]
122. *Drainage and Irrigation.* Second term. Two hours a week. Given in alternate years.
24. *Farm Concrete.* First term. Two hours a week. Laboratory fee, \$2.
31. *Farm Structures.* First term. Three hours a week. Materials fee, \$1.
40. *Farm Shop Work.* Either term. Two hours a week. Laboratory fee, \$4.
41. *Shop Work for Rural High School Teachers.* Either term. Three hours a week. Laboratory fee, \$4.
47. *Farm Blacksmithing.* Either term. One or more hours a week. Laboratory fee, \$3.

251. **Research in Agricultural Engineering.** Prerequisite, permission to register. Professors ROBB, RILEY, GOODMAN, McCURDY, JENNINGS, and ROEHL and Associate Professor F. B. WRIGHT. Hours as arranged. Investigations for which the student is prepared and for which adequate facilities can be provided. Laboratory fees appropriate to the work undertaken.

252. **Seminary.** Required of graduate students. Both terms, credit one hour a term. Professor ROBB. T 4:30-5:45. Presentation and discussion of papers on special problems in agricultural engineering.

## AGRONOMY

*Professors* R. BRADFIELD, H. O. BUCKMAN, J. K. WILSON, A. F. GUSTAFSON, F. B. HOWE, H. B. HARTWIG, E. V. STAKER, D. B. JOHNSTONE-WALLACE, R. F. CHANDLER, JR., R. B. MUSGRAVE, MICHAEL PEECH, M. G. CLINE, H. A. MACDONALD and D. S. FINK; at Geneva, *Professor* H. J. CONN.

**Approved Major and Minor Subjects** (key to symbols on p. 42)

Soils 1, 2, 4

Field Crop Production 1, 2, 4

The laboratories of the Department are well equipped for chemical, physical, and microbiological investigations of soil and field crops. Greenhouses are available for soil and crop experimentation during the winter and a field, conveniently located and well equipped, is available for experiments on a larger scale during the summer. Special equipment can generally be supplied when needed. The Departmental library contains the more important journals, reference works, and experiment station literature.

Members of the staff will be especially interested in directing research in the field as listed: Professor BRADFIELD, in soil fertility; Professor PEECH in soil chemistry; Professor BRADFIELD in soil physics and physical chemistry; Professor BUCKMAN in soil genesis and geography; Professors HOWE and CLINE in the morphology, classification, and cartography of soils; Professor J. K. WILSON and Professor H. J. CONN in soil microbiology; Professor STAKER in organic soils; Professor CHANDLER in forest soils; Professor GUSTAFSON in soil erosion control; Professor HARTWIG in field crop production; Professors JOHNSTONE-WALLACE, MACDONALD and FINK in pasture management; and Professor MUSGRAVE in field crop ecology. Prospective students are urged to correspond with the member of the staff whose interests are most closely related to their own a few months in advance of the time they expect to enter upon their work, as only a limited number of students can be accommodated.

Students preparing for graduate work in Agronomy are urged to obtain a thorough knowledge of general physics, analytical, organic, and physical chemistry, general botany, bacteriology, plant physiology, and geology. Opportunity will be afforded for further study of some of these subjects after entering the Graduate School, but a student deficient in two or more of these foundation courses cannot expect to receive a degree in the minimum time required for residence. Some practical experience with soil and crop management problems is also desirable. Opportunity to acquire additional experience will be afforded a limited number of students majoring in the Department by summer employment on Departmental projects.

*Students must consult professor in charge before registering for any course numbered above 100.*

## SOIL SCIENCE

1. *The Nature and Properties of Soils.* Fall or spring term. Credit five hours. Laboratory fee, \$3.

101. **Origin, Morphology, Classification, and Mapping of Soils.** Spring term. Credit three hours. Prerequisite, course 1. Lectures, T Th 10. Caldwell 100. Professor HOWE.

A course dealing with the origin, profile characteristics, classification, and mapping of soils. An important part of the course will be devoted to field examination of soils, cartographic expression, and interpretation of soil maps. Field trips to be arranged. Cost of field trips will be included in laboratory fee. Laboratory fee, \$5.

102. **Soil Conservation.** Spring term. Credit two hours. Prerequisite, courses 1 and 11 or their equivalents. Professor GUSTAFSON. Lectures, T Th 11. Caldwell 143. Laboratory fee, \$4.

An analysis of the cause of the decline in the inherent productivity of soils and of practical methods of management which will permanently maintain their pro-



ductivity. The causes of erosion and its control by agronomic methods will receive special emphasis. Two all-day Saturday field trips.

[103. **Organic Soils.** First term. Credit two hours. Prerequisites, course 1 and Chemistry 201. Assistant Professor STAKER. Lectures, W F 8. Caldwell 143. Given in alternate years, not given in 1944-45.]

A course designed primarily for students specializing in soil technology. Emphasis is placed on the composition and properties of organic soils.

104. **Forest Soils.** Fall term. Credit two hours. Prerequisites, course 1 and Botany 31. Associate Professor CHANDLER. Lectures, W F 8. Caldwell 143. Given in alternate years.

Assigned readings and semi-weekly discussions of the more important forest soils literature. There will be occasional field trips.

106. **Soil Microbiology.** Spring term. Credit three hours. With the approval of the instructor, the lectures without the laboratory may be taken for two hours' credit. Prerequisite, course 1, except for students majoring in bacteriology, Bacteriology 1, and Chemistry 201 or its equivalent. Professor WILSON. Lectures, M W 8. Caldwell 143. Laboratory, F 1:40-4. Caldwell 201. Laboratory fee, \$5.

A course in biological soil processes designed primarily for students specializing in soil technology and bacteriology. The laboratory work is supplemented by reports and by abstracts of important papers on the subject.

205. **Soil Fertility, Advanced course.** Fall term. Credit three hours. Prerequisites, course 1 and Chemistry 201, or its equivalent. Professor BRADFIELD. Lectures, T Th S 8. Caldwell 143.

The lectures are supplemented by reviews of literature and by the preparation of abstracts.

207. **Physical and Chemical Properties of Soil. Lectures.** Spring term. Credit three hours. Prerequisites, course 1, Physics 3 and 4, Chemistry 201. A course in physical chemistry is recommended. Professor BRADFIELD. Lectures, T Th S 8. Caldwell 143.

A study of physical and chemical processes and changes which take place in soils with emphasis upon their practical application and significance.

208. **Physical and Chemical Properties of Soils. Laboratory.** Spring term. Credit three hours. Must be preceded or accompanied by Agronomy 207. Enrollment limited. Professor BRADFIELD and Professor PEECH. Laboratory, M W 1:40-4. Caldwell 294. Laboratory fee, \$5.

Laboratory practice in the use of physical and physico-chemical techniques used in soil investigations.

209. **Research in Soil Science.** Throughout the year. Professors BRADFIELD, BUCKMAN, CONN, GUSTAFSON, J. K. WILSON, PEECH, and HOWE. Associate Professor CHANDLER, and Assistant Professors STAKER and CLINE.

210. **Special Topics in Soil Science.** Throughout the year. Credit one to three hours. Prerequisites, ten credit hours in Soil Science. Day and hour to be arranged.

Topics for 1944-45: To be announced later.

#### FIELD CROPS

11. **Production of Field Crops.** Fall or Spring term. Credit four hours. Laboratory fee, \$3.

[211. **Field Crops, Advanced Course.** Spring term. Credit two hours. Prerequisites, Agronomy 11, Botany 31, and Plant Breeding 211, or their equivalent. Professor H. B. HARTWIG. Lectures and discussions, T Th 10. Caldwell 250. Given in alternate years, not in 1944-45.]

A literature course organized to meet the needs of students specializing in field crops. Current problems involving crops other than pasture will be considered. The emphasis will be on forage crops. In addition to lectures, papers will be assigned for reading and abstracting.

212. **Pastures.** Spring term. Credit three hours. Prerequisites, courses 1 and 11, or their equivalent. Assistant Professor JOHNSTONE-WALLACE. Lectures and dis-

cussions, T Th 9. Caldwell 143. Laboratory and field trips, Th 1:40-4. Laboratory fee, \$4.

Special attention will be devoted to the principles involved in the improvement and management of pastures in humid, temperate climates. Current literature will be studied.

[213. **Crop Ecology.** Fall term. Credit three hours. Prerequisites, course 11 and Botany 31, or their equivalent. Assistant Professor MUSGRAVE. Given in alternate years, not to be given in 1944-45.]

An analysis of the environment of crop plants and their ecological responses, with emphasis on the cereals and on the legumes and grasses used for forage.

219. **Research in Field Crop Production.** Throughout the year. Professor HARTWIG; Assistant Professors JOHNSTONE-WALLACE, MUSGRAVE, FINK and MAC DONALD.

#### AGRONOMY

290. **Seminar.** Throughout the year. Required of graduate students taking work in the Department. Professor BRADFIELD and departmental staff. S 11-12:30. Caldwell 143.

#### ANIMAL BREEDING

See under ANIMAL SCIENCES, p. 76.

#### ANIMAL HUSBANDRY

*Professors* F. B. MORRISON, W. H. ADOLPH, S. A. ASDELL, L. A. MAYNARD, J. I. MILLER, G. W. SALISBURY, K. L. TURK, and J. P. WILLMAN; *Associate Professor* J. K. LOOSLI; *Assistant Professors* G. H. ELLIS and S. E. SMITH.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Animal Husbandry 1, 2, 3, 4

Animal Nutrition 1, 2, 3, 4 (See also under Animal Nutrition)

Animal Breeding 1, 2, 3, 4 (See also under Animal Breeding)

*Note.* If the major for the Ph.D. degree lies in one of these three fields, not more than one of the other two should be selected for a minor.

For the special facilities of the Animal Husbandry department in Animal Breeding and Animal Nutrition and detailed descriptions of the courses in these fields see the statements under these subjects.

The department is well equipped with herds and flocks of animals of the leading breeds of livestock and with modern barns adapted for experimental work. The livestock includes a herd of over 300 dairy cattle, a herd of beef cattle, studs of draft horses, a flock of over 200 sheep, and a herd of breeding swine. The library includes a very full collection of the herd and flock registers of all of the breeds of domestic animals kept in this country, amounting to more than one thousand volumes, and affording excellent facilities in heredity and genetics.

The animals of the herds and flocks and their records provide opportunity for studying problems of nutrition, livestock feeding, breeding, and production.

Slaughter and meat laboratories are available for the study of the relation of breeding and nutrition to anatomical structure and to chemical composition and food value. The college animals are available for studies relating to the production and the processing, sale, grading, and measuring of their various products such as milk, meat, and horsepower, including animal mechanics.

In order to enter upon graduate study in animal production, the student should have the equivalent of the following courses: elementary feeds and feeding, elementary breeding, and the elementary production courses in dairy and beef cattle, horses, sheep, and swine.

1. **Livestock Production.** Fall term. Two lectures and one laboratory period a week. Laboratory fee, \$2.

10. *Livestock Feeding*. Spring term. Three lectures and one laboratory period a week.
20. *Animal Breeding*. Fall term. Two lectures and one laboratory period a week. Laboratory fee, \$2.
40. *The Horse*. Spring term. Two lectures and one laboratory period a week. Laboratory fee, \$2.
41. *Livestock Judging: Beef Cattle, Horses, Sheep, and Swine*. Fall term. One lecture and laboratory period a week. Laboratory fee, \$2.
- [42. *Advanced Livestock Judging: Beef Cattle, Horses, Sheep, and Swine*. Spring term. Two lectures and laboratory periods a week. Not given in 1944-45.]
- [43. *Advanced Livestock Judging: Beef Cattle, Horses, Sheep, and Swine*. Fall term. Two lecture and laboratory periods a week. Not given in 1944-45.]
50. *Dairy Cattle*. Spring term. Two lectures and one laboratory period a week. Laboratory fee, \$2.
51. *Advanced Judging, Dairy Cattle*. Spring term. Hours by appointment.
- [60. *Beef Cattle*. Spring term. Two lectures and one laboratory period a week. Not given in 1944-45.]
67. *Beef Cattle and Swine*. Spring term. Two lectures and one laboratory period a week. Laboratory fee, \$2.
- [70. *Swine*. Spring term. Two lectures and one laboratory period a week. Not given in 1944-45.]
80. *Sheep*. Fall term. Two lectures and one laboratory period a week. Laboratory fee, \$2.
90. *Meat and Meat Products*. Fall term, to be repeated in spring term. One lecture and two laboratory periods a week. Laboratory fee, \$2.
93. *Meat Cutting*. Fall term, to be repeated in spring term. One period a week. Laboratory fee, \$2.
110. *Principles of Nutrition*. Fall term. See **Animal Nutrition**.
111. *Laboratory Work in Nutrition*. Fall term. Laboratory course. See **Animal Nutrition**. Laboratory fee, \$10; breakage deposit, \$5.
120. *Problems in Animal Breeding*. Fall term. Given in alternate years. See **Animal Breeding**.
125. *Endocrinology, Reproduction, and Lactation*. Spring term. See **Animal Breeding**.
126. *Problems in Animal Physiology*. Fall term. Given in alternate years. See **Animal Breeding**.
213. *Biochemistry of Lactation*. Spring term. Given in alternate years. See **Animal Nutrition**.
214. *Special Topics in Animal Nutrition*. Spring term. Given in alternate years. See **Animal Nutrition**.
215. *History of Nutrition*. Fall term. See **Animal Nutrition**.
219. *Seminar in Animal Nutrition*. Fall term, to be repeated in spring term. See **Animal Nutrition**.
229. *Seminar in Animal Breeding*. Fall and spring terms. See **Animal Breeding**.
150. *Dairy Cattle, Advanced Course*. Spring term. Credit two hours. Prerequisite, course 50. Professor TURK. Lecture, T 11. Practice, T 1:40-4. Wing E. Analysis of breeding operations in successful breeding establishments. Formulating a breeding program. Selection of foundation females and herd bulls and special problems in the feeding and management of the purebred dairy herd.
200. *Research*. Fall and spring terms. Professors MORRISON, MILLER, SALISBURY, TURK, and J. P. WILLMAN. Hours by arrangement. Laboratory fee determined by nature of work and number of credit hours.
201. *Seminary in Animal Husbandry*. Fall term, to be repeated in spring term. Required of all graduate students taking either a major or minor subject in Animal Husbandry. Professor MORRISON and departmental staff. M 11.

## ANIMAL NUTRITION

See under ANIMAL SCIENCES, p. 78.

## BACTERIOLOGY

See under PLANT SCIENCES, p. 89, and NEW YORK STATE EXPERIMENT STATION AT GENEVA, p. 191.

## DAIRY SCIENCE

Professors J. M. SHERMAN, H. E. ROSS, P. F. SHARP, B. L. HERRINGTON, E. S. GUTHRIE, W. E. AYERS, H. J. BRUECKNER, D. B. HAND, and V. N. KRUKOVSKY; at Geneva, Professors A. C. DAHLBERG, D. C. CARPENTER, J. C. HENING, and J. C. MARQUARDT.

**Approved Major and Minor Subjects (key to symbols on p. 42)**

Dairy Science 1, 2, 3, 4

Dairy Chemistry 1, 2, 3, 4

Biochemistry 1, 2, 3, 4

Before taking up graduate work in dairy science, it is desirable that the student have general chemistry, qualitative and quantitative analysis, organic chemistry, college physics, and general bacteriology, in addition to the elementary courses in the particular field in which he wishes to do his graduate work.

Formal courses open to undergraduate and graduate students are given in the following subjects:

1. *Introductory Dairy Science*. Either term. Credit three hours a week. Laboratory fee, \$7.

5. *Technical Control of Dairy Products*. Second term. One hour a week.

[102. **Market Milk**. Spring term. Credit five hours. Prerequisites, course 1, and Bacteriology 1 or its equivalent. Professors ROSS and BRUECKNER. Lecture and laboratory practice, T Th 12:30-5:30. Dairy Building 119 and 146. Laboratory fee, \$10. Not given in 1944-45.]

The scientific, technical, and sanitary aspects of the fluid milk industry.

[103. **Milk-Products Manufacturing**. Fall term. Credit five hours. Prerequisite, course 1. Professor GUTHRIE and Assistant Professor AYRES. Lectures, recitations, and laboratory practice, T Th 10-3:30. Dairy Building 120. Laboratory fee, \$10. Not given in 1944-45.]

The principles and practice of making butter, cheese, and casein, including a study of the physical, chemical, and biological factors involved.

[104. **Milk-Products Manufacturing**. Spring term. Credit five hours. Prerequisite, course 1; should be preceded or accompanied by course 5. Assistant Professor AYRES. Lectures, recitation, and laboratory practice, F 12-5, S 8-1. Dairy Building 120. Laboratory fee, \$10. Not given in 1944-45.]

The principles and practice of making condensed and evaporated milk, milk powders, ice cream, and by-products, including a study of the physical, chemical, and biological factors involved.

III. **Analytical Methods**. Spring term. Credit four hours. Prerequisite, quantitative analysis. Professor HERRINGTON. Lectures, T Th 10. Laboratory practice, T 1-5. Dairy Industry Building 120. Laboratory fee, \$10.

An advanced course in the chemical analysis of products and materials important in the dairy industry.

[112. **Chemistry of Biological Materials**. Fall term. Credit three hours. Prerequisites, analytical and organic chemistry, and college physics. Associate Professor HAND. M W F 12. Dairy Building 119. Not given in 1944-45.]

A fundamental treatment of the physico-chemical processes occurring in living cells and other biological materials.

113. **Chemistry of Milk**. Fall term. Credit two hours. Prerequisites, qualitative and quantitative analysis and organic chemistry; must be preceded or accom-



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panied by course 112 or its equivalent. Professor P. F. SHARP. Lectures, M W 8. Dairy Building 119.

A consideration of milk and dairy products from the physico-chemical point of view.

**Dairy Bacteriology.** (See Bacteriology 191.)

[220. **Chemistry of Milk Products.** Spring term. Credit four hours. Must be preceded by course 113. Professor P. F. SHARP. Lectures, M T W Th 8. Dairy Building 218. Not given in 1944-45.]

An advanced consideration of the scientific and technical aspects of milk products.

252. **Seminary.** Throughout the year. Without credit. Required of graduate students specializing in the department. Professor SHERMAN. Hours to be arranged. Dairy Building.

### *For Graduates*

Graduate students may elect research problems in any of the various fields of dairy science and in related fields of bacteriology and biochemistry.

### RESEARCH AT THE NEW YORK STATE EXPERIMENT STATION

Research work in dairying is also available to graduate students at Geneva. For further information see page 191.

## FLORICULTURE AND ORNAMENTAL HORTICULTURE

*Professors* L. H. MACDANIELS, R. W. CURTIS, J. P. PORTER, KENNETH POST, R. C. ALLEN and A. M. S. PRIDHAM; and *Doctor* L. G. COX.

### **Approved Major and Minor Subjects** (key to symbols on p. 42)

Floriculture and Ornamental Horticulture 1, 2, 4

The field of research in floriculture and ornamental horticulture affords excellent opportunities for original work. Studies in the propagation, nutrition, culture, and improvement of ornamental plants may be undertaken. Also monographic studies of ornamental groups and their adaptability to use are suitable problems for investigation.

Most of the problems in this field are basically those of plant response with relation to environment and thus the student majoring in the department should have adequate preparation in Botany, Plant Physiology, Genetics, Agronomy, Plant Pathology, Entomology, Chemistry, and elementary Floriculture and should have had experience in the growing and handling of horticultural material. Minor subjects should be chosen in the above-named basic science fields. A candidate for the doctor's degree may find it expedient to arrange a joint major in Floriculture and one of the basic science departments. Under these circumstances the problem would be worked out with horticultural material under the joint supervision of committeemen from the two departments.

The greenhouse, nursery, plant materials, and laboratory facilities of the department are adequate for research in practically any phase of the field. This, with the strong departments in the basic sciences gives an outstanding opportunity for graduate work with ornamental plants at Cornell.

1. *General Floriculture and Ornamental Horticulture.* Fall term. Two lectures and one laboratory period a week. Laboratory fee, \$4; breakage fee, \$2.

2. *Introduction to Landscape Design.* Spring term. Three lectures a week.

5. *Flower Arrangement.* Spring term. One lecture and one laboratory period a week. Laboratory fee, \$8; deposit, \$2.

10. *Taxonomy of Cultivated Plants.* Fall term. One lecture and two laboratory periods a week. Laboratory fee, \$3.

12. *Herbaceous Plant Materials.* Spring term. Two lectures and one laboratory period a week. Laboratory and transportation fee, \$7.

13. *Woody Plant Materials*. Spring term. Two lectures and two laboratory periods a week. Laboratory fee, \$7.

32. *Elementary Landscape Planning and Planting of Small Properties*. Fall term. One lecture and two laboratory periods a week. Laboratory fee, \$5.

112. *Herbaceous Plant Materials*, advanced course. Fall term. One laboratory period a week. Laboratory fee \$2.

113. *Woody Plant Materials*, advanced course. Fall term. Two laboratories a week. Laboratory fee, \$7.

114. *Turf*. Spring term. One lecture and one laboratory period a week.

115. *Plant Propagation*. Fall term. Two lectures and one laboratory period a week. Laboratory and transportation fee, \$5.

125. *Flower Store Management*. Spring term. One lecture and one laboratory period a week. Laboratory fee, \$10; deposit, \$2.

123. **Commercial Greenhouse Production**. Fall term. Credit four hours. Prerequisites, courses 1 and 115, Botany 31, Agronomy 1, and the practice requirement. Associate Professor POST. Lectures and recitation, M W F 9. Plant Science 37. Laboratory, W 1:40-4. Greenhouses. Laboratory and transportation fee, \$7.

A comprehensive study of the application of basic science to the culture of ornamental plants.

124. **Commercial Greenhouse Production**. Spring term. Credit three hours. Prerequisite, course 123. Associate Professor POST. Lectures, M W 9. Plant Science 37. Laboratory, W 1:40-4. Greenhouses. Laboratory and transportation fee, \$2.

A course supplementary to course 123 dealing with the study of the commercial production of florists' crops with emphasis on the practical problems concerned. A trip made to nearby commercial greenhouses.

119. **Outdoor Culture of Ornamental Plants**. Spring term. Credit three hours. Prerequisites, Botany 31 and Floriculture 12, 13, and 115. Assistant Professor PRIDHAM. Lectures, T Th 11. Plant Science 37. Laboratory, F 1:40-4. Laboratory fee, \$2.50.

A study of the principles and practices employed in the production of plants in the nursery and in transplanting, fertilizing, pruning, and winter protection of landscape materials.

132. **Landscape Planning and Planting of Small Properties**. Both terms. Credit four hours a term. Prerequisites, courses 1, 2, 12, 13, 32, and Drawing 15. Associate Professor PORTER and Mr. BAIRD. Lectures, T Th 10. Plant Science 141. Two laboratories. Laboratory fee, \$5.

An advanced course in the design of small properties to follow course 32.

134. **Construction and Planting of Small Gardens**. Fall term. Credit three hours. Intended for advanced students specializing in landscape service. Prerequisite, course 132. Associate Professor PORTER and Mr. BAIRD. Lecture, Th 9. Plant Science 143. Two laboratories. Plant Science 433. Laboratory fee, \$3.

A study of the design, construction, and planting of intimate garden areas with special attention to plant and flower combinations.

241. **Seminar**. Fall term. One hour to be arranged. Required of all graduate students in the department and recommended for senior majors. Plant Science 37.

## FORESTRY

Professors C. H. GUISE and E. F. WALLIHAN.

### Approved Major and Minor Subjects (key to symbols on p. 42)

Forest Conservation 2, 4

Forest Ecology 2, 4

### Graduate Work in Forestry

Instruction and research in forestry on the graduate level leading to advanced professional degrees in forestry have been discontinued.

Graduate students, candidates for the degrees Master of Science or Doctor of Philosophy, may elect to do work of non-professional character in forestry. Pro-

spective graduate students should correspond with the Dean of the Graduate School in order to ascertain the availability of work desired.

#### General Forestry

1. *Farm Forestry*. Fall term. Three hours a week. Laboratory fee, \$1.
2. *Utilization of Farm Woodland Products*. Spring term. Two hours a week.
3. *Conservation of Natural Resources*. Spring term. Two hours a week.
23. *Establishment and Management of Farm Woodlands*. Spring term. Three hours a week. Laboratory fee, \$1.

[166. **Wildlife Conservation in Relation to Forestry**. For graduate and undergraduate students. Fall term. Credit two hours. Prerequisite, *Wildlife Conservation and Management 2*. Professor ————. Not given in 1944-45.]

A consideration of the place of wildlife conservation and management in the multiple purpose programs which govern the full and rounded use of the national, state, and private forests.

291. **Seminar**. Spring term. Without credit. Members of the staff. Hours to be arranged. Field and classroom conferences.

#### POMOLOGY

Professors A. J. HEINICKE, M. B. HOFFMAN, R. M. SMOCK, DAMON BOYNTON, and A. VANDOREN; at Geneva, Professors RICHARD WELLINGTON, H. B. TUKEY, and R. C. COLLISON.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Pomology I, 2, 4

The large experimental and varietal orchards of different fruits at Ithaca and at Geneva are available for graduate use. Representative varieties of all domesticated species that grow in this climate may be found in these orchards. Each year a large collection of exotic fruit is brought together at the College; herbarium and preserved material is also available. The important pomological literature required for research is found in the libraries at Cornell and at the State Station. Modern apparatus for research work on pomological problems involving chemical, histological and physiological technique is available in the departmental laboratories. Opportunity for investigation of fruit storage problems is afforded by a modern cold storage plant which is equipped for experimental purposes.

Special facilities for research work in fruit breeding, nursery stock investigations, and other phases of pomology are also available to graduate students at Geneva. (For further information, see page 191.)

In order to enter upon graduate work in Pomology, the student should have the equivalent of the following courses: General Botany, Elementary Plant Physiology, Economic Entomology, Elementary Plant Pathology, Introductory Inorganic and Elementary Organic Chemistry, Elementary Pomology, and Systematic Pomology. In addition, students are required as part of their graduate work in Pomology to take advanced courses in Plant Physiology and Chemistry, unless minors are chosen in those subjects. They are urged, however, to choose a minor in some phase of Botany, particularly Plant Physiology.

On account of the nature of the work, it is very desirable that graduates studying for the Master's degree should spend one summer at Ithaca or Geneva or in the field investigating their special subject. This is expected of graduates working for a Doctor's degree.

1. *General Pomology*. Spring term. Credit three hours. Laboratory fee, \$1.50.

102. *Fruit Varieties*. First term. Credit two hours.

111. *Handling, Storage, and Utilization of Fruit*. Fall term. Credit three hours.

[112. *Advanced Laboratory*. Second term. Credit two hours. Not given in 1944-45.]

[121. **Economic Fruits of the World**. Professor ————. Lectures, T Th 12. Laboratory, F 1:40-4. Plant Science 107. Given in alternate years, not in 1944-45.]

A study of all species of fruit-bearing plants of economic importance, such as the date, the banana, the citrus fruits, the nut-bearing trees, and the newly introduced fruits, with special reference to their cultural requirements in the United States and its insular possessions. All fruits not considered in other courses are considered here. The course is designed to give a broad view of world pomology and its relationships with the fruit industry of New York State.

[131. **Advanced Pomology.** Credit four hours. Prerequisites, Pomology 1 and 2 and Botany 31. Professor HEINICKE. Lectures, M W F 10. Conference, W 11. Plant Science 141. Given in alternate years. Not given in 1944-45.]

A systematic study of the sources of knowledge and opinion as to practices in pomology. The results of experiences and research pertaining to pomology are discussed with reference to their application in the solution of problems in modern fruit growing.

231. **Special Topics in Experimental Pomology.** Fall term. Credit three hours. Prerequisite, Pomology 131. Professor HEINICKE. Associate Professors BOYNTON and SMOCK. Conference periods, M W F 10. Plant Science 141. Given in alternate years.

In this course the student is expected to review critically and evaluate the more important original papers relating to pomological research. Interpretation of the literature will be made on the basis of the fundamental principles of plant biology. Modern experimental methods applicable to the field of pomology are fully considered.

201. **Research Problems in Pomology.** Fall and Spring terms. Professors HEINICKE, HOFFMAN, SMOCK, BOYNTON and VANDOREN.

[200. **Seminar.** Members of the staff. M 11. Plant Science 404. Not given in 1944-45.]

#### POULTRY HUSBANDRY

*Professors* J. H. BRUCKNER, G. O. HALL, G. F. HEUSER, F. B. HUTT, L. C. NORRIS, A. L. ROMANOFF.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

##### Poultry Husbandry 2, 4

The department provides excellent facilities for research in the genetics, physiology, incubation, embryology, nutrition, and behavior of domestic birds. A flock of over 4000 birds of various breeds of the domestic fowl is maintained, and turkeys, ducks, geese, and game birds can be obtained when needed. The equipment includes the usual facilities for hatching, brooding, and rearing poultry, together with laying houses and pens for experimental work. There is a well-equipped chemical laboratory and complete facilities for work in poultry nutrition, equipment for studies of incubation and facilities for various kinds of histological and physiological work.

The accumulated records of the department are available for study, and other extensive data are provided by two laying tests conducted under the supervision of the department.

Students for the Ph.D. degree in this department may elect either Animal Breeding or Animal Nutrition as the major field of study. For requirements and courses in these fields, see pp. 76 and 78 of this publication. Animal Breeding and Animal Nutrition may also be elected as major or minor fields of study for the M.S. degree.

Poultry Husbandry may be elected as a major for the M.S. degree and as a minor for the M.S. or Ph.D. degree when the major is taken in a field of study other than Animal Breeding or Animal Nutrition.

The prerequisites for graduate students electing a major subject in this department include some undergraduate training in poultry husbandry, some experience in that field, courses in zoology or animal biology, physiology, and chemistry, as well as permission of the major adviser.



1. *Farm Poultry*. Fall term. Credit three hours.
20. *Poultry Breeds, Breeding, and Judging*. Fall term. Credit three hours.
30. *Poultry Incubation and Brooding*. Spring term. Credit three hours.
50. *Marketing Poultry Products*. Spring term. Credit two hours. Laboratory fee, \$2.
110. *Poultry Nutrition*. Spring term. Credit three hours.
170. *Poultry Hygiene and Disease*. Fall term. Credit two hours.
120. *Poultry Genetics*. Spring term. For details see Animal Breeding.
- [140. *Anatomy of the Fowl*. Fall term. Credit two hours. Not given in 1944-45.]
209. **Seminar in Poultry Biology**. Throughout the year. Members of departmental staff. F 4:15. Rice 201. Required of all graduate students in the department.
- A survey of recent literature and research in poultry biology.
210. **Experimental Methods in Poultry Nutrition**. Fall term. For details see Animal Nutrition. Laboratory fee, \$5.
219. **Animal Nutrition Seminar**. Fall and spring term. For details see Animal Nutrition.
220. **Animal Genetics**. Fall term. For details see Animal Breeding.
229. **Seminar in Animal Breeding**. Fall, to be repeated in spring term. For details see Animal Breeding.

## VEGETABLE CROPS

*Professors* H. C. THOMPSON, PAUL WORK, E. V. HARDENBURG, ORA SMITH, HANS PLATENIUS, and G. J. RALEIGH; at Geneva, *Professors* C. B. SAYRE, W. T. TAPLEY.

## Approved Major and Minor Subjects (key to symbols on p. 42)

## Vegetable Crops 1, 2, 4

Opportunity is available for research in such lines of vegetable growing and handling as the student may select. There are excellent opportunities for original work on this subject.

The facilities available include the regular classrooms and laboratories; research laboratories, with the necessary equipment for chemical and physiological work; cold storage and common storage rooms; greenhouse space of approximately 7,500 square feet; hotbeds and cold frames; and about 25 acres of land devoted to teaching and research work. Special equipment is obtained as needed for students majoring in this field.

In order to enter upon graduate work in this field, the student should have the equivalent of the following courses: Botany 1 and 31, Plant Pathology 1, Entomology 12, Agronomy 1, Vegetable Crops 1, 2, 12. These courses are outlined in the *Announcement of the College of Agriculture*. In case a student has not had all of these courses, he should take them early in his period of graduate study. Students taking either a major or a minor in vegetable crops are required to take the courses 101, 113, 225, and to attend the seminar.

Students majoring in vegetable crops will ordinarily find it necessary to spend at least one summer in Ithaca, in order to grow and study plant materials used in their research work.

1. *Vegetable Crops*. Spring term. Credit three hours. Laboratory fee, \$2.
2. *Special Cash Crops*. Spring term. Credit three hours. Botany 1 should precede or accompany this course. Laboratory fee, \$2.50.
12. *Grading and Handling Vegetable Crops*. Fall term. Credit three hours. Laboratory fee, \$2.50.

101. **Advanced Vegetable Crops**. Fall term. Credit four hours. Prerequisites, course 1 and Botany 31. Professor THOMPSON. Lectures, M W F 9. One conference period to be arranged. East Roberts 223.

This course is devoted to a systematic study of the sources of knowledge and opinions as to practices in vegetable production and handling. Results of experi-

ments that have been concluded or are being conducted are studied and their application to the solution of practical problems is discussed.

**113. Types and Varieties of Vegetables.** Credit two or three hours. Prerequisite, course 1 or 2 or permission to register. Professor WORK. To be given during two weeks September 18 to September 29, 1944 inclusive. One or two lectures, two laboratory periods daily beginning at 8 a.m. Monday to Friday inclusive, each week. East Ithaca gardens. Laboratory fee, \$2. A third week for one hour additional credit will be optional. Students will register in fall term to receive credit.

This course deals with the taxonomy, origin, history, characteristics, adaptation, identification, classification, exhibition, and judging of kinds and varieties of vegetables; the characteristics, production, and handling of vegetable seeds. The leading varieties of the vegetable crops are grown each year. The value of the course depends to a great extent upon gaining an acquaintance with the plant material as it grows.

**225. Special Topics in Vegetable Crops.** Spring term. Credit three hours. Prerequisites, course 101 and Botany 31. It is recommended that Botany 231 and 232 precede or accompany this course. Professors THOMPSON, RALEIGH, SMITH, and Associate Professor PLATENIUS. Discussions, M W F 9. East Roberts 223. Given in alternate years.

In this course, intended primarily for graduate students, the student is expected to review critically and to evaluate the more important research publications that deal with vegetable production, handling, and storage problems. In the discussions, attention will be given to research methods and technique.

**231. Research.** Members of the staff are prepared to direct investigations in the various lines of vegetable production and handling.

**232. Seminar.** Fall and spring terms. Members of the department staff. Recent literature is taken up for general study and discussion. All graduate students in vegetable crops are required to take part in this seminar. Time to be arranged. East Roberts 223.

#### RESEARCH AT THE NEW YORK STATE EXPERIMENT STATION

Research work in vegetable crops is also available at Geneva. For further information see page 191.

# SCHOOL OF EDUCATION

## EDUCATION AND RURAL EDUCATION

*Professors* H. R. ANDERSON, T. L. BAYNE, C. E. BINZEL, J. E. BUTTERWORTH, L. A. EMERSON, E. N. FERRISS, F. S. FREEMAN, A. H. GROMMON, E. R. HOSKINS, M. L. HULSE, P. G. JOHNSON, P. J. KRUSE, C. B. MOORE, R. A. OLNEY, E. L. PALMER, W. A. SMITH, R. M. STEWART, F. M. THURSTON, A. L. WINSOR, and A. D. WOODRUFF.

**Approved Major and Minor Subjects for A.M., M.S., M.S. in Agr., and Ph.D.**

(key to symbols on p. 42)

Agricultural Education 1, 2, 3, 4  
Curriculum 1, 2, 3, 4  
Education 3, 4  
Educational Administration 1, 2, 3, 4  
Educational and Mental Measurement (including Statistics) 2, 3, 4  
Educational Method 3, 4  
Educational Psychology 1, 2, 3, 4  
Guidance and Personnel Administration 1, 2  
History of Education 2, 3, 4  
Home Economics Education 1, 2, 3, 4  
Industrial Education 1, 2, 3, 4  
Nature Study 1, 2, 3, 4  
Rural Education 1, 3, 4  
Rural Secondary Education 1, 2, 3, 4  
Science Education 1, 2, 3, 4  
Secondary Education 1, 2, 3, 4  
Social Studies Education 1, 2, 3, 4  
Supervision 1, 2, 3, 4  
Theory and Philosophy of Education 1, 2, 3, 4  
Vocational Education 1

There are two types of advanced degrees for which students in Education may become candidates, as follows:

1. The degrees of *Master of Arts*, *Master of Science*, *Master of Science in Agriculture*, and *Doctor of Philosophy*, administered by the Graduate School.
2. The degrees of *Master of Science in Education* and *Master of Education*, administered by the School of Education under the jurisdiction of the Graduate School.

A separate Announcement listing the offerings in Education may be obtained by writing to the Director of the School of Education, 211 Stone Hall.

### *Admission*

A student may be admitted to candidacy for any of the degrees, Master of Arts, Master of Science, Master of Science in Agriculture, or Doctor of Philosophy, with a major or minor or both, in some phase of Education. For details of admission see page 12.

The requirements for admission to candidacy for Master of Science in Education are the same as for Master of Arts or Master of Science, except that there is no requirement in foreign language.

Requirements for admission to candidacy for the degree of Master of Education will be announced later.

Persons interested in becoming candidates for these degrees should address inquiries to the Director of the School of Education. Formal application for admission should be sent to the Dean of the Graduate School.

*The Degree of Master of Education*

The student who enters the University with the intention of preparing for secondary school teaching will be expected to complete a five-year program. He will register in one of the undergraduate colleges and at the end of four years will normally receive a Bachelor's degree. Upon the satisfactory completion of the five-year program, the professional degree, Master of Education, will be awarded.

*The Degree of Master of Science in Education*

The various programs leading to this degree are planned primarily for those who, having had experience in teaching or other type of educational work, wish to prepare themselves for such specialized forms of service as supervision, counseling, or the administration of an elementary, secondary, vocational, or technical school. For the present, teachers of industrial arts and of industrial and technical subjects should also ordinarily seek this degree. Information regarding requirements for admission to candidacy for this degree will be found in the *Announcement of the School of Education*.

**For information regarding rooms in which classes will be held see the Announcement of the School of Education.**

PRE-PROFESSIONAL AND PROFESSIONAL COURSES  
FOR SECONDARY SCHOOL TEACHERS

*Introduction to Social Science, A, B.* Summer term, to be repeated in fall and spring terms. Credit three hours a term.

A. *Human Growth and Development.* Summer term, to be repeated in spring term. Credit three hours. Fee, \$1.

B. *Human Growth and Development.* Fall term. Credit three hours. Course A is prerequisite to Course B.

100. *Educational Psychology* (Ed. and R.E.) Summer term, to be repeated in fall and spring terms. Credit three hours.

120. *Social Foundations of Education* (Ed. and R.E.) Summer term, to be repeated in fall and spring terms. Credit three hours. Laboratory fee, \$1.

130. *The Art of Teaching.* (Ed. and R.E.) A two-term course, fall and spring terms.

130a. *The Art of Teaching.* (Ed. and R.E.) Fall term. Credit five to ten hours.

130b. *The Art of Teaching.* (R.E.) Summer term, to be repeated in fall and spring terms. To be taken in two successive terms. Credit two hours the first term the student is registered; eight hours the second term the student is registered. Fee, including transportation, \$20.

131. *Introduction to Teaching in Vocational Agriculture.* (R.E.) Spring term. Credit three hours. Laboratory fee, \$3.

132a. *The Teaching of Agriculture in the Secondary School.* (R.E.) A two-term course, fall and spring terms, in two sequences beginning in either term. Credit three or four hours each term for a total of seven hours. Laboratory fee, \$5.

R.E. 133. *Directed Teaching of Students in Agricultural Education.* Fall term, to be repeated in spring term. Credit to be arranged.

200. **Apprentice Teaching.** (Ed. and R.E.) An eight-week period off-campus to be arranged. Credit six hours. Members of the staff. Required of all candidates for the M.Ed. degree. Prerequisite: satisfactory completion of the first four years of the five-year program, or the equivalent, or special permission.

Students will be assigned to cooperating schools so selected as to provide the most favorable conditions for this type of experience. They will be expected to carry a half-time teaching program including the usual related responsibilities of the teacher. Preparation for teaching and work on special problems under the direction of University instructors will occupy the remainder of the student's time. Each student will be under the immediate supervision of the principal, of a competent local teacher, and of a member of the staff of the School of Education,



210. **Special Problem in Teaching.** (Ed. and R.E.) Summer term, to be repeated in fall and spring terms. Credit two hours. Members of the Staff.

A critical study of some phase of teaching undertaken during the period of apprentice teaching.

220. **Philosophy of Education.** (Ed. and R.E.) Credit two hours. Offered for an eight-week period during the spring term at such time as will not interfere with the student's apprentice teaching. Time and place of meeting to be arranged. Associate Professor HULSE.

For fifth year students in preparation for secondary school teaching under the five-year program. A coordinating course in the professional sequence designed chiefly to develop a critical appreciation of teaching enterprise. It centers, therefore, upon the question of values in education and calls for examination and judgment of aims and content from that standpoint. Every student is required to undertake a study in valuation of the teaching enterprise in his own field of specialization.

#### GENERAL COURSES

199. *Informal Study in Education.* Maximum credit, three hours each term. Members of the staff.

[Ed. 20. **Seminar in Human Development and Behavior.** Fall term. Credit two hours. Primarily for graduate students. Seniors may be admitted with permission of instructor. Professor FREEMAN. Not given in 1944-45.]

R.E. 234. **Seminar.** Spring term. Credit two hours. Open to graduate students contemplating research in education, and who have permission to register. Associate Professor W. A. SMITH. W 2-4.

A consideration of scientific methods applied in education through graduate studies and other educational research.

#### EDUCATIONAL PSYCHOLOGY

R.E. 110. *Psychology: An Introductory Course.* Fall term, to be repeated in spring term. Credit three hours. Laboratory fee, \$1.

R.E. 112. *Psychology for Students of Education.* Summer term, to be repeated in fall and spring terms. Credit three hours. Laboratory fee, \$1.

*Psychology for Students of Hotel Administration.* (*Hotel Administration* 114.) Fall term. Credit three hours.

R.E. 117. *Psychology of Childhood and Adolescence.* Summer term, to be repeated in fall and spring terms. Credit three hours. Laboratory fee, \$1.

*Personnel Administration.* (*Hotel Administration* 119.) Spring term. Credit three hours.

Ed. 8. **Experimental Educational Psychology.** Fall term. Credit and hours to be arranged. Consent of the instructor is required. Education 7 or its equivalent should normally precede this course. Professor FREEMAN.

The application of psychological and statistical methods to problems in education.

Ed. 18. **Individual Differences.** Spring term. Credit three hours. Prerequisite, a course in general or educational psychology. It is desirable, though not required, that Education 7 precede this course. Mrs. RIEMER. T Th 2-3:15.

The nature, causes, and implications of individual differences in abilities and behavior. Study and observation of atypical groups.

R.E. 211a. **Psychology for Students of Education.** Fall term. Credit three hours. For mature students with teaching experience. Professor KRUSE. M F 11-12:20.

R.E. 212. **Psychology of Learning.** Spring term. Credit two hours. Professor KRUSE. Th 4:00-5:45.

[R.E. 213. **Psychology of Learning in the School Subjects.** Fall term. Credit two hours. Assistant Professor BAYNE. Not given in 1944-45.]

[R.E. 218 **Seminar in Educational Psychology.** Spring term. Credit two hours. Professor KRUSE. Not given in 1944-45.]

**Seminar in Personnel Administration.** (*Hotel Administration* 219.) Spring term. Credit two hours. Prerequisite, *Hotel Administration* 119. Professor WINSOR. Th 4:15-6.

#### METHOD

R.E. 121. *Method and Procedure in Secondary School Teaching.* Fall term. Credit three hours.

R.E. 127. *Visual and Auditory Aids in Teaching.* Spring term. Credit two hours.

[R.E. 134a. *Special Education for Out-of-School Youths and Adults.* Spring term. Credit two hours. Not given in 1944-45.]

R.E. 134b, 134c. *Adult Homemaking Education.*

134b. *Organization and Policies.* Spring term. Credit three hours. Fee, \$5; estimated cost of trips, \$8.

134c. *Program Planning and Methods.* Fall term, to be repeated in spring term. Credit three hours. Fee for two hours, \$4 or for three hours, \$5; estimated expenses for field work, \$2 to \$5.

R.E. 226. **Research in Science Teaching.** Fall term, to be repeated in spring term. Credit one or two hours a term. Professor PALMER and Assistant Professor JOHNSON. Hours to be arranged.

Special problems in science teaching.

R.E. 227. **Seminar in Elementary Education.** Spring term. Credit two hours. S 9-10:40.

R.E. 228. **Seminar in Child Guidance.** (*Family Life* 350.) Spring term. Credit two hours. Professor WARING. F 4-6.

For graduate students who have had some work in child guidance.

Ed. 230. **Seminar in Social Studies Education.** Fall term, to be repeated in spring term. Credit as arranged. Associate Professor ANDERSON. M 4:15.

Students working on critical papers, theses, or other research in the field may register for this course.

R.E. 232. **Advanced Problems of Teaching in Vocational Agriculture.** Spring term. Credit two hours. Associate Professor HOSKINS.

R.E. 235. **Seminar in Teaching Home Economics.** Spring term. Credit two hours. Students will need to consult the instructor before registering. Professor THURSTON. Hours to be arranged.

This course provides opportunity for graduate study of methods in home economics education and for field work. It is intended for secondary school teachers, extension workers, college teachers, and leaders in home economics. Individual problems may include experiments, observation, and practice in teaching and supervision. It is especially recommended in connection with courses R.E. 248, R.E. 249, and R.E. 269.

R.E. 249. **Seminar in Home Economics Education.** A two-term course, Fall and spring terms. Credit two to four hours either term. Total credit for the year not to exceed six hours. Students will need to consult the instructor before registering. Professor THURSTON. S 10-12 and hours to be arranged. Field work will be required.

Designed to meet the needs of graduate students who have had experience as home economics educators in schools, colleges, extension service, business, etc. Arrangements will be made for students to work on their individual problems. Courses in philosophy and principles of education, psychology, guidance, curriculum, and measurement are recommended as prerequisites or parallel.

## PREPARATION OF TEACHERS FOR NORMAL SCHOOLS AND COLLEGES

[R.E. 241. **The Preparation of Teachers in Normal Schools and Colleges.** Spring term. Credit two hours. Professor MOORE. Not given in 1944-45.]

R.E. 245. **The Technical and Professional Preparation of Teachers of Agriculture for the Secondary School.** Spring term. Credit three hours. Should follow course 211a or its equivalent. T Th 11-12:30. Professor STEWART.

A course designed to study critically in the light of the teaching of agriculture in secondary schools the programs of teacher education in the colleges of agriculture.

[R.E. 248. **The Preparation of Teachers of Home Economics for Secondary Schools.** Spring term. Credit two hours. Professor THURSTON. Not given in 1944-45.]

R.E. 250. **Seminar in Agricultural Education.** Fall term. Credit two hours. For students whose progress in graduate study is satisfactory. Professor STEWART. T 4-5:30.

## MEASUREMENT AND STATISTICS

Ed. 7. **Mental Measurements.** Fall term. Credit three hours. Prerequisite, a course in general or educational psychology or human growth and development. Professor FREEMAN. T Th S 9.

Development of individual and group tests of intelligence and personality; principles underlying their construction and use; their use in schools, psychological clinics, the armed services, and in other fields. The nature of mental abilities. Use of educational tests. Demonstrations in administering and interpreting tests.

R.E. 251. **Educational Measurement.** Spring term. Credit three hours. Candidates for the principal's certificate may register for two hours' credit. Prerequisite, a course in educational psychology. Assistant Professor BAYNE. S 11-12:30 and an additional hour to be arranged.

The use of aptitude and achievement tests and other measuring instruments in the classification and guidance of pupils, improvement of instruction, and other activities of the teacher and school officer. Those class members who wish may make a study of their own aptitudes and achievements.

R.E. 253. **Introduction to Educational Statistics.** Fall term. Credit three hours. Assistant Professor BAYNE. T Th 10 and an hour to be arranged.

A study of common statistical procedure in relation to critical reading of technical studies, research, and writing reports of studies. As far as possible the work is related to the problems of the individual student.

R.E. 253a. **Statistical Instruments in Education.** Spring term. Credit two hours. Prerequisite, a first course in statistics and permission of the instructor. Assistant Professor BAYNE. T 10.

## ADMINISTRATION AND SUPERVISION

R.E. 246. **Seminar in Industrial and Technical Education.** Credit two hours each term. Professor EMERSON. T Th 2-4.

R.E. 260a. *Organization and Administration of the Secondary School.* Fall term. Credit two hours. Professor FERRISS. M W 2.

A course in the organization and administration of the secondary school.

R.E. 261a. **Fundamentals of Educational Organization and Administration.** Fall term. Credit three hours. Professor BUTTERWORTH. T Th 11-12:30.

A consideration of the main problems in organizing and administering the school program, including the services provided when school and community cooperate in meeting educational needs.

R.E. 262a. **School Finance.** Spring term. Credit two hours. Prerequisite, R.E. 261a or equivalent. Professor BUTTERWORTH. M W 11.

Typical problems: how local school funds are levied, collected and disbursed; cost accounting; budget making; bonding; sources of state funds and their distribution. The discussion is based upon actual problems; prospective members of the class are urged, therefore, to bring with them financial data regarding their schools.

R.E. 262c. **The School Plant.** Spring term. Credit two hours. Prerequisite, R.E. 261a or equivalent. Professor BUTTERWORTH. S 11-12:30.

The planning and utilization of the school building to serve community needs.

R.E. 263. **Procedures and Techniques in Supervision.** Fall term. Credit three hours. Candidates for the principal's certificate may register for two hours' credit. Professor MOORE. M W F 10.

Designed for superintendents, supervisors, and principals. Students taking this course must be prepared to spend four full days or more in observing supervisory procedures in various school systems.

R.E. 264. **Seminar in Rural School Administration.** Spring term. Credit two hours. Professor BUTTERWORTH. T 4:15-5:45.

Topic to be announced.

R.E. 265. **Seminar for Principals.** Fall term. Credit two hours. Required of all graduate students who are candidates for a principal's certificate. Professor MOORE. S 9-10.

R.E. 266. **The Supervision of the Elementary School.** Spring term. Credit three hours. Candidates for a principal's certificate may register for two hours' credit. Professor MOORE. M W F 9.

A course designed for supervisors, elementary school principals, and superintendents.

[R.E. 267. **The Organization and Administration of Vocational Agriculture in the Public Schools.** Spring term. Credit three hours. Should follow or accompany Course 261. Professor STEWART. Not given in 1944-45.]

267b. **The Supervision of Vocational Agriculture in the Secondary School.** Fall term. Credit two hours. Open to teachers, supervisors, principals, district superintendents, and other educational leaders responsible for supervision in this field. S 10-12. Associate Professor W. A. SMITH.

A consideration of the supervisory and professional improvement needs of teachers of vocational agriculture and the procedures and techniques to supervision.

R.E. 268. **Seminar in Rural Educational Leadership.** Fall term. Credit three hours. Professors BUTTERWORTH, FERRISS, and others. M W 3:30-5.

A consideration of problems especially significant in the rural areas. Planned for superintendents, principals, extension specialists, social workers, and others preparing for leadership responsibilities in rural education.

R.E. 269. **The Supervision of Home Economics Education.** Spring term. Credit two hours. Students will need to consult instructor before registering. Professor THURSTON. Hours to be arranged. Field work will be required.

For persons who are now engaged in supervision and in the education of teachers and leaders in service and for those who wish to prepare for such work.

R.E. 276. **Principles of Curriculum Building.** Fall term. Credit three or four hours. Primarily for graduate students. Professor FERRISS. T Th 2-3:30 and an additional hour to be arranged for those wishing to carry further study of curriculum problems.

A consideration of major problems, principles, and techniques in determining educational objectives and curriculum content and organization in elementary and secondary schools in the light of modern theory and practice.

[R.E. 277. **Courses of Study in Vocational Agriculture.** Spring term. Credit two hours. Associate Professor HOSKINS. Not given in 1944-45.]



[R.E. 278. **Seminar in Rural Secondary Education.** Spring term. Credit two hours. Professor FERRISS. Not given in 1944-45.]

[R.E. 293. **Seminar in the Social and Economic Problems of the School Administrator.** Spring term. Credit three hours. Professor BUTTERWORTH and others. Not given in 1944-45.]

## EDUCATIONAL THEORY

[R.E. 194. *Principles of Vocational Education.* Fall term. Credit three hours. Not given in 1944-45.]

R.E. 281. **Rural Secondary Education.** Fall term. Credit three hours. Professor FERRISS. M W F 9.

A consideration of some of the more basic problems in the functions, nature, organization, curriculum, and extension of secondary education in its adaptations to rural and village needs and conditions.

[R.E. 294a. **The Evolution of Educational Theory.** Fall term. Credit three hours. Professor ————. Not given in 1944-45.]

[R.E. 294b. **Theory of Values in Education.** Spring term. Credit two hours. Professor ————. Not given in 1944-45.]

R.E. 294c. **Philosophy of Education.** Spring term. Credit two hours. Professor MOORE. W 4-5:40.

[R.E. 295. **Comparative Education.** Fall term. Credit two hours. Professors BUTTERWORTH, FERRISS, and MOORE. Not given in 1944-45.]

## NATURE STUDY

R.E. 106. *Outdoor Living.* Spring term. Credit two hours.

R.E. 107a. *The Teaching of Nature Study and Elementary School Science.* Fall term. Credit two hours. Laboratory fee, \$1.50.

R.E. 108. *Field Natural History.* Fall term. Credit two hours. Laboratory fee, \$1.

[R.E. 202. **Nature Literature.** Fall term. Credit two hours. Professor PALMER and Miss GORDON. Not given in 1944-45.]

R.E. 205. *The Teaching of Conservation.* Spring term. Credit two hours. Professor PALMER and Miss GORDON. T Th 9.

Consideration of the principles, materials and methods of conservation education useful to teachers and others engaged in teaching wise use of the resources of the nation.

[R.E. 209. **The Nature Movement and Its Makers.** Fall term. Credit two hours. Professor PALMER and Miss GORDON. Not given in 1944-45.]

## GUIDANCE

Ed. 25. **Procedures in Clinical Child Guidance.** Fall term. Credit three hours. Primarily for graduate students; a limited number of qualified seniors may be admitted. All students must have consent of the instructor. Professor FREEMAN. Th 4-6 and conferences.

Procedures and instruments used in case studies of psycho-educational problems of learning and adjustment. Study of case materials. Participation in making actual case studies of pupils.

R.E. 282. **Educational and Vocational Guidance.** Fall term. Credit two hours. Planned primarily for graduate students but a small number of undergraduates with a background of experience may be admitted upon permission of the instructor. Mr. PALMER. W 4-6.

This is an information course. It is designed to familiarize students with (1) the history, principles, and place of guidance in a democratic society, (2) methods of collecting, classifying, interpreting, and disseminating various types of information essential to a successful guidance program (educational, occupational, community, etc.), (3) placement procedures and employment supervision.

R.E. 283. **Counseling Methods.** Spring term. Credit two hours. Planned primarily for graduate students. Mr. PALMER. W 4-6.

The following techniques used in the collection and interpretation of information pertinent to counseling will be considered: interviews, observation, records, reports, case studies, and conferences.

R.E. 217. **Use and Interpretation of Tests in Guidance and Personnel Administration.** Fall term. Credit two hours. Open to students in guidance or personnel administration. Th 4-6. Professor WINSOR.

This course deals with the development, use, and interpretation of aptitude tests as a basis for guidance and selection.

#### RESEARCH

B 300. **Special Studies.** Credit as arranged. Members of the staff.

Students working on theses or other research projects may register for this course. The staff members concerned must be consulted before registration.

## THE ENGINEERING DIVISION

S. C. HOLLISTER,  
*Chairman.*

W. R. CORNELL,  
*Secretary.*

THE ENGINEERING DIVISION of the Graduate School consists of all professors, associate professors, and assistant professors of the College of Engineering, the Dean of the Graduate School, and such other members of the Faculty of the University as have supervision of the work of Graduate Students in the Division.

THE EXECUTIVE COMMITTEE of this Division has general supervision of the graduate work falling within its jurisdiction, and its chairman and secretary are the same as for the Division.

Each of the main branches (Chem.E., C.E., E.E., and M.E.) of the division has a COMMITTEE ON GRADUATE WORK which has direct charge of the following: examining engineering credentials of applicants for admission, which, however, must first be sent to the Dean of the Graduate School; corresponding with applicants for the purpose of giving or receiving information or of giving advice concerning the availability of facilities for the graduate work desired in Engineering; the registration of students in the subdivision, after they have registered in the Graduate School; giving advice and approval regarding the student's program and the selection of his Special Committee, which has direct charge of his work; looking after the completion of undergraduate shortages; and making final review of the student's records to check the fulfillment of all scholastic requirements for the degrees. The membership of the Committees on Graduate Work in the four subdivisions is as follows:

### COMMITTEES ON GRADUATE WORK IN THE ENGINEERING DIVISION

CHEMICAL ENGINEERING—F. H. RHODES, *Chairman*, 124 Olin Hall; C. C. WINDING, *Secretary*, 228 Olin Hall; C. W. MASON, 318 Olin Hall.

CIVIL ENGINEERING—W. L. MALCOLM, *Chairman*, 122 Lincoln Hall; R. Y. THATCHER, *Secretary*, 308 Lincoln Hall; E. W. SCHODER, 206 Lincoln Hall.

ELECTRICAL ENGINEERING—E. M. STRONG, *Chairman*, 107 Franklin Hall; R. F. CHAMBERLAIN, *Secretary*, M 125 Franklin Hall; T. McLEAN.

MECHANICAL ENGINEERING—W. N. BARNARD, *Chairman*, 18 West Sibley; W. R. CORNELL, *Secretary*, 304 West Sibley; W. M. SAWDON, Mechanical Laboratory.

DIVISION REPRESENTATIVE on the General Committee of the Graduate School, and Chairman of Group E.—J. N. GOODIER.

### GRADUATE STUDY IN ENGINEERING

The instructing staffs and the laboratories, libraries, and other facilities of the various departments of the College of Engineering and those of the other departments of the University are available for students desiring to pursue graduate study and research in engineering and allied fields. Graduate students in engineering will also find among the regular and elective courses given in the College and in mathematics, physics, chemistry, and in other departments of the University, many suitable for advanced study. For the courses offered, and for the laboratory, library, and other facilities in Engineering, see the *Announcement of the College of Engineering*.

Due to the war and the accelerated programs there is great uncertainty as to what term any one course will be given. Anyone interested in a course should inquire of the School concerned.

### ADVANCED DEGREES OFFERED

The degrees of Master of Chemical Engineering (M.Chem.E.), Master of Civil Engineering (M.C.E.), Master of Electrical Engineering (M.E.E.), Master of Mechanical Engineering (M.M.E.), Master of Science in Engineering (M.S. in Engineering), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) are

granted in the field of engineering. For the professional degrees, Chem.E., C.E., M.E., and E.E., see the *Announcement of the College of Engineering*.

THE DEGREES OF M.CHEM.E., M.C.E., M.E.E., M.M.E.,  
AND M.S. IN ENGINEERING

Subject to certain general regulations of the Graduate School,<sup>1</sup> the rules governing admission to candidacy for and for graduation with one of the engineering degrees (M.Chem.E., M.C.E., M.E.E., M.M.E., and M.S. in Engineering) are established and administered by the Engineering Division of the Graduate School.

For purposes of administration, the Engineering Division of the Graduate School has created four *Committees on Graduate Work*, one for each of the subdivisions (Chem.E., C.E., E.E., and M.E.). See page 139.

THE DEGREES OF M.S. AND PH.D.

The rules governing admission to candidacy for, and those for graduation with, the degrees of Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) are established and administered by the faculty of the Graduate School.<sup>2</sup> For further information concerning these degrees, see pages 14ff and 21ff.

FELLOWSHIPS AND SCHOLARSHIPS

See pages 37 and 39 of this *Announcement*.

ADMISSION TO GRADUATE STUDY IN ENGINEERING

(1) All applications for admission to the Graduate School and all applications for Graduate Fellowships and Scholarships must be sent to the *Office of the Graduate School*. Obtain the necessary blanks and instructions from that office.

(2) If the applicant wishes to become a candidate for one of the advanced Engineering Degrees his credentials should include not only information requested on page 12, but in addition, (a) a statement showing, if possible, his relative standing in his class, (b) a catalogue of the institution from which he graduated, with each subject that he has completed clearly marked therein, and (c) a detailed statement concerning his practical experience, together with letters from his employers.

(3) In all cases, the applicant should designate as definitely as possible his chosen field of study, both major and minor, so that he may be advised concerning the facilities and personnel available in those fields. See paragraphs 13 and 19 below.

(4) A prospective graduate student is urged to write to the office concerned (Chemical, Civil, Electrical, or Mechanical Engineering) for advice or information.

(5) Candidacy for M.Chem.E., M.C.E., M.E.E., or M.M.E., presupposes the substantial equivalent of the corresponding first degree at Cornell University. In the evaluation of a candidate's credits, however, the quality of his previous work, his practical experience if any, and his chosen fields of advanced study will be considered in making adjustments if the candidate's undergraduate work has not been the exact equivalent of that required for the corresponding undergraduate degree at Cornell.

Candidacy for the degree M.S. in Engineering presupposes graduation from a school or college of recognized standing, with work, either prior to or subsequent to the bachelor's degree, which is equivalent to a recognized curriculum in engineering and which is adequate preparation for the field chosen for graduate work.

(6) A shortage, which does not exceed six university credit hours, may be made up as extra work. If an applicant's total shortage is more than six hours, he may be required, and if more than eighteen hours he will be required, to enter an undergraduate school, and pay the undergraduate fees. See paragraph 12 below.

<sup>1</sup>See pages 12, 15-18.

<sup>2</sup>Although not under the supervision of the Engineering Division, it is to the advantage of candidates for non-professional degrees in Engineering who have registered in the Graduate School to register also in the appropriate branch of the Engineering Division.



(7) The Committees on Graduate Work will recommend for admission to the Graduate School only those applicants who show promise of outstanding ability to pursue graduate study and research, judged by previous record and training.

No applicant will be admitted to the Graduate School for work in Engineering unless he is in at least the upper half of his class. Exception may be made when an applicant can present further evidence which would demonstrate his fitness to carry on graduate work.

(8) When a student's Special Committee considers that a reading knowledge of French or German or both is essential for satisfactory progress in his particular fields of study, the student will be required to demonstrate such knowledge before proceeding with this study.

(9) An applicant who does not care to meet the requirements either for entrance to candidacy for or graduation with an advanced degree may arrange for a program of work as a "non-candidate," provided only that he has had previous training which is adequate for advanced study in the fields of engineering in which he desires to work.

(10) A student whose mother tongue is other than English may be required by the Committee on Graduate Work to furnish satisfactory evidence of his ability to speak, write, and read English to a degree sufficient for satisfactory progress in his graduate work. The Committee may lengthen the minimum time of residence and prescribe some study of English when a student's deficiency in this respect is deemed to place an undue burden upon him and upon the faculty members with whom he is to come in contact.

#### REGISTRATION

A graduate student in engineering must, at the beginning of each term of residence, register first in the Graduate School and then at the office of the Engineering School of whose faculty his major professor is a member.

#### RULES GOVERNING GRADUATE STUDY LEADING TO MASTERS' DEGREES IN ENGINEERING

(11) A Master's Degree in engineering shall be awarded only after the candidate has spent at least one full academic year, or the equivalent, in residence and study at the University.

(12) In general, a graduate student should remove his shortages before he enters his chosen fields of graduate work. Since it is not always practicable to do this, the student may receive permission from the Committee on Graduate Work to make up his shortages while doing his graduate work.

Arrangements can sometimes be made for making up deficiencies in the Summer Session preceding admission to the Graduate School. Sometimes graduate work may also be done in the summer, either in the Summer Session or by special arrangement under "personal direction." To be allowed to work under "personal direction," a student is expected to have spent one year in graduate study, here or elsewhere.

In making up shortages, a student is under the general supervision of the Committee on Graduate Work.

(13) (a) A student shall select a major field of study to which he shall devote not less than one-half nor more than three-fourths of his time. He must also select one or more secondary fields of study to which he shall devote the remainder of his time.

(b) A student shall select one Professor<sup>1</sup> who shall supervise his work in his major field. For each secondary (or minor) field to which he intends to devote not less than one-fourth of his time, he shall select one Professor to supervise his work in that field. The Professor or Professors thus selected shall be known as his

<sup>1</sup>Members of the Faculty who are qualified to supervise the work of graduate students are Professors, Associate Professors, Assistant Professors, and those Instructors who hold the doctor's degree. For the sake of brevity any such member is herein referred to as "Professor."

*Special Committee.* The professor in charge of the major field shall be Chairman of the Special Committee. If the student selects a secondary field to which he intends to devote less than one-fourth of his time, he shall in that field be under the supervision of the Committee on Graduate Work.

(14) A student shall select his program of study and his Special Committee with the advice and approval of the Committee on Graduate Work in that subdivision (Chem.E., C.E., E.E., or M.E.) in which his major subject falls. No change in the program of study or in the personnel of the Special Committee shall be made without the written approval of the appropriate Committee on Graduate Work and the advice of the student's Special Committee.

(15) When a candidate for an advanced degree in Engineering takes a course specified by the Committee on Graduate Work or approved by his Special Committee, he must register in that course and must conform to all the requirements of that course, including the examinations.

(16) If, in the opinion of the Special Committee, a candidate at any time during his residence shows insufficient preparation in any subject or subjects, he may be required to register in and take the work of specified undergraduate courses. His residence requirement will be increased accordingly.

(17) A candidate for a Master's degree in Engineering must present a *thesis* on a subject in his major field. The thesis must show initiative and originality and must conform to the general requirements of the Graduate School. It may take one of the following forms:

(a) An analytical or interpretative discussion of results already in existence.

(b) A design or construction or both, of sufficient importance and originality to demonstrate thoroughly a knowledge of the principles involved and of their applications.

(c) A dissertation based upon his own original investigation, analytical or experimental.

(18) When a student has satisfied all the requirements set by his Special Committee, including a satisfactory final examination, the Special Committee will so certify to the Committee on Graduate Work. The Committee on Graduate Work will then review the student's record and if the student has fulfilled all scholastic requirements imposed upon him, he will be duly recommended for his degree.

#### FIELDS OF GRADUATE INSTRUCTION IN ENGINEERING

(19) A candidate for the Master's degree (M.Chem.E., M.C.E., M.E.E., M.M.E., or M.S. in Engineering) must select his major field in Engineering. He will be allowed considerable latitude in the selection of his minor field or fields, and any field may be chosen which includes a sufficient amount of graduate work, and provided his entire program shows a unified purpose. For instance, a student might select some phase of structural engineering as his major field and economics as his minor field if he could show that his study of economics had a definite purpose consistent with a well-rounded training as an engineer. The major and minor fields available in the College of Engineering are listed below. Graduate courses in engineering are described in the following pages. For opportunities in other fields of graduate study, see elsewhere in this *Announcement*.

#### Approved Major and Minor Subjects<sup>1</sup> (Key to symbols on p. 42)

##### *In Chemical Engineering*

##### Chemical Engineering 1, 2, 4

(Candidates for the degree of Master of Chemical Engineering will be expected to be thoroughly familiar with the general field of Chemical Engineering. Candidates for this degree will be required to select a minor in some other field of engineering or in a related science.)

<sup>1</sup>Any of the basic sciences are also available as minors.

*In Civil Engineering*

- Astronomy
  - Geodetic Astronomy 2, 3, 4
  - Geodesy 1, 2, 3, 4
- Highway Engineering 1, 2, 3, 4
- Hydraulic Engineering 1, 2, 3, 4
- Hydraulics
  - Theoretical 1, 2, 3, 4
  - Experimental 1, 2, 3, 4
- Management Engineering 1, 2, 3, 4
- Materials of Engineering 2, 3, 4
- Mechanics 1, 2, 3, 4
- Railroad Engineering
  - Railroad Maintenance 1, 2, 3, 4
  - Railroad Location 1, 2, 3, 4
  - Railroad Operation and Management 1, 2, 3, 4
- Sanitary Engineering 1, 2, 3, 4
  - Sewage Treatment 2, 3, 4
  - Water Purification 2, 3, 4
- Soil Mechanics 1, 2, 3, 4
- Structural Engineering
  - Structural Engineering 1, 2, 3, 4
  - Theory of Structures 1, 2, 3, 4
- Surveying
  - Geodetic Engineering 1, 2, 3, 4
  - Topographic Engineering 1, 2, 3, 4

*In Electrical Engineering*

- Electrical Communication 1, 2, 3, 4
- Electrical Conduction through Gases 1, 2, 3, 4
- Electrical Design 1, 2, 3, 4
- Electrical Machinery 1, 2, 3, 4
- Electrical Measurements 1, 2, 3, 4
- Electric Circuit Analysis 1, 2, 3, 4
- Electric Power Applications 1, 2, 3, 4
- Electric Power Generation, Transmission, and Distribution 1, 2, 3, 4
- Electronics 1, 2, 3, 4
- High Voltage Technique 1, 2, 3, 4
- Materials of Engineering (in Electrical Engineering) 1, 2, 3, 4

*In Mechanical Engineering*

- Administrative Engineering
  - Industrial Accounting 2, 3, 4
  - Industrial Marketing 1, 2, 3, 4
  - Industrial Statistics 3, 4
- Aeronautical Engineering 2, 4
- Automotive Engineering 1, 2, 4
- Experimental Mechanical Engineering 1, 2, 3, 4
- Fluid Mechanics 1, 2, 3, 4
- Heat-Power Engineering 1, 2, 3, 4
- Industrial Engineering 1, 2, 3, 4
- Machine Design 1, 2, 3, 4
- Materials of Engineering 1, 2, 3, 4
- Mechanical Processing 1, 2, 3, 4
- Mechanics 1, 2, 3, 4
- Metallography 1, 2, 4

## ADMINISTRATIVE ENGINEERING

(See MANAGEMENT ENGINEERING)

Professors J. R. BANGS (on leave), S. S. GARRETT; Associate Professors G. R. HANSELMAN, and H. J. LOBERG.

- 3A21. *Economic Organization*. Each term. Credit three hours.  
 3A31. *Principles of Industrial Accounting and Cost Finding*. Each term. Credit three hours.  
 3A34. *Corporation Finance*. Each term. Credit three hours.  
 3A35a. *Industrial Organization and Management*. Each term. Credit three hours.  
 3A41. *Elementary Industrial Statistics*. Alternate terms. Credit three hours.  
 3A42. *Personnel Management in Industry*. Each term. Credit two hours.  
 3A43. *Engineering Business Law*. Alternate terms. Credit three hours.  
 3A44. *Industrial Marketing*. Temporarily discontinued. Credit three hours.  
 3A45. *Industrial Marketing*. Temporarily discontinued. Credit two hours.  
 3A46. *Engineering Business Law*. Alternate terms. Credit two hours.  
 3A47. *Principles of Cost Control*. Alternate terms. Credit three hours.  
 3A49. *Industrial Relations*. Alternate terms. Credit two hours.  
 3A51. **Business and Industrial Research**. Credit one hour for each forty hours of actual work. Professor BANGS and others. Open to a very limited number of seniors and graduate students who have shown by training and aptitude their ability to carry on original investigations in business and industrial subjects. (Temporarily discontinued).

3A52. *Industrial Salesmanship*. Credit two hours. (Temporarily discontinued).

3A54. *Standard Costs and Management Control*. Alternate terms. Credit three hours.

NOTE:—Only a limited number of graduate students can be taken in this department. Those contemplating graduate work in Administrative Engineering are advised to make advance arrangements with the department.

## AERONAUTICAL ENGINEERING

Professor W. N. BARNARD, and Assistant Professor KOCH.

Problems related to the design and performance of airplanes may be carried on in this field. The laboratories of the College, which include a small wind tunnel, are available for studies on airplanes and their engines. Arrangements may be made with the authorities of the Ithaca airport for flight experiments. Most of the technical reports and notes of the National Advisory Committee for Aeronautics and the Aeronautical Research Committee and many reference books on aeronautics are available in the library.

3B35a **Aerodynamics**. Each term. Credit three hours. Prerequisites, courses 3M21 and 3M22a and b. Two recitations a week. Assistant Professor KOCH.

Properties of air, airfoil characteristics, drag calculations, engine-propeller characteristics and their relation to airplane performance. Stability calculations, performance estimates, and flight testing.

3B46. **Airplane Design**. Each term. Credit two hours. Prerequisite, 3B35. Two recitations a week. Assistant Professor KOCH.

Layout procedure, weight and balance estimates, load factors, materials, and costs. Principles of stress analysis and airplane computations.

3B47, 3B48. **Airplane Computations**. Each term. Credit two hours a term. Prerequisites, course 3B35a; and must be accompanied or preceded by 3B46. Two computing periods a week. Assistant Professor KOCH. The student makes calculations and drawings similar to those required by the Department of Commerce for approval of the design of an airplane.

3B50. **Special Problems in Aerodynamics**. Each term. Credit two hours. Prerequisite, 3B35a. For qualified graduate students and seniors. Assistant Professor KOCH.



## AGRICULTURAL ENGINEERING

See under AGRICULTURE, p. 119.

## AUTOMOTIVE ENGINEERING

Professor W. N. BARNARD and Assistant Professor L. L. OTTO.

Special problems related to Automotive Engineering may be selected for advanced study. Laboratory facilities of the Department of Mechanical Engineering Laboratory are available for research on internal combustion engines, or on the chassis dynamometer; and arrangements may be made for investigations on other automotive topics. Students desiring to take a minor in this field may find courses 3B41, 42, 43 and 44 suitable as a foundation.

**3B41, 3B43. Automotive Design.** Professor L. L. OTTO. Two lectures and two computing periods a week. Offered if conditions permit.

General study of automotive road vehicles and their functioning; driving, braking, steering, springing, power required for operation.

**3B42, 3B44. Automotive Design.** Professor L. L. OTTO. Two lectures and two computing periods a week. Offered if conditions permit.

Power plants of automotive field, particularly internal combustion types. General design and functioning, lubrication, mechanical efficiency, volumetric efficiency, valving, balancing, carburation, ignition, performance.

**3B50. Advanced Automotive Engineering.** For qualified graduate students and seniors. Professor L. L. OTTO.

## CHEMICAL ENGINEERING

Professors F. H. RHODES, C. W. MASON, O. J. SWENSON, W. G. GORTNER, C. C. WINDING; *Doctor E. H. TAYLOR.*

To qualify for admission as a candidate for the degree of M.Chem.E., a student must hold the degree of B.Chem.E., or the equivalent thereof, and must have completed satisfactorily a course substantially equivalent to the course leading to the degree of B. Chem.E. at Cornell University.

The work for the thesis may be in the specific fields of:

**Unit Operations.**

**Unit Processes.**

**Chemical Engineering Economics.**

**Chemical Plant Design.**

**530. Introductory Chemical Microscopy.** Summer term, to be repeated in fall term and in spring term. Credit, three hours. Prerequisite or parallel course, Chemistry 405 or 406. Fee, \$5. Professor MASON and assistants. Lecture: M 10 and Olin R Laboratory Sections: To be arranged. Olin 305.

Lectures and laboratory practice. The use of microscopes and their accessories in chemical and technical investigations. Micrometry; particle size determinations; quantitative estimations; microscopical characteristics and physical chemistry of crystals; illumination, ultramicroscopy and photo-micrography; study of industrial materials such as textile and paper fibers.

**531. Special Methods in Chemical Microscopy.** Summer term, to be repeated in fall term and in spring term. Credit, one or more hours. Prerequisite, 530 and special permission. Fee variable. Professor MASON.

Laboratory practice may be elected in various fields, such as optical crystallography, photomicrography, and the microscopy of industrial materials.

**535. Microscopical Qualitative Analysis (Inorganic).** Summer term, to be repeated in fall term and in spring term. Prerequisite, 530. Professor MASON. Credit, two or more hours. Laboratory periods to be arranged. Olin 305.

**540. Microscopical Methods in Organic Chemistry.** Credit, two or more hours. Prerequisites, 530, Chemistry 340, and special permission. Professor MASON. (Not given in 1944-45.)

545. **Introductory Metallography.** Fall term. Given in alternate terms. Credit, three hours. Prerequisite, 755, or Mechanical Engineering 3X31. Fee, \$10. Professor MASON and assistant. One lecture and two laboratory periods, to be arranged.

Microstructures of alloys, as related to composition, thermal history and physical properties, and explained in terms of general crystallographic phenomena. Preparation of specimens, and principles and use of metallographic microscopes.

550a,b. **Advanced Metallography.** Summer term, 550a and spring term, 550b. Credit; lectures, two hours; laboratory optional, one or more hours. Prerequisite, 545 and consent of the instructor. Fee variable. Professor MASON and assistant.

Lectures and reports on various topics in physical metallurgy. Laboratory work arranged in accordance with the interests of the student, covering heat treatment and structures of ferrous and non-ferrous alloys, or minor research problems.

701a, b. **Chemical Engineering Technology.** A two-term course, summer and fall terms. Credit, two hours a term.

705a, b. **Unit Operations of Chemical Engineering.** A two-term course, spring and summer terms, summer and fall terms, fall and spring terms. Credit, three hours a term.

710a, b. **Unit Operations Laboratory.** A two-term course; spring and summer terms, summer and fall terms, fall and spring terms. Credit two hours a term.

745. **Chemical Engineering Stoichiometry.** Spring term, repeated in summer term and in fall term. Credit, two hours a term.

715. **Synthetic Resins and Plastics.** Fall term. Credit, three hours. Prerequisite or parallel course, Chemical Engineering 705. Associate Professor WINDING.

Polymerization reactions; manufacture and properties of synthetic resins, plastics and rubbers.

720a,b. **Food Technology.** A two-term course. Summer and fall terms; spring and summer terms. Credit, two hours a term. Prerequisite, Chemistry 305, 310, and 405. Assistant Professor GORTNER.

The chemistry of foods, vitamins, methods of food processing, dehydration, freezing.

725. **Petroleum Refining.** A one-term course, summer and spring terms. Credit, three hours. Prerequisite, Chemical Engineering 705. Associate Professor WINDING. Three lectures a week.

Processes used in petroleum refining.

730a,b. **Chemical Plant Design.** A two-term course. Summer and fall terms, fall and spring terms, spring and summer terms. Credit, three hours a term. Prerequisite, Chemical Engineering 705a and b. Deposit, \$10. Professors RHODES and MASON, Associate Professors SWENSON and WINDING, Assistant Professor GORTNER.

Practice in the development of a chemical engineering process and the design of a chemical engineering plant; the work is largely individual work by the student, under supervision.

740a,b. **Chemical Engineering Computations.** A two-term course. Summer and fall terms, spring and summer terms. Credit, two hours a term. Prerequisite, Chemical Engineering 705a and b, and 710a and b. Associate Professor WINDING.

Advanced computations in unit operations of Chemical Engineering.

755a,b. **Materials of Construction.** A two-term course; 755b, summer term and spring term, 755a, fall term. Credit two hours a term. Prerequisite or parallel course, Chemistry 405. Professor MASON. Lectures W F 10, Olin R.

A discussion of the nature, behavior, and application of the important structural materials used in chemical engineering.

760. **Chemical Engineering Instrumentation.** Summer term. Credit two hours. Prerequisite course Chemical Engineering 705. Mr. KRANICH.

Lectures. Basic Principles of instrumentation and process control.

780a,b. **Chemical Engineering Equipment Design.** A two-term course. Spring and summer terms, fall and spring terms. Credit, two hours a term. Prerequisite,

Chemical Engineering 705a and b and 710a and b. Associate Professor SWENSON.  
Detailed design of individual units of chemical engineering equipment.

790. **Special Topics in Chemical Engineering.** Summer term. Credit, one hour.  
Prerequisite, Chemistry 405B. Professors RHODES and MASON.

The use of chemical literature; methods of research; administration of chemical laboratories; patent law; and other special topics.

Graduate students are advised to take this course before beginning thesis work.

792. **Chemistry of Explosives.** Fall term. Credit two hours. Professor RHODES.  
Lectures. Manufacture and properties of primers, propellants, and high explosives. Open to officers of U. S. Navy, to others by special permission only.

793. **Interior Ballistics.** Fall term. Credit, two hours. Professors RHODES.

Lectures. Open to officers of U. S. Navy; to others by special permission only

## DESCRIPTIVE GEOMETRY AND DRAWING

(*In Civil Engineering*)

Professor H. T. JENKINS.

202. *Drawing.* Sophomore. Any term. Credit one hour.

203. *Drawing.* Sophomore. Any term. Credit two hours.

204. *Descriptive Geometry.* Sophomore. Any term. Credit three hours.

205. **Advanced Drawing.** Credit three hours. Assistant Professor JENKINS.

Perspective drawings, rendered in pencil, ink, and washes, of buildings, concrete bridges, dams, and other engineering works; building details of window frames, doors, stairs, and other simple units, to give the student some insight into detailing parts of plans, and further to familiarize him with reading working drawings. Problems in concrete, structural, topographical, highway, and sanitary drafting; engineering drawings, rendered in color, to enable the student to supplement ordinary working drawings with artistic representations so portrayed as to be readily intelligible to non-technical persons.

(*In Mechanical Engineering*)

Professors C. E. TOWNSEND and S. F. CLEARY.

3C11. *Drawing and Descriptive Geometry.* Any term. Credit three hours.

3C12. *Mechanical Drafting.* Any term. Credit three hours.

3C15 a and b. *Drawing.* Throughout the year. Credit two hours a term.

## TOPICS SUGGESTED FOR ADVANCED WORK

**Special Applications of Descriptive Geometry.**

**Economic Organization of Geometric Structures.**

**Drafting Tools and Equipment.**

## ELECTRICAL ENGINEERING

Professors W. C. BALLARD, R. F. CHAMBERLAIN, L. A. BURCKMYER, M. G. MALTI, E. M. STRONG; Associate Professors B. K. NORTHROP, TRUE McLEAN, M. L. MANNING, W. E. MESERVE, H. G. SMITH, A. B. CREDLE; Assistant Professors W. W. COTNER, E. T. B. GROSS, C. L. COTTRELL, J. H. SMITH, M. M. PETERSON.

**RESEARCH:** Research in Electrical Engineering may be divided into two general classes (a) theoretical and (b) experimental. Whenever possible the student is required to prove his theoretical deductions by experiment and conversely he is required to explain his experimental results by theoretical considerations.

For theoretical research the facilities of a well-equipped library are available.

For experimental research special equipment and shop facilities are required. The College of Engineering maintains several mechanics and has machine shops fully equipped to provide shop facilities. The available special equipment required for experimental work along specific lines is given under the general topics outlined below.

**GRADUATE COURSES AND TOPICS:** Members of the faculty are prepared to guide students in the *graduate topics* given below. Seminars are conducted by members of the faculty for groups of graduate students interested in closely related lines of research.

#### ELECTRICAL COMMUNICATIONS

450. *Electronics*. Credit four hours.

451. **Electrical Communication Engineering**. Credit three hours. Prerequisites, 411, 412, 431, 450. Professor BALLARD, Associate Professor McLEAN and Associate Professor CREDELE.

Theory of alternating currents as applies to telegraph, telephone, and radio communication. Theory and application of thermionic devices.

452a. **Electrical Communication Engineering**. Credit three hours. Prerequisite, 451. Professor BALLARD, Associate Professor McLEAN, and Associate Professor CREDELE.

Consideration of problems, apparatus, and measurements particularly applicable to electrical communication engineering.

453-454. **Theory of Communication Networks**. Throughout the year. Credit two hours a term. Must be accompanied or preceded by 451. Associate Professor McLEAN.

Foundation laws of elements and circuits with variable frequency. General network theorems. Two and four terminal structures. Recurrent networks and wave filters. Equalizers. Distributed circuits including continuous and concentrated loading of long lines. Special networks for very high frequencies.

456. **Elements of Broadcast Engineering**. Credit two hours. Prerequisite, 451. Must be accompanied by 452. Professor BALLARD.

Critical analysis and design of equipment used for radio telephone transmission. The laws of acoustics as applied to studio construction and equipment.

4C53, 4C54. **Ultra High Frequency Techniques**. Throughout the year. Credit, first term three hours, second term four hours. One recitation and two laboratory or computing periods each week. Must be accompanied by 451 and 452a. Professor BALLARD, Associate Professors McLEAN, H. G. SMITH and CREDELE.

A study of the theory and techniques of ultra-high frequency equipment. The course will include both theoretical consideration and laboratory testing of various types of high frequency oscillators including triodes, magnetrons, klystrons and other similar tubes; transmission lines including parallel wire and concentric types; wave guides; radiating systems including antenna arrays, electro-magnetic horns, paraboloids, and other directive systems; receivers for ultra high frequency waves; pulse circuits, and cathode ray oscillographs.

Maxwell's field equations and their application in the theory of ultra high frequency propagation and radiation will be considered in some detail.

**Graduate Topics.** Electro-mechanical vibrating systems, propagation of electromagnetic waves, thermionic tubes and their applications, design of radio circuits, sound recording and reproduction, electric wave filters, carrier current telephony.

**SPECIAL EQUIPMENT.** Broadcast transmitter, 1 Kw., complete and up to date in separate building with antenna towers. Complete studio and control equipment. Available to advanced students for special problems. Primary frequency standard, consisting of 100 k.c. temperature controlled quartz crystal oscillator with multivibrator and harmonic amplifier. Laboratory is equipped with 2.5 Kw., 2,000 volt, D. C. power supply and large assortment of power tubes and parts for experimental work on radio transmitters.

Complete type D carrier current telephone equipment, with signalling auxiliaries.



Audible and carrier frequency oscillator, with complete set of resistance, inductance, and capacitance standards for impedance bridge measurements.

Vacuum tube voltmeter-milliammeter and transmission measuring set.

Complete laboratory model 100 line step-by-step dial telephone exchange.

Large assortment of small meters and equipment for studying characteristics of receiving tubes, audio transformers, and telephone equipment.

Standard Signal Generator and wave analyzer.

Complete equipment for the manufacture and exhaustion of experimental electron tubes, both of high vacuum and vapor types, is available for the construction of special apparatus.

#### ELECTRICAL MACHINERY AND ELECTRICAL DESIGN

413. *Direct Current Machinery*. Credit two hours.

412. *Elements of Electrical Engineering*. Credit four hours.

431, 432. *Electrical Laboratory*. Throughout the year. Credit three hours first term, two hours second term.

450. *Electronics*. Credit four hours.

421. **Electrical Practice**. Credit three hours. Three lecture-recitations each week. Prerequisites, 411, 412, 413, 431, 432. Associate Professor MANNING and Assistant Professor GROSS.

Practical aspects of advanced electrical theory, as applied to rotating electric machinery.

442. **Electrical Design**. Credit four hours. Prerequisites, 421 and 433. Associate Professor MANNING.

Fundamental principles underlying the design of direct and alternating current machinery.

433-434. **Advanced Electrical Laboratory**. Throughout the year. Credit four hours a term. Prerequisites, 412, 413, 431, 432, and 450. Professor BURCKMYER. Two recitations and one laboratory period each week.

Laboratory technique and instrumentation. Tests on rotating machinery, transformers, and other apparatus.

**Theory and Characteristics of Electrical Machinery**. Prerequisite, general knowledge of the theory and testing of electrical machinery.

Advanced theory of electric and magnetic circuits. Mathematical treatment of the physical laws involved in the performance of continuous and alternating current machines. Transient behavior of high-voltage apparatus. Relationship between proportions and operating characteristics. The theory underlying special tests for the determination of machine constants.

**Graduate Topics**. Advanced study of the parameters of revolving machines, special design problems, transient analysis of machines, hunting and stability problems, short circuit phenomena, commutation armature reaction.

**SPECIAL EQUIPMENT**. A great variety of direct and alternating current machines is available, so selected as to afford at least one machine of every type ordinarily encountered in practice. Most of these represent modern construction and are of such size and design as to give typical performance, but at the same time provision is made for great flexibility of operation. One 15-kva. synchronous machine is provided with a phase-wound rotor and a squirrel-cage rotor, either of which may be readily used to replace the synchronous rotor. A modern type of synchronous converter is arranged for direct or inverted operation, either single-phase, two-phase, or three-phase, with metering and control boards which permit very rapid change of operating conditions. There are three types of commutating alternating current motors, four types of fractional-horsepower alternating-current motors, and a large number of direct-current machines.

Typical examples of automatic starters for alternating and direct current motors are provided, including time-element, counter-e.m.f., and series lockout types, as well as drum controllers.

The non-rotating apparatus also includes constant-potential transformers of

standard and special construction, constant-current transformers, induction regulators, storage batteries, and a small mercury-arc rectifier.

The electronic laboratory contains various types of high vacuum thermionic devices, gas conduction devices, photo-electric cells, mercury tubes, and a modern 6-phase steel-tank mercury rectifier with grid control and complete vacuum apparatus, so arranged that it may be operated either as converter or inverter.

The facilities for testing are well-planned and very complete. For machine testing, there are numerous Prony brakes, an electric dynamometer, and a special apparatus for determining the complete characteristics of fractional-horsepower motors.

#### ELECTRICAL MEASUREMENTS

431. *Electrical Laboratory*. Credit three hours.

433-4. **Advanced Electrical Laboratory**. See above.

**Graduate Topics.** Design of special types of meters and the characteristics of the exponential response meter, development of methods of measurement, characteristics of measuring instruments.

**SPECIAL EQUIPMENT.** The Standardizing Laboratory includes standard precision ammeters and voltmeters. A Silsbee current-transformer test set, and primary standards of voltage and resistance with the necessary potentiometers and auxiliary equipment arranged for convenient checking of secondary standards and of other meters.

#### ELECTRIC CIRCUIT ANALYSIS

410. *Elements of Electrical Engineering*. Credit four hours.

411. *Elements of Electrical Engineering*. Credit three hours.

423-424. **Advanced Electrical Theory**. Throughout the year. Credit two hours a term. Two recitations each week. Professor MALTI.

The work of the first term covers dimensional analysis, circuits with variable characteristics, coupled circuits, non-sinusoidal currents, and Fourier Series.

The second term is devoted to balanced and unbalanced polyphase circuits, symmetrical components, electric transients, filter circuits, and ladder networks.

485-486. **Heaviside's Operational Analysis**. Throughout the year. Prerequisite, 411 or its equivalent. Concurrently with or preceded by 423 and 424. Credit three hours a term. Professor MALTI. Two lecture-recitations and one computing period a week.

Mathematical introduction covering functions of real variables, functions of complex variables, infinite series, some special functions, integral equations, and Laplace and Fourier transforms. Generalized expansion theorems for differential and difference equations. Application to transient problems in circuits with lumped and distributed parameters, and to ladder networks.

**Seminar in Circuit Analysis.** Throughout the year. One period of two hours each week. Prerequisites, a general knowledge of Circuit Analysis and of the principles of electric machines. Professor MALTI.

This seminar reviews the developments in the fields of circuit analysis and electrical machinery and provides opportunity to discuss the research work of graduate students in these fields.

**Graduate Topics.** General theory of circuits and networks, skin effect, eddy currents in metallic masses, transient phenomena, electro-magnetic oscillations and waves, electric wave filters.

#### ELECTRIC POWER APPLICATIONS

462. **Industrial Application and Control of Electricity**. Credit two hours. Prerequisites, 412 and 432. Professor CHAMBERLAIN.

Study and selection of motor drives and control, electric welding, and electric heating.

465-466. **Illumination**. Throughout the year. Credit two hours a term. Professor STRONG.

ELECTRIC POWER GENERATION, TRANSMISSION, AND  
DISTRIBUTION

422. **Electrical Practice.** Credit three hours. Three lecture-recitation periods each week. Prerequisites, 411, 412, 431, 432. Associate Professor M. L. MANNING and others.

The application of advanced electrical theory to problems in high voltage phenomena, dielectrics, corona, transmission circuits, and lightning protection.

441. **Electric Power Plant Design.** Credit three hours. Prerequisites, 411 and 412. Associate Professor MANNING.

Selection and arrangement of power plant equipment. Operating features, public policy, and finance.

463. **Electrical Power Transmission and Distribution.** Credit three hours. Must be accompanied by 421-423 and 433. Assistant Professor GROSS.

Principles of electric power transmission and distribution. Long lines with distributed parameters. Circle diagrams. Elements of power system stability.

444. **The Economics of Public Utilities.** Credit three hours. Professor CHAMBERLAIN.

A study of the origin and development of public utilities, regulation, rates and rate structures, and public relations.

**Graduate Topics.** Circuit breaker and reactor problems. System disturbances, lightning protection, relay protection, system stability, voltage regulation, corona. Sag stress in transmission lines, insulator stresses, valuations, rate structures, accounting methods, rate of return, public ownership, holding companies, depreciation, public regulation, capitalization.

## HIGH VOLTAGE TECHNIQUE

422. **Electrical Practice.** Credit three hours. See 422 above.

**High Voltage Practice.** Throughout the year. Prerequisites, 422. Associate Professor MANNING and Assistant Professor PETERSON.

Insulation tests of apparatus and insulators. Low-frequency and impulse tests, wet and dry. Corona measurements. Radio influence.

**Graduate Topics.** Behavior of insulating materials under electrical stress. Dielectric strength of solid, liquid, and gaseous insulating materials. Partial and complete breakdown and corona. Lightning studies with models.

**SPECIAL EQUIPMENT.** The new high voltage research laboratory offers unexcelled experimental facilities for research in this field. Equipment includes a three-unit, 60-cycle testing transformer bank that may be connected cascade to provide 750,000 volts, single phase, or wye to provide 433,000 volts, three phase; a 3,000,000 volt impulse generator; radio-influence measuring equipment; and a high-voltage cathode-ray oscillograph. An outdoor transmission line adjacent to the laboratory permits study of corona and behavior of surges under simulated service conditions.

## MATERIALS OF ELECTRICAL ENGINEERING

**Solid Dielectrics.** Throughout the year. Prerequisites, 421-2-3-4. Professor MALTI.

A study of anomalous behavior of solid dielectrics under varying conditions of e.m.f., time, frequency, temperature, pressure, humidity, and ionizing radiation.

**Magnetic Materials.** Throughout the year. Prerequisites, 421-2-3-4. Professor MALTI.

A study of the properties of magnetic materials such as hysteresis, permeability, the effect of crystal structure and heat treatment on the magnetic properties of materials and magnetic analysis (i.e. the correlation of magnetic and mechanical properties).

**Electrical Testing.** Prerequisites, 421-2-3-4 and 433-434. Professor BURCKMYER.

The testing of engineering materials for determining their magnetic and electrical properties.

**SPECIAL EQUIPMENT.** The magnetic testing apparatus includes a Fahy permeameter, an Epstein apparatus and a large motor-generator set comprising two sine-wave generators and a third-harmonic generator on the same shaft, with provision for adjusting phase displacement and for measuring form factor. The dielectric testing apparatus includes an 80,000-volt testing transformer together with full-wave rectifying equipment and an electrostatic voltmeter. Among the general pieces of test equipment are a complete assortment of meters and oscillographs. For the study of discharge of electricity through gas a vacuum system is available, and specially designed tubes to show special discharge phenomena.

### EXPERIMENTAL MECHANICAL ENGINEERING

*Professors* C. O. MACKAY, V. R. GAGE, W. M. SAWDON; *Associate Professors* W. C. ANDRAE, F. S. ERDMAN; *Assistant Professors* D. DROPKIN and L. L. OTTO.

The numerous laboratories and the shops of the Mechanical Engineering Laboratory Department are available for carrying on the many activities in Experimental Mechanical Engineering. See the *Announcement of the College of Engineering*.

Students contemplating experimental research in mechanical engineering should communicate with the department as far as possible in advance of beginning work in order to arrange for the use of available equipment.

3X40 (a) or (b). *Introductory Mechanical Laboratory*. One laboratory period a week and a written report on the work.

3X41. *Mechanical Laboratory*. One laboratory period a week and a written report on the work.

3X51. **Experimental Engineering Research**. Any term. Prerequisites dependent upon field of investigation selected.

Open to a limited number of students who have available at least one laboratory period a week and who have shown proficiency in engineering subjects. Special problems and investigations which are in general carried on in the laboratories under the immediate direction of the members of this department, but which may be carried on in any department of engineering under the general supervision of this department. One hour of credit for forty hours of work.

3X53. **Temperature Measuring Instruments**. Credit two hours. Prerequisites, 3X32 or 3X34. Dr. DROPKIN.

Theory, construction, calibration, and application of: liquid-in-glass thermometers, solid expansion thermometers, pressure-spring thermometers, electrical resistance thermometers, thermocouples, optical pyrometers, and radiation pyrometers. (Offered when conditions permit.)

### TOPICS SUGGESTED FOR ADVANCED WORK

Instrumentation

Heat Transfer

Heating and Ventilation

Refrigeration

Air Conditioning

Flow of Fluids

Power Transmission

Steam Engineering

Compressors and Pumps

Internal Combustion Engines

### HEAT-POWER ENGINEERING

*Professor* F. O. ELLENWOOD; *Associate Professors* R. E. CLARK, and W. H. HOOK; *Assistant Professors* L. T. WRIGHT, and B. J. CONTA.

In each of the many branches of this very extensive field are innumerable opportunities for making advanced studies of interest and value. This advanced work includes such studies as original investigations in engineering thermo-



dynamics; interpretative studies of available data and other material; investigations in power plant economics; the design, selection, and arrangement of apparatus, and plant layout, to meet specific requirements; analytical and experimental research; to mention but a few of the possibilities. The department and college libraries are liberally provided with reference books, periodicals, transactions of engineering societies, reports, and other material related to this field.

As prerequisite for this graduate work the student should have had the equivalent of the fundamental courses in heat-power engineering that are required of undergraduates in mechanical engineering at Cornell. These courses are described in the *Announcement of the College of Engineering*. Those lacking the full equivalent of this training may be required to take one or more of these undergraduate courses or to do specially assigned work to make up deficiency.

The following courses, which are described in the *Announcement of the College of Engineering*, are open to both undergraduate and graduate students:

3P35, 3P36. *Heat-Power Engineering*. Three hours a week.

3P43A. *Heat-Power Engineering*. Three hours a week. Two lectures and one laboratory period a week.

[3P44, 3P45. **Steam and Oil-Engine Plants**. Two hours a week. Prerequisites, 3D31, 3D32, 3D33, 3P31 and 3P32 and must be accompanied or preceded by 3P41 and 3P42. Assistant Professor WRIGHT. Not given in 1944-45.]

Performance characteristics and design features of steam and internal-combustion prime movers, steam generators, condensers, feedwater heaters, evaporators, deaerators, oil engines, pumps, fans, and cooling towers; power-plant piping; automatic control; power plant instruments, fuel-burning equipment; coal-and-ash-handling equipment.

[3P46, 3P47. **Power Plant Computing and Design**. Must be accompanied by 3P44 and 3P45. Two computing periods a week. Assistant Professor WRIGHT. Not given in 1944-45.]

[3P48. **Heating, Ventilating, Air Conditioning**. Credit three hours. Prerequisite, course 3P32. Professor MACKAY. Not given in 1944-45.]

Principles and practice in the conditioning of air, including cooling, heating, dehumidifying, humidifying, and ventilating.

[3P50. **Power Plant Economics; Equipment Selection**. Two hours a week. Prerequisite, 3P32 or 3P34. Assistant Professor WRIGHT. Not given in 1944-45.]

Costs of equipment and plants; energy costs; load curves, station factors; determining characteristics of equipment; selection of best working pressures, temperatures, and cycles; economic number and size of units. Selection of equipment based on these and other determining considerations. Economic operation. Applications to central stations and to industrial power and heating plants. By-product power. Other similar topics.

3P51. **Steam Turbines**. Alternate terms. Two hours a week. Prerequisites, 3P32 or 3P34. Associate Professor CLARK.

Classification of turbines and description of leading features of the various types; mechanical and thermal considerations underlying the action of steam in turbines; calculations involved in turbine design; discussion of building, erecting, and testing; adaptability to special conditions of service; economic results of the use of turbines in engineering practice.

3P52. **Internal Combustion Engines**. Alternate terms. Two hours a week. Prerequisites, 3D31, 3D32, 3D33, and 3P32 or 3P34. Associate Professor CLARK.

Fuels; general theory and salient points in the design and operation of internal combustion engines; study of existing commercial types, relative advantages, and questions of economy; current developments.

[3P53. **Steam Boilers and Related Apparatus**. Two hours a week. Prerequisites, 3D31, 3D32, 3D33, and 3P32 or 3P34. Associate Professor HOOK. Not given in 1944-45.]

Fuels, combustion, combustion apparatus; furnaces and boiler types, proportions, materials, design of details; superheaters, economizers, air heaters; accessories; equipment, arrangement, and operation of steam generating plants.

**3P55. Graphical Computations and Representations.** Each term. Two hours a week. Assistant Professor WRIGHT.

Slide rules; construction of net work charts and alignment charts for the solution of equations; and derivation of empirical equations from experimental curve.

[3P57, 3P58. **Heat Engineering.** Prerequisite, 3P32. Must be accompanied or preceded by 3P41 and 3P42. Professor MACKAY. Two lectures and two computation periods a week. Not given in 1944-45.]

Properties of mixtures, dimensional analysis, fluid flow, heat transmission, selection of fans and pumps and refrigeration; applications to problems in air conditioning.

**3P61, 3P62. Advanced Heat-Power Engineering.** Summer and Fall terms. Credit two hours a term. Two recitations a week. Professor ELLENWOOD.

Consideration of advanced problems dealing with internal-combustion-engine and steam-power plants.

[3P63. **Advanced Thermodynamics.** Two recitations a week. Prerequisite, permission of the instructor. Assistant Professor WRIGHT. Not given in 1944-45.]

The Carnot Principle; temperature scales; entropy; the state properties of a substance; their experimental determination and correlation; equations of state; kinetic theory of gasses; mixtures of ideal gasses; special topics in mathematics will be considered as needed.

**3P70. Advanced Heat-Power Engineering Research.** Each term. Work and credit as arranged. Professors ELLENWOOD and WRIGHT.

Advanced analytical and experimental investigations in this field.

The following group offerings for seniors may be used as minors by graduate students:

**3P81. Internal-Combustion Engines.** Each term. Credit three hours. Prerequisites, 3P35 and 3P36 or their equivalent. Assistant Professors WRIGHT and Mr. GAY.

The principles of operation of spark- and compression-ignition, internal-combustion engines and their auxiliaries; petroleum fuels and their properties; combustion; detonation and octane rating; engine cooling, rating, and performance; supercharging of aircraft and compression-ignition engines; gas turbine cycles.

**3P82. Steam-Power Plants.** Each term. Credit three hours. Prerequisites, 3P35, 3P36 or their equivalent. Professors ELLENWOOD and Associate Professor CLARK.

A review of the thermodynamics of vapor is followed by a further study of combustion and combustion-control equipment, draft apparatus; boilers, condensers, evaporators, feedwater heaters, feed pumps, economizers, and air preheaters; turbines, and plant auxiliaries; performance and cost of steam engines, turbines, and plants.

**3P88. Refrigeration and Air Conditioning.** Repeated each term. Credit three hours. Prerequisites, 3P35, 3P36 or their equivalent. Three periods a week. Assistant Professor WRIGHT.

The general principles of refrigeration with particular emphasis on the equipment; principles and practice in the conditioning of air, including cooling, heating, dehumidifying, and ventilating; application of refrigeration in cold storage.

#### TOPICS SUGGESTED FOR ADVANCED WORK

**Advanced Engineering Thermodynamics.**

**Steam Engineering.**

**Internal Combustion Engineering.**

**Economic Studies.**

**Heat Transmission.**

**Fuels, Combustion, Burners, Furnaces.**

**Flow of Fluids through Closed Conduits; Power Plant Piping.**

Refrigeration.

Compressors and Pneumatic Machinery.

Air Conditioning.

Power and Heating Projects.

### HIGHWAY ENGINEERING

*Professors* W. L. CONWELL (on leave), W. L. MALCOLM, and GILMORE D. CLARKE.

The laboratories for the examination of non-bituminous and bituminous materials and their utilization, soils, subgrade stabilization problems, etc., are located in the School of Civil Engineering. The other laboratories of the School of Civil Engineering, equipped for examining the properties of engineering materials, and the Ceramic Laboratory of the Department of Geology are also available for graduate work in Highway Engineering.

In addition to the scheduled courses for the graduate student, there is much graduate work of an independent character which requires investigation by the student and frequent conferences with staff members. Occasional field trips are also made.

*Note:* For courses in design of highway structures such as large bridges, see Structural Engineering.

265. *Highway Engineering.* Either term. Credit three hours.

265-A. **Low Cost Roads.** Either term. Credit three hours. Prerequisite, 265 or its equivalent.

Study of economic importance of routes and selection of farm to market roads to be improved; location and design; subgrade soils and stabilization of subgrade soils by use of admixtures, chemicals, and bituminous materials; drainage and drainage structures; bituminous treatments and bituminous mats for stabilized subgrades. Survey of the experimental work in the use of materials and design and construction of low cost roads. Design, construction, and maintenance of road mixes, plant mixes, etc.

266. **Highway Laboratory.** Either term. Credit three hours. Prerequisite, 265 or its equivalent; may be taken concurrently with course 265.

Non-bituminous and bituminous materials are tested. Subgrade soils are sampled and their properties examined; subgrade stabilization admixtures are also tested and studied. Bituminous mixtures are designed and their properties examined.

[266-A. **Advanced Highway Laboratory.** Credit three hours. Prerequisites, 265 and 266. Professor CONWELL. Two laboratory periods a week. Not given in 1944-45.]

Non-bituminous and bituminous materials are tested and their characteristics studied. Soils are sampled and examined, and investigations made of the behavior of mixtures of soils with bituminous and non-bituminous materials. Special investigations and tests are made to determine the properties of various combinations of materials and the effects of modifications in design.

[267. **Advanced Highway Engineering.** Credit three hours. Prerequisite, 265 or its equivalent. Professor CONWELL. This course is conducted as a seminar. Meetings are held once each week at hours to be arranged. Not given in 1944-45.]

The topics for assignment and discussion include the economics of highway engineering, highway finance, legislation, regulation, traffic, design, construction, and maintenance of highways, the latest research programs and reports, labor and plant organization for various kinds of highway contracts with special emphasis on the economics of contracting, etc.

[268. **Modern Highway Planning and Design.** Credit three hours. Prerequisite, 265 or its equivalent. Professors CLARKE and CONWELL. Not given in 1944-45.]

Study of geographical, political, and economic divisions of communities with particular reference to highway transportation requirements; analysis of regional plans chiefly concerning the classification of roads and the selection of routes to be abandoned or improved, based upon their economic justification. Design of

regional systems of highways, freeways, and parkways, including the consideration of the economic, safety, and aesthetic aspects. Traffic studies, legislation, financing, and zoning. Design of intersections and grade separations. Problems and reports required.

291 (g). **Highway Engineering Design.** Credit three or more hours. Prerequisites, 265, 270, 271, and 280. Professor CONWELL. Conferences to be arranged. Not given in 1944-45.]

The problems are those encountered in the selection, location, design, and construction of highways. They include the following: economic selection of routes, economic location, design of highways, highway intersections, culverts, highway bridges, retaining walls, and other highway structures. Bills of materials and estimates of cost are usually required, also plant layouts and methods of executing work.

297 (g). **Research in Highway Engineering.** Credit three or more hours. Prerequisites, 265 and 266. Professor CONWELL. Hours to be arranged. Not given in 1944-45.]

Studies of traffic and traffic regulations and legislation may be made. The field of economics of highway engineering offers a wide variety of problems. Laboratory investigations of subgrade soils, subgrade stabilization, and the effects of modifications in design of bituminous and non-bituminous mixtures provide a wide range of topics for research.

## HYDRAULICS AND HYDRAULIC ENGINEERING

### (In Civil Engineering)

Major work in Experimental Hydraulics, Theoretical Hydraulics, or Hydraulic Engineering may consist in part (subject to the thesis requirement) of advanced courses, or the entire minor work may consist of such courses accompanied by special work and reports as may be arranged with the members of the special committee.

A candidate for the degree of Master of Civil Engineering (or of Science), or Doctor of Philosophy, who desires to take either a major or minor subject in these fields of study must ordinarily have completed, preliminary to graduate work, courses in Hydraulics (including laboratory), Municipal Sanitation (including sewer design and construction and sewage disposal), and Water Supply, substantially equivalent to these courses as required of all undergraduates in the School of Civil Engineering. If a graduate student lacks one or more of these preliminary courses or considerable portions of any of them, more than the minimum period of residence may be necessary.

### HYDRAULICS

*Professor E. W. SCHODER; Assistant Professors M. BOGEMA and M. S. PRIEST.*

For major work in Experimental (or Theoretical) Hydraulics the thesis requirement may be satisfied by individual experimental (or theoretical) investigation and a thesis based thereon. The tendency is to underestimate the time required for preliminary thesis work and that necessary for a thorough digestion of results. Consequently the work should be begun, if possible, during the first term of residence.

240. *Hydraulics* (including laboratory work). Either term. Credit four hours.

241. **Advanced Hydraulics.** Credit three hours. Prerequisite, Hydraulics 240 or the equivalent. Professor SCHODER. Lectures, recitations, and problems. Three hours a week.

Topics selected from the following list are taken up, subject to changes to suit group requirements: stability of flotation; barometric levelling; flow over weirs and dams, free and submerged; backwater and non-uniform flow in open channels; the hydraulic jump; water hammer; surges in pipes and canals; viscous flow of fluids and flow of air in pipes; hydraulic similitude and flow in models; some introductory elements of hydrodynamics; impulse wheels and turbines; centrifugal pumps,



242. **Hydraulic Measurements.** Credit three hours. Prerequisite, Hydraulics 240 (including the laboratory) or the equivalent. Professor SCHODER. Three periods a week in laboratory or computing room.

Experimental studies involving usually (as time permits): current meters and floats in canal or river; Pitot tubes in pipes; water meters; weirs; the hydraulic jump; special features of orifices, nozzles, Venturi meters, pipe modern studies; such other occasional experimental measurements as opportunity offers in the laboratory or in the neighborhood of Ithaca; the determination of efficiency, capacity and characteristics of hydraulic machinery by tests.

297 (c). **Hydraulic Research.** Professor SCHODER.

The subject and scope of the investigations in experimental or theoretical hydraulics should be selected by conference at the beginning of the term if not previously arranged. It is often desirable and is permissible for two students to work together on the same investigation. Written reports are required but the test need not be typewritten in thesis style. These reports are kept by the department. In most cases it is necessary to arrange a definite schedule for work in the laboratory to avoid conflicts.

#### HYDRAULIC ENGINEERING

*Associate Professor* L. D. DOTY.

For the master's degree with major work in Hydraulic Engineering the thesis requirement of the Graduate School may be satisfied by work involving original designs, estimates, or analyses based on actual engineering data, these to be gathered by the student himself as an essential part of advanced work in this field. The requirement may not be satisfied by the so-called descriptive type of thesis with only rather vague design based on assumed data.

Ordinarily a candidate for the Ph.D. degree who elects most of his work in the general fields of hydraulic engineering and hydraulics is required to select his thesis in experimental or theoretical hydraulics. Only when the candidate has an adequate background of practical experience and mature judgment will a doctor's thesis in hydraulic engineering be permitted.

230. **Water Supply.** Any term. Credit three hours.

231. **Hydraulic Construction.** Credit three hours. Prerequisite, 230 or the equivalent. Professor DOTY.

This is a computing and designing course dealing with problems of water storage and the design and construction of dams by means of lengthy problems to be solved by graphical and analytical methods and involving the economics of water storage at a given site; the design of a high masonry dam by Wegmann's Method and the tests for safety and stability of design, and the analysis of stresses and stability.

[232. **Water Power.** Credit three hours. Prerequisites, 230 and 240, or the equivalent. Professor DOTY. Three lectures and recitations a week and the working of three lengthy problems during the term. Not given 1944-45.]

The subject matter of the course covers the technique of hydraulic turbines, the analysis of test data, study of the adaptation of turbine types to working conditions, unsteady flow and surging in long conduits, governing, and the analysis of the power available at a low head millsite.

233. **Hydraulic Engineering.** Credit three hours. Prerequisite, 230 or the equivalent. Professor DOTY. Lectures, recitations, and abstracting of references.

Theory of percolating water, ground water development, recent developments in soil technology and the design and construction of earthen dams and levees; theory of design of gravity and arch masonry dams and distribution of stresses in such structures; spillway design; preparation of dam sites; construction methods and plants.

234. **Conservancy and Reclamation Problems.** Credit three hours. Prerequisites, 230 and 240, or the equivalent. Professor DOTY, Lectures, recitations, and abstracting of references.

Flood flow estimates; planning for and designing of flood protection structures, irrigation and drainage works. The Miami Conservancy work will be the chief source of material for the course.

[236. **Water Power and Pumping Plants.** Credit three hours. Prerequisite, 232. May be taken concurrently with course 232. Professor DORY. Not given 1944-45.]

This is a computing and designing course devoted to the problems of designing and detailing power and pumping plants.

291c. **Hydraulic Engineering Design.** Credit three hours. Prerequisite, 240. For best results Hydraulic Design should be preceded by course 230, but the two may be taken concurrently. Professor DORY.

The purpose of the course is to go more into detail in selected phases of hydraulic engineering and is not to duplicate in large part work regularly given in the scheduled courses in hydraulic and structural engineering.

#### TOPICS SUGGESTED FOR ADVANCED WORK

**Hydraulic Turbines.**

**Draft Tube Design and Performance.**

**Centrifugal Pumps.**

**Economics of Water Power Plants.**

#### INDUSTRIAL ENGINEERING

*Professor C. I. MILLARD and Mr. MABIE.*

The departmental library of literature on Industrial Engineering subjects is available for the use of graduate students. In the micro-motion laboratory 16 mm. motion picture cameras and projectors with the necessary auxiliary apparatus are available for motion and process studies as well as the necessary tools and work places for setting up and studying various operations.

The courses offered include a consideration of the organization, administration, and selection and location of equipment for industrial enterprises.

Formal graduate courses are offered and facilities are available for original work in the field of Industrial Engineering.

To take advanced work in this department the student must have had the equivalent of the undergraduate courses 3A35, 3I43, 3I44, and 3A31. Students desiring to take a minor in this field may enroll for the following courses for which they have had the necessary prerequisites.

3I43, 3I44. *Industrial Engineering.* Each term. One lecture and two computing periods a week.

3I48. *Industrial Engineering Economy.* Each term. Two recitations or discussion periods a week.

3I51. *Advanced Industrial Engineering.* Each term. Credit one hour for forty hours of actual work. Open to a limited number of seniors and graduates. Associate Professor MILLARD and Mr. MABIE.

Special problems and investigations which are carried on under the direction of members of the department staff.

[3I52. *Industrial Auditing.* Each term. One lecture and one computing period a week. Not given in 1944-45.]

3I54. *Motion and Time Study.* Each term. One recitation and one laboratory period a week.

#### TOPICS SUGGESTED FOR ADVANCED WORK

**Micro-motion analysis.**

**Investigations for motion and process economy.**

**Practical economic and production investigations in near-by industries.**

**Economic control of quality in production.**

## MACHINE DESIGN

*Professors J. N. GOODIER, F. S. ROGERS; Associate Professor P. H. BLACK, and Assistant Professor W. A. JOHNSON.*

Under this head is included advanced work in kinematics and dynamics, machine design and design methods, and special-design problems and investigational work.

There are eight well-equipped drawing rooms and a very complete collection of Kinematic models. The Department Library, the Library of the School of Mechanical Engineering, and the University Library have a very complete collection of books on kinematics, machine design and construction, mechanical technology, structural design, and other books on related subjects.

3D25. *Kinematics, Recitations.* Each term. Credit three hours.

3D26. *Kinematic Drawing.* Each term. Credit two hours.

3D27. *Kinematics, Recitations.* Each term. Credit two hours.

3D37. *Machine Design, Drawing.* Each term. Credit three hours.

3D38. *Machine Design, Drawing.* Each term. Credit two hours.

3D51. *Tool Engineering.* Each term. Credit two hours. An elective for juniors and seniors in engineering. Assistant Professor JOHNSON. One discussion and two computing periods a week.

The course deals with the theory and principles of operation underlying the design of punches, dies, jigs, and fixtures and with the application of such tools to the production of parts of appliances and machines in small and in large quantities.

[3D52. **Advanced Kinematics and Kinetics.** Prerequisites, 3D25 and 3D26. Professor ROGERS or ————. Two lecture and discussion periods and one laboratory period a week. Not given in 1944-45.]

Graphical and semi-graphical treatment of linear and angular velocities and accelerations and of the resulting forces, stresses, and strains due to the form and mass of the moving parts of mechanisms and machines. Vibration and critical speeds and the theoretical basis and use of balancing machines for securing static and running balance of machine parts, will be treated so far as time permits. (Temporarily discontinued.)

[3D53. **Materials Handling.** Prerequisites, 3D25 and 3D26. Professor ————. Two lectures a week. Not given in 1944-45.]

Treatment and analysis of the known methods of handling different kinds of materials and of the principles and considerations involved in a proper choice of the method of handling any given kind of material. (Temporarily discontinued.)

3D54. **Dynamics and Vibrations of Machinery.** Each term. Credit three hours. Prerequisites, 3D37 and 3M24. Associate Professor BLACK. Two lecture and discussion periods and one laboratory period a week.

Graphical and analytical treatment of velocities, accelerations, static forces, inertia forces, and combined forces. Balancing of engines. Transverse and torsional vibrations, critical speeds, and balancing machines.

3D55. **Advanced Machine Design.** Credit three hours. Prerequisites, 3M24 and 3D37. Associate Professor BLACK and ————. Three lecture and discussion periods a week.

Advanced problems in stress and analysis of machine and structural members including consideration of fatigue, creep, stress concentration, stability, etc. Vibrations and a few special topics.

[3D56. **Design of Pressure Vessels.** Credit two hours. An elective for seniors in engineering and an alternative course for Option I. Mr. CARRIER. Two lecture and discussion periods a week. Temporarily discontinued.]

The course deals with the design of thin and thick pressure vessels under internal or external pressure or both and with the stresses in such vessels and in flat plates, flanges, heads, openings, and connections.

[3D57. **Welding in Machine Design.** Credit two hours. An elective for seniors

in engineering and an alternative course for Option I. Professor ————. One discussion and one computing period a week. Not given in 1944-45.]

The course deals with flame cutting and methods of welding, with shrinkage, warpage, and stress relieving, with inspection and testing, with the design of welded joints, and with the application of fusion welding in the design of appliances and machines.

[3D59. **Special Investigations in Machine Design.** Credit as arranged. Professors GOODIER, ROGERS, BLACK or JOHNSON. Opportunity is offered to qualified students, individually or in small groups, to pursue, under direction, special investigations in machine design and related fields. Not given in 1944-45.]

#### TOPICS SUGGESTED FOR ADVANCED WORK

**Kinematics and Dynamics.**

**Special Design Problems.**

**Vibrations and Critical Speeds.**

**Investigational Work.**

#### MANAGEMENT ENGINEERING

(See ADMINISTRATIVE ENGINEERING)

*Associate Professors* R. Y. THATCHER, CARL CRANDALL, and J. E. PERRY.

The study of methods of construction is neglected in some colleges and the graduate student who is not familiar with them may well take course 264. Books and periodicals on construction methods for various types of work, on management of construction work, and laws and practices governing it are available in the Library of the School of Civil Engineering.

264. *Engineering Construction.* Either term. Credit three hours.

290. *Engineering Law.* Either term. Credit three hours.

293. *Engineering Management.* Either term. Credit three hours.

290-A. **Advanced Engineering Law.** Credit three hours. Prerequisite, 290. Associate Professor THATCHER. Lectures and recitations, three hours a week.

Some of the topics treated in course 290 are here enlarged upon and extended, particularly laws relating to the various phases of construction contracts, employer-employee relationship, workman's compensation, mechanics liens, patents, copyrights, trademarks, and insurance. Among other subjects covered are suretyship, conditional sales, bailments, trusteeship, and taxation. Actual cases are used for illustrating the above and reference is also made to recent court decisions regarding engineering matters.

295. **Valuation Engineering.** Credit three hours. Prerequisites, 264 and 290. May be taken concurrently with course 290. Associate Professor CRANDALL. Lectures, recitations, and reports.

Theory and practice of valuation or appraisal for purposes of utility rate making, purchase or sale, eminent domain or condemnation cases, mergers or joint ownership, taxation and assessment, issuance of securities, bank loans, insurance, uniform system of accounting and improved management. Topics considered include scientific systems of real estate assessment, federal railroad valuation, rate disputes, court rulings, computation of actual rates for gas, telephone, electrical supply and street railways, valuation of land, mines, water power, factories, railroads, toll bridges, buildings, and all kinds of property both tangible and intangible. Detailed examples of forms and methods with outline of typical valuation reports.

297 (h). **Research in Management Engineering.** Any term. Credit three hours or more. Professor ————.

Special problems relating to the economic, legal, and financial aspects of engineering construction projects, management of public works and appraisals.



## MATERIALS OF ENGINEERING

*(In Civil Engineering)**Professor H. H. SCOFIELD.*

The library of the School of Civil Engineering is well supplied with reference works of various kinds on the subject of structural materials, their properties, specifications, and tests. Especial effort is made to add continually the most recent investigations and researches as the results find their way into print.

The laboratory equipment is selected to make all ordinary and many special tests and investigations of the materials of construction. The cement and concrete laboratories are equipped to make all the standard tests upon cement and the various other ingredients entering into concrete. A specialty is made of the tests and investigations of the finished concrete under various conditions as to proportion, manufacture, and design.

225. *Materials of Construction.* Either term. Credit three hours.

226. *Materials Laboratory.* Either term. Credit three hours.

297 (b). **Engineering Research in Materials.** Either or both terms. Credit one hour for forty hours of actual work. Prerequisites, 225 and 226 or their equivalents. Professor SCOFIELD.

Special investigations of an advanced nature of the properties of structural units and the materials of construction. The aim of the course is to secure results by proper investigational methods which are of the caliber and scope deemed essential for publication.

*(In Mechanical Engineering)*

*Professors J. R. MOYNIHAN, J. O. JEFFREY; Associate Professor H. S. SACK; Assistant Professors G. W. EHRHART and J. R. YOUNG.*

Experimental problems related to the testing, control of the properties and engineering applications of ferrous and non-ferrous metals and alloys, non-metallic materials, such as plastics, fuels, lubricants, woods, refractories and foundry sands, may be carried on in this department.

The Materials Testing Laboratory is equipped for tension, transverse, and compression tests with an Olsen 200,000-lb. hydraulic machine, an Olsen 100,000-lb. three-screw machine, an Amsler 100,000-lb. hydraulic machine, a Baldwin-Southwark 50,000-lb. hydraulic machine, together with several small testing machines. The laboratory also contains an Olsen torsion machine of 140,000 inch-pounds capacity, two Upton-Lewis fatigue testing machines, an R. R. Moore fatigue tester, and an Amsler-Charpy-Izod impact testing machine. The other equipment includes hardness testing machines, cupping test machines, metallographic microscopes, polishing equipment, extensometers, gas and electric furnaces, tempering baths and photographic apparatus.

In addition, there is available a fuel laboratory for fuel analysis and calorimetry, an oil laboratory for determining the properties of oils and the behavior of oils in bearings, and a sand laboratory for room and high temperature properties of foundry sands.

3T21, 3T22. *Engineering Materials.* Throughout the year. Three lectures a week.

3T31. *Engineering Materials Laboratory—Metals and Alloys.* Alternate terms. One lecture period and one laboratory period a week and a written report of the work.

3T32. *Engineering Materials Laboratory—Non-Metallic Materials.* Alternate terms. One laboratory period a week and a written report of the work.

3T51. **Engineering Materials Research.** Each term. Prerequisites, 3T21, 22, 31 and 32. Professors MOYNIHAN, JEFFREY, and EHRHART. Credit one hour for forty hours of actual work. Open to a limited number of seniors and graduate students who have shown a proficiency in this field. Special problems and investigations are carried on under the general supervision of the members of the department.

3T52. **Applied Physical Metallurgy.** Alternate terms. Credit three hours. Prerequisites, 3T21, 3T22, and 3T31. Professor JEFFREY. This course covers the applications of physical metallurgy to problems in engineering. This will include all processing operations including casting, mechanical working and heat treatment, and the subsequent inspection and use of ferrous and non-ferrous metals and alloys. The significance and control of mechanical properties will be emphasized.

3T53. **Physics of Engineering Materials.** Any term. Credit variable. Open to graduate students by permission. Associate Professor SACK.

This course offers opportunity for individual research in the field of physical properties of engineering materials and applications of physical methods to production control.

#### TOPICS SUGGESTED FOR ADVANCED WORK

**Applied Physical Metallurgy.**

**Control of Properties of Engineering Materials.**

**Fuels.**

**Insulating Materials.**

**Lubrication.**

**Physics of Engineering Materials.**

**Properties of Engineering Materials.**

**Properties of Foundry Sands.**

**Properties of Lubricants.**

**Thermal Qualities of Quenching Liquids.**

#### MECHANICAL PROCESSING

*Assistant Professor R. L. GEER.*

The shops available for graduate research include the following: forge shop, foundry, welding shop, pattern shop, and machine shop. The shops are also available for use in the building of equipment for research in any department. Arrangements for the construction of new equipment should be made in advance with the head of the department.

3S11. *Metal Working.* Any term. One laboratory period a week.

3S14. *Casting Processes.* Any term. One laboratory period a week.

3S15. *Casting Processes.* Any term. Two laboratory periods a week.

3S23. *Machine Tool Processes.* Any term. Two laboratory periods a week.

3S24. *Measuring Instruments.* Any term. One laboratory period a week.

3S50. **Advanced Mechanical Processing.** Any term. Work and credit as arranged. Assistant Professor GEER.

#### TOPICS SUGGESTED FOR ADVANCED WORK

**Cupola practice; foundry practice.**

**Selection, testing, and handling of foundry sands.**

**Arc and other types of welding.**

**Machinability of materials.**

**Cutting tools; cutting and dynamometric studies.**

**Dies, jigs, and fixtures.**

**Measuring and gaging.**

#### MECHANICS

*(In Civil Engineering)*

*Professor J. N. GOODIER; Associate Professor E. V. HOWELL; Assistant Professor M. S. PRIEST.*

An extensive departmental library in Lincoln Hall, in addition to the University

Library, affords facilities for advanced work in the field of applied mechanics especially in applications such as occur in structural engineering.

The prerequisite training for graduate work in this subject should cover the fundamental principles and applications in mathematics, physics, materials, mechanics, and structural design required for graduation in civil engineering at Cornell University. Many of the advanced treatises are in French and German, and an ability to read technical works in these languages is extremely valuable.

220. *Mechanics of Engineering*. Credit five hours.

220-A and 220-B. *Mechanics Laboratory and Computations*. Credit two hours.

221. *Mechanics of Materials*. Credit four hours.

221-A. *Mechanics Laboratory*. Credit one hour.

222. **Advanced Mechanics**. Credit three hours. Prerequisites, 220 and 221. Associate Professor HOWELL. Three recitations a week.

Following a brief general review of fundamental topics in Mechanics of Materials, this course covers: induced stresses, torsion; unsymmetrical bending; torsion of prisms of non-circular section; hoops; flat plates; localized stresses; theory of least work; internal work and its derivatives.

223. **Engineering Problems**. Credit two hours. Prerequisites, 220, 221, and 240. Associate Professor HOWELL. Two computing periods a week.

224-A. **Engineering Mathematics**. Credit three hours. Prerequisite, Mathematics 55. Three recitations a week.

An elementary course in ordinary differential equations with applications to engineering problems. Trigonometry, calculus, and algebra are dealt with in so far as this is necessary for a clear understanding of the treatment of differential equations. The purpose of this course is to lay the foundation for the more advanced courses in engineering mathematics.

224-B. **Advanced Engineering Mathematics**. Credit three hours. Prerequisite, 224-A.

This course is an introduction to the mathematics used in the solution of advanced engineering problems. Special emphasis is given to partial differentiation. Fourier Series, line integrals, formation of partial differential equations, integration in form of infinite series of several of the partial differential equations arising in engineering problems, vector notation, conformal representation, determinants, theory of the complex variable, development of function into series, etc., are reviewed in so far as a knowledge of these is essential to the course.

[224-C. **Advanced Differential Equations**. Credit three hours. Prerequisites, 224-A and 224-B or their equivalents. Not given in 1944-45.]

A systematic study of differential equations. Partial differential equations and their solutions are emphasized.

[224-D. **Special Mathematical Topics**. Credit three hours. Prerequisites, 224-A and 224-B. Not given in 1944-45.]

The content of this course depends largely upon the needs and the interests of those enrolled. Generalized coordinates, vector analysis, and the calculus of variation are three subjects to be considered.

228-A, B. **Applied Elasticity**. Throughout the year. Credit three hours each term. Prerequisites, 224-A, 224-B, or Mathematics 200 or 70. Professor GOODIER.

General theorems of the elastic solid, reciprocal theorem, sudden loading. Tension, flexure, and torsion of bars of arbitrary section. Castigliano's theorem with application to frames, rings loaded in and normal to plane, spiral, and helical springs. Stress in thick cylinders and discs due to pressure, heating, and rotation. Beams on elastic foundations. Symmetrical deformation of thin tubes. Propagation of stress waves in bars.

In the second term the topics are chosen from: Thermal stress, stress-analysis, stability, and vibration, of plates and shells. Vibration of beams.

[228-C. **Engineering Physics of Metals**. Credit three hours. Professor ———. Not given in 1944-45.]

An introduction into the physical basis of matter in relation to its elastic and plastic behavior. Topics for discussion include: Atomic basis of generalized

Hooke's Law, atomic cohesive forces and potential troughs, the yield value, primary bonds, dipole and Van der Waal's forces, influences of temperature on elastic properties, thermoelastic basis of internal friction, experimental and theoretical strength of crystals, distortion of the lattice, Smekal's criticism of Born's lattice theory of metals, evidence of submicroscopic structure, elementary concepts of the cooperative phenomena in metals.

[229-A. **Theory of Elastic Stability.** Credit three hours. Prerequisite, course, 3M22a, 3M22b, 3M24, or equivalents. Professor GOODIER. Given only in alternate years. Not given in 1944-45.]

Mathematical analysis of the conditions under which columns, beams, rings, tubes, thin plates and thin curved shells may fail by general or local buckling. Applications to mechanical, civil, naval, and aeronautical structures.

229-B. **Mechanics of Vibration.** Credit three hours. Prerequisite, 3M24 or 224-A. Professor GOODIER.

The characteristic phenomena of mechanical vibrations encountered in engineering, and their quantitative investigation, illustrated by a group of typical vibrating systems. Representation of simple harmonic motion. Combination of several simultaneous motions. Simple cases of free and forced vibrations, with damping. Resonance. Principles of transmission and isolation of vibration. Systems of variable mass and variable elasticity. Vibrations of taut wires, bars, beams, rings, membranes, and plates. Relation of vibration and noise. Detection and measuring instruments. Examples of diagnoses and preventive measures.

(In Mechanical Engineering)

Professors J. N. GOODIER, W. R. CORNELL; Assistant Professors H. C. PERKINS, and G. H. LEE.

The libraries of the university are well equipped for students engaged in both analytical and experimental investigation. In addition to the regular laboratories, facilities are available for the construction and accommodation of special apparatus for research and testing. These include a photo-elastic laboratory for investigation of two- and three-dimensional stress.

3M21. *Theoretical and Applied Mechanics.* Each term. Five hours a week.

3M22a. *Strength of Materials.* Each term. Three hours a week.

3M22b. *Strength of Materials, continued.* Each term. Two hours a week.

3M24. *Applied Mathematics.* Each term. Three hours a week.

3M55. **Photoelasticity.** Any term.\* Prerequisite, 3M22b. Assistant Professor LEE. Two lectures or laboratory periods and reports a week.

The optics of photoelasticity, the stress-optical effect, plane and circularly polarized light, white and monochromatic. Elements of elasticity required for the analysis of observations and the determination of principal stresses.

3M54. **Advanced Engineering Mathematics.** Any term.\* Credit three hours. Prerequisite 3M24 or its equivalent. Mr. CARRIER. Elective, Juniors, Seniors and Graduates.

An introduction to the mathematics used in the solution of advanced engineering problems. Partial differentiation. Line and surface integrals. Ordinary differential equations, power series solutions. Fourier series. Fourier integrals. Partial differential equations.

3M56. **Applied Elasticity.** Any term.\* Credit three hours. Prerequisite, 3M24 or 224A or Mathematics 41. Professor GOODIER. Three lectures a week.

General theorems of the elastic solid. Castigliano's Theorem with application to bending and twisting of curved bars, rings, arches, and springs. Fundamentals of general stress analysis. Torsion of non-circular bars. Stress in thick cylinders and disks due to pressure, heating, and rotation.

3M57. **Applied Elasticity.** Any term.\* Credit three hours. Prerequisite, same as 3M56. Professor GOODIER. Three lectures a week.

This course is a continuation of 3M56. Beams on elastic foundations and

\*Will be given any term when there is demand, and staff is available.



thin cylindrical shells. Plane stress in flat plates. Bending, buckling and vibration of bars and flat plates.

**3M58. Mechanics of Vibration.** Any term.\* Credit three hours. Prerequisite, 3M24 or its equivalent. Professor GOODIER.

The characteristic phenomena of mechanical vibrations encountered in engineering, and their quantitative investigation, illustrated by a group of typical vibrating systems. Representation of simple harmonic motion. Combination of several simultaneous motions. Simple cases of free and forced vibrations, with damping. Resonance. Principles of transmission and isolation of vibration. Systems of variable mass and variable elasticity. Vibrations of taut wires, bars, beams, rings, membranes, and plates. Relation of vibration and noise. Detection and measuring instruments. Examples of diagnosis and preventive measures.

**3M59. Seminar in Applied Mechanics.** Any term.\* Credit one hour each term. One discussion period each week. Prerequisites, 3M56 and 3M57 or equivalents. Professor GOODIER.

Current research papers in applied mechanics reported and discussed by members of the group.

**3M60. Theory of Elastic Stability.** Any term.\* Credit three hours. Prerequisites, 3M22a, b, 3M24, or equivalents. Professor GOODIER.

Mathematical analysis of the conditions under which columns, beams, rings, tubes, thin plates, and thin curved shells may fail by general or local buckling. Applications to mechanical, civil, naval, and aeronautical structures.

**3M61. Advanced Fluid Mechanics.** Any term.\* Credit three hours. Prerequisites, CE6, 3M24, or equivalents. Professor GOODIER.

The study of various fluid phenomena, modern methods of rational analysis being correlated with empiricism and research; dimensional analysis; elementary principles of flow; generalized equations; irrotational motion, conformal mapping; fundamental equations of viscous flow; fluid turbulence; boundary layer phenomena; flow around immersed bodies; flow in closed conduits; flow in open channels; wave phenomena.

#### TOPICS SUGGESTED FOR ADVANCED WORK

Theory of Elasticity.

Elastic Stability.

Vibration.

Photo-elastic Stress Analysis.

Fluid Motion.

#### RAILROAD ENGINEERING

*Associate Professors R. Y. THATCHER, CARL CRANDALL, and J. E. PERRY.*

The library of the School of Civil Engineering contains an excellent collection of books, periodicals, and publications of railway and other technical societies dealing with the location, construction, maintenance, and operation of railroads. Books and other publications on transportation are available either in this collection or in the University Library. Maps and profiles are available for studies of the economics of location, and special plans provide for studies of signal layouts, interlocking, and yard and terminal design. Instrumental equipment is available for securing data for special problems in relocation and for designs of structures.

**260-A. Location Surveying.** Credit one hour. One week during summer vacation following sophomore year.

**260-B. Route Surveying and Drawing.** Credit three hours.

**261. Railroad Maintenance of Way.** Credit three hours. Prerequisite, 260-B. Associate Professor PERRY. Lectures and recitations three hours a week.

The subjects treated are track materials (with special reference to the section, method of manufacture and composition of steel rails, to the economics of tie

\*Will be given any term when there is demand, and staff is available.

preservation and the use of metal ties, and to the effect of quality of ballast upon maintenance); machine and other methods of grading for second track; drainage; track laying by both machine and hand methods; ballasting and bringing new track to line and grade; turnouts and switches; derailling switches; side tracks and yard tracks; sorting and terminal yards; track maintenance; track tools; work trains; action of car wheels on curves; widening of gage; double tracking; separation of grades; and improvement in grades and alinement.

**262. Railroad Operation and Management.** Credit three hours. Prerequisite, 260-B. Associate Professor PERRY. Lectures and recitations three hours a week.

Under organization, the following subjects are treated: general principles underlying organization and the effect of each on efficiency; principal departments of railway service with a brief outline of the work of each; departmental and divisional systems of organization, with examples on various roads and discussion of adaptability of each. The duties of officers and the work of the different departments are taken up in considerable detail. The most important laws affecting railroads are given in discussing the work of the legal department. Freight traffic, freight houses, classification yards, car service rules, accounting, etc., are among the topics considered under operation. Signaling and interlocking and train rules are also considered.

**263. Route Location.** Credit three hours. Prerequisites, 260-A and 260-B. Professor ————. Lectures and recitations with problems involving investigations of projects, revisions, and comparisons of alternate routes. Three hours a week.

A detailed study is made of the economic principles and other factors governing the location of new routes for both railroads and highways, and the revision of existing lines to effect the most efficient and satisfactory transportation. Some of the topics treated are estimation of traffic and revenue; costs and rates; steam electric, and other locomotive and motor operation; gradients, distance, curvature and rise and fall; line and grade revisions; grade crossing eliminations; location surveys and estimates.

**269. Transportation.** Associate Professor PERRY.

A course covering travel and transport agencies with special reference to their facilities, ownership, financing, regulation, and coordination. A brief review of the development of transportation throughout the world is used as a background for an intensive study of the present situation in the various countries and comparison of the policies and practices in use. Particular attention is given to the various proposals to promote more efficient use of the various transportation agencies in the United States by better coordination, pooling of facilities, etc., and economic studies are made of some of the new projects which are under discussion.

**291 (e). Railroad Engineering Design.** Any term. Credit three or more hours. Associate Professor PERRY.

The problems are those encountered in the location and construction of railroads, and include the following subjects: economic location of railroads; culverts; bridges; retaining walls; tunnel and subway design; small depot buildings; freight houses; water supply and coaling plants; icing stations; turntables and engine-houses; gravel washing plants; track layouts with details of signals and interlocking; yard and terminal design, etc. Bills of material and estimates of cost are usually required. The field is so broad that the interest of the student is given consideration in assigning problems.

**297 (e). Railroad Engineering Research.** Any term. Credit three or more hours. Professor ————.

Special problems in the economics of location, construction, maintenance, and operation of railroads, comparison of transportation agencies, traffic studies, and economics of various systems of transport.

*Note:* For the larger railway structures see STRUCTURAL ENGINEERING.

In addition to the above courses, the student may take courses in other departments if time permits; such as courses in transportation in the College of Arts and Sciences, or in applications of electricity in transportation in the School of Electrical Engineering.

## SANITARY ENGINEERING

*Professor C. L. WALKER; Associate Professor H. M. GIFFT.*

Courses offered to graduate students may be divided into two classes: those fundamental studies in Chemistry, Biology, and Bacteriology, which the undergraduate student in Civil Engineering has not had an opportunity of pursuing; and those dealing with the design, construction, and operation of sewage treatment and water purification plants. The sewage treatment and water purification plants in the city of Ithaca and in neighboring communities offer opportunity for experimental study.

A well-equipped sanitary laboratory established in the School of Civil Engineering provides an opportunity for students to acquire laboratory technique in water and sewage analyses, and also a practical training in interpretation. The Kuichling Library for Hydraulic and Sanitary Engineering, and the main library of the School are well provided with the literature dealing with Sanitary Engineering topics.

250. *Sanitary Biology*. Credit three hours.

251. *Sanitary Biology*. Credit two hours.

252. *Sewerage and Sewage Disposal*. Credit three hours.

253-A. *Treatment of Water*. Credit two hours.

258. *Water and Sewage Analysis*. Credit two hours.

253. **Control and Treatment of Water Supplies**. Credit three hours. Professor \_\_\_\_\_ . Two recitations and one computation period a week.

This course comprises a comprehensive study of the general principles and methods involved in furnishing safe water supplies of satisfactory quality. The topics studied include the character of surface and underground water supplies; inspection of sources; relation of communicable diseases to water supplies; standards of quality and safety of supplies; water treatment methods including coagulation, sedimentation, aeration, slow and rapid filtration, tastes and odor control, softening and iron removal, corrosion control, sterilization, and miscellaneous treatment methods. Also some study of the design and operation of water treatment plants is included.

254. **Sewerage Works**. Credit three hours. Prerequisite, 252. Professor \_\_\_\_\_ . Two recitations and one computation period a week.

A comprehensive study of principles and methods involved in the design, construction and operation of sewers and sewage treatment works including reference to existing typical plants. In general, the study includes the determination of capacity and design of sewers; the disposal of sewage by dilution and broad irrigation; stream pollution and self purification; sewage treatment methods including preparatory devices, sedimentation, chemical precipitation, intermittent sand and trickling filters, activated sludge, sludge digestion, sludge dewatering and incineration, and miscellaneous treatment methods.

255. **Treatment of Wastes**. Credit three hours. Prerequisite, 252. Professor WALKER. Three lectures or recitations a week.

The treatment of municipal and industrial wastes such as garbage, and the wastes from tanneries, packing-houses, mines, canning factories, textile mills, paper and pulp mills, creameries, cheese factories, condensaries, etc. Flow or process charts are used to show the general character of the waste, and methods of treatment applicable are considered. Special attention is given to experimental studies of waste treatment. Numerous references, bulletins, reports.

[256. **Municipal Administrative Engineering**. Credit three hours. Professor \_\_\_\_\_ . Lectures, recitations, and readings. Three periods a week. Not given in 1944-45.]

A study of municipal organizations and the relationships between the civil engineer in public service and various city, county, state, federal, and special governmental bodies, with which he may become associated; the limitations on the activities of the public works agency usually imposed by law or regulations and the effect of these on the activities of the engineer; methods of financing

governmental operations including bond issues, sinking funds, special assessments, service and rental charges.

**256-A. Public Health Engineering.** Credit three hours. Professor ———. Lectures, recitations, and readings. Three periods a week.

A study of the position of the engineer in public health work. Organization and operation of Boards of Health, vital statistics, public health laws, and the sanitary code.

**256-B. Rural Sanitation.** Credit two hours. Professor WALKER. Lectures, reports, and recitations. Two periods a week.

A course dealing with the sanitation of rural areas, trailer and other camps, summer hotels, and swimming pools. Attention is given to water supply, sewage and garbage disposal, and to the problem of milk sanitation. Lectures, reports, and recitations.

**257-A. Conference on Present Methods of Water Treatment.** Any term. Credit three hours. Professor ———. Readings, investigations, inspections, and reports. Hours to be arranged.

A critical study of selected problems in water treatment, control of water sheds; the construction and operation of existing water treatment plants.

**257-B. Conference on Present Methods of Sewage Treatment.** Any term. Credit three hours. Professor ———. Readings, investigations, inspections, and reports. Hours to be arranged.

A critical study of selected problems in sewage disposal; sewage treatment methods; the construction and operation of existing sewage treatment plants.

**259. A Laboratory Course for Graduates.** Professors WALKER and ———. Hours to be arranged.

A course devoted to some problems of water or sewage or trade waste, such as the operation of a water filtration plant, a sewage disposal plant, the detection, measurement, and purification of trade wastes, the value of disinfection, etc.

**291 (d). Sanitary Engineering Design.** Any term. Credit three hours. This course should be preceded by courses 252 and 253-A or equivalent courses. Professor WALKER.

The purpose of the course is to teach methods of determining the capacity basis of design, computations, sketches, and general plans and profiles involved in the design of sewerage works.

Problems such as the design of a separate or combined sewerage system, an intercepting sewer, a municipal or an institutional sewage treatment plant, a plant for the treatment or disposal of an industrial waste, or a plant for the treatment of an industrial, institutional, or municipal water supply, may be elected.

**297 (d). Sanitary Engineering Research.** Any term. Prerequisites for work in this field will depend upon the particular problem to be pursued, but in general will include work in water analysis, bacteriology, and courses in Hydraulics and Sanitary Engineering dealing with the field in which the work is to be undertaken. Professors WALKER and ———. Hours, credit for work, prerequisites, and other questions relating to contemplated research in this field will be arranged by conference.

#### STRUCTURAL ENGINEERING (INCLUDING SOIL MECHANICS)

*Professors* L. C. URQUHART (in service), C. E. O'ROURKE; *Associate Professors* E. N. BURROWS, H. T. JENKINS, H. M. GIFFT; *Assistant Professor* GEORGE WINTER.

In this subject instruction is offered in the determination of loading and stresses and the design of roofs, buildings, bridges, arches, foundations, piers, retaining walls, and other structures of timber, steel, and concrete.

The department is equipped with a Beggs Deformeter for the Mechanical Analysis of structures. The facilities of the testing laboratories are available to graduate students.



The Soil Mechanics Laboratory is fully equipped for work by graduate students. The freezing room and humid room are available for research work in investigating the physical properties, bearing capacity, permeability and stability of soil, and the flow of water through earth dams. There is also a shop for use in the building of new equipment.

To qualify for graduate work in structural engineering a knowledge of theoretical mechanics, strength of materials, engineering construction, and elementary courses in stress and design in timber, steel, and concrete are required.

270. *Stress Analysis and Structural Design*. Either term. Credit four hours.

271. *Structural Design*. Either term. Credit three hours.

280. *Concrete Construction*. Either term. Credit three hours.

281. *Foundations*. First term. Credit three hours.

287. *Soil Mechanics*. Either term. Credit three hours.

272. **Advanced Structural Analysis**. Credit three hours. Prerequisite, 270. Professor O'ROURKE. Three recitations a week.

Stress analysis of continuous beams, framed bents, and rigid frames. Horizontal as well as vertical loading considered. Redundant structures including the braced two-hinged arch. Displacement diagrams for trusses and arches and analytical computation of deflections of such structures.

273. **Steel Buildings**. Credit three hours. Prerequisites, 220, 221, and 271, or their equivalents. Associate Professor BURROWS. Reports and drawings. Three two-hour periods a week.

This course comprises the design of the steel framework for buildings of the prevailing type used in power house or shop construction. Dead, snow, and wind stress diagrams are drawn for the roof trusses. Provision is made for an electric crane moving the whole length of the building and the stresses in the framework due to the movement of the crane are determined. The effect of the wind and the eccentric load due to the crane girder are considered in the design of the columns.

274. **Bridge Design**. Credit three hours. Prerequisite, 271 or the equivalent. Associate Professor BURROWS. Computations and drawings, three two-hour periods a week.

Computations and drawings for the complete design of a railroad bridge of six or seven panels or a heavy highway bridge. The computations to determine the stresses and sections of all members, pins, pinplates, splices, deflection, camber, and other details as well as of connecting rivets are to be written up in the form of systematically arranged reports. The drawings consist of general detail plans showing the location of all rivets as well as the composition and relation of all members and connections. The final report is to give a full list of shapes and plates, and a classified analysis of weight for the span.

275. **Investigation of Existing Bridges**. Credit three hours. Prerequisite, 271 or the equivalent. Associate Professor BURROWS.

Inspection of existing structures for the determination of sizes and conditions of plates and shapes. After full data have been obtained in the field, computations will be made to determine either the unit stresses under a specified load, or the safe load or rating according to standard specifications.

[282. **Reinforced Concrete Building Design**. Credit three hours. Prerequisite, 280. Professor O'ROURKE. Seven and one-half hours a week. Not given in 1944-45.]

Design of a reinforced concrete flat-slab building and investigation of various other types of floor systems for commercial buildings. Complete detail design for one building, including stairway, elevator shafts, penthouses, etc. Working drawings and steel schedules.

283. **Fixed Arches**. Credit three hours. Prerequisites, 270, 271, and 280. Professor O'ROURKE. Lectures, recitations, and computations. Six hours a week.

Theory of the curved beam; the closed ring; the fixed arch. Influence lines for arches of various forms. Selection of curvature of axis for various loadings. Effect of temperature and rib-shortening; effect of plastic flow on stresses in a reinforced concrete arch. Design of a reinforced concrete arch and its abutments.

[284. **Highway Bridges.** Credit three hours. Prerequisite, 280 or the equivalent. Professor O'ROURKE. Not given in 1944-45.]

Design of short span bridges and their abutments. Comparison of the economy of steel and reinforced concrete superstructures for bridges of this type. Reports and drawings.

285. **Reinforced Concrete Design.** Credit three hours. Prerequisite, 280. Professors URQUHART and O'ROURKE. Three two-hour periods a week.

Design of footings: single and multiple columns of reinforced concrete. I-beam grillages. Design of bins and tanks, subsurface and supported on towers. Reports and sketches.

[286. **Elastic Foundations and Thin Structural Shells.** Professor \_\_\_\_\_ . Credit three hours. Not given in 1944-45.]

Study of the properties of elastic foundations and the application of the elastic foundation theory to the analysis of large diameter, low head tanks, hemispherical domes, hemispherical headers on large pipes, and thin shell pipes under flexure.

[288. **Applied Soil Mechanics.** Credit three hours. Prerequisite, 287 or its equivalent. Not given in 1944-45.]

Advanced application of soil mechanics, based on the principles and physical studies of course 287. The plastic flow theory; the consolidation theory; stability of earth slopes; flow of water through earth structures; theories of earth pressure on retaining walls, caissons, and tunnels. Review of modern soil mechanics research.

291 (f). **Structural Engineering Design.** Any term. Prerequisites, 270, 271, and 280. Professor O'ROURKE and Associate Professor BURROWS.

The student may select a problem such as the following: (a) an arch bridge of steel, (b) a cantilever bridge, (c) a rigid frame bridge, (d) a special problem in steel or concrete building design, (e) the design of any other structure of particular interest to the student provided he has had the proper preparation for such design. The work is submitted in the form of reports. Drawings of typical details must accompany reports.

297 (f). **Research in Structural Engineering.** Professor O'ROURKE and Assistant Professor WINTER.

Students wishing to pursue one particular branch of bridge engineering further than can be done in any of the regular courses may elect work in this field. The prerequisite courses depend upon the nature of the work desired. The work may be in the nature of an investigation of existing types of construction or theoretical work with a view to simplifying present methods of design or proposing new methods.

## TOPOGRAPHIC AND GEODETIC ENGINEERING

Professor P. H. UNDERWOOD; Associate Professor L. A. LAWRENCE; Assistant Professor F. J. SPRY.

The preliminary training as a qualification for work in this department should include the equivalent of the regular undergraduate course in civil engineering, including work in General and Practical Astronomy. A thorough training in Mathematics and Physics is desirable.

Graduate work for those interested in Topographic and Geodetic Engineering includes courses in Advanced Topographic Surveying, in Geodesy, Least Squares, Geodetic Astronomy, and in Photographic and Aerial Surveying. The Library of the School of Civil Engineering contains an extensive collection of reference books in the subjects mentioned. The surveying equipment of the School is also available for practice work.

For courses in Geodetic Astronomy see page 98.

182. *Elements of Field Astronomy.* Any term. Credit two hours. (Given in Department of Astronomy.)

211. *Advanced Surveying.* Credit three hours.

213. *Summer Survey: Topographic, Hydrographic, and Geodetic Survey: Camp.* Five weeks during end of summer following sophomore year. Credit four hours.

214. *Mapping*. Credit two hours.

215. *Problems in Adjustment of Observations*. Credit one hour.

216. **Least Squares: Adjustment of Observations**. Credit two hours. Prerequisites, Calculus and Physics. Professor UNDERWOOD. Two recitations and lectures a week as may be arranged.

The course is designed for students who have experimental investigations in view. Applications are made to problems in physics, astronomy, mechanics, hydraulics, surveying, etc., with some attention given to the derivation of empirical formulae.

217. **Advanced Topographic Surveying**. Credit two hours. Prerequisite, 213. Professor UNDERWOOD. Lectures, recitations, and assigned readings. Two hours a week.

Economics of surveying methods. Surveys for special purposes, such as extensive construction work; storage and distribution of water for irrigation; earth work on a large scale; lines of communication, topographic reconnaissance, etc.; photographic surveying.

218. *Geodesy and Geodetic Laboratory*. Credit three hours. Prerequisites, courses 182 and 211. Professor UNDERWOOD. Lectures, reading, discussions, and laboratory work. Three periods a week.

A course for the consideration of special problems in geodetic work. Precise leveling, deflection of the plumb line, figure of the earth, use and investigation of geodetic instruments and apparatus such as circles, levels, micrometer microscopes, standards of length, thermometers, pendulums, magnetic apparatus, etc. Subject to arrangement to meet the special needs of students.

219. **Photographic and Aerial Surveying**. Credit three hours. Prerequisite, 211. Professor UNDERWOOD. Recitations, lectures, and collateral reading. Three hours a week.

The principles of photographic surveying; surveys with camera stations on the ground, including stereoscopic methods; aerial surveys and the making of maps from such surveys; ground control.

297 (i). **Research in Geodetic Engineering**. Any term. Credit three or more hours. Prerequisites will depend upon the line of work to be pursued. Professor UNDERWOOD.

Special problems in least squares, geodetic surveying, and photographic surveying as may be arranged.

## HOME ECONOMICS

Courses offered in the College of Home Economics are numbered in accordance with the following plan: courses numbered below 300 are, in general, undergraduate courses; courses numbered 300 to 400 are for seniors and graduate students; courses numbered above 400 are for graduate students. The full description of the undergraduate courses, listed in italics, will be found in the *Announcement of the College of Home Economics*.

Unless otherwise noted all classes meet in Martha Van Rensselaer Hall.

Attendance for at least one term during the regular academic year is usually necessary for candidates for the master's degree on the A Plan.

### ECONOMICS OF THE HOUSEHOLD AND HOUSEHOLD MANAGEMENT

*Professor HELEN CANON; Associate Professors ELLA M. CUSHMAN, and DELPHA E. WIESENDANGER; Assistant Professors MABEL ROLLINS, and ANN AIKIN.*

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Economics of the Household and Household Management 1, 2, 4

Graduate students are accepted in all courses offered by the Department of Economics of the Household and Household Management. Graduate credit is given only for work at a graduate level.

120. *Household Processes*. Summer term, to be repeated in fall and spring terms. Credit three hours.

130. *Economic Conditions in Relation to the Welfare of Families*. Summer term, to be repeated in fall and spring terms. Credit three hours.

260. *Problems in Providing Consumers' Goods*. Summer term, to be repeated in fall and spring terms. Credit three hours.

300. *Special Problems*. Summer term, to be repeated in fall and spring terms. Credit to be arranged individually.

308. *Management in Homes*. Fall term. Credit one hour.

310. *Management in Family Living*. Summer term, to be repeated in fall and spring terms. Credit three hours.

320. *Management in Relation to Household Equipment*. Spring term. Credit three hours.

330. *Management in Relation to Personal Finances*. Summer term, to be repeated in fall and spring terms. Credit three hours.

400. **Review of Research in Management**. Summer term, to be repeated in fall term. Credit two hours. Prerequisite or parallel, Economics of the Household 310. The instructor should be consulted before registering. Associate Professor CUSHMAN. Time to be arranged. Room G 19. Fee, \$2.

Evaluation of results and methods of research in management. Discussions with investigators in various phases of management. Individual work on special problems.

410. **Economic Problems of Families**. Spring term. Credit two hours. The instructor should be consulted before registering. Professor CANON. F 9-11. Fee, \$1.

Analysis of a few outstanding contributions to economic thought related to this field. Examination of methods of research.

415. **Problems in the Distribution of Consumers' Goods**. Summer term, to be repeated in spring term. Credit two hours. Prerequisite or parallel, Economics of the Household 260 or the equivalent. The instructor should be consulted before registering. Assistant Professor ROLLINS. F 2-4. Room 124. Fee, \$3.

Analysis of some of the important problems in distribution. Practice in locating and in using sources of data bearing on marketing problems. Discussion of contributions from research in marketing.



418. **Personal Finances.** Fall term. Credit two hours. The instructor should be consulted before registering. Assistant Professor AIKIN. Time to be arranged. Room 132. Fee, \$1.

Examination of the nature of personal financial problems, and of adjustments in individuals' financial practices under changing conditions. The operation and regulation of financial institutions of importance in personal management. Analysis of teaching materials.

420. **Seminar.** Summer term, to be repeated in fall and spring terms. Department Staff. T 4-5:15. Room 114.

## FAMILY LIFE

Professors ROBERT H. DALTON, ETHEL B. WARING, LEMO D. ROCKWOOD, HELEN D. BULL; Associate Professor KATHERINE REEVES; Assistant Professors MARY FORD, MARY PEABODY, and OLIVE WOODRUFF.

## Approved Major and Minor Subjects (key to symbols on p. 42)

Family Life 1, 2, 4

Family Relations and Marriage 2, 3, 4

Child Development and Child Guidance 2, 3, 4

(Candidates for the Ph.D. degree with a major in Family Life may not take both minors in the other two subjects.)

Advanced study in family life may be built upon a background of teaching experience with young children, school children, youth or older young people, or adults; school supervision or administration; social or clinical work in a health, nutrition, or behavior clinic; or extension teaching or administration. Previous training should include courses in psychology, sociology, and family life.

The selection of courses for a degree will vary with the previous background of the candidate but will fall largely within three groups:

*Basic courses in biology, sociology and anthropology, psychology and education; Courses in the other areas of the field of Home Economics—foods and nutrition, textiles and clothing, housing and furnishing, home finance and management, and institutional management;*

*Graduate Work in Family Life*—Graduate study involves course work to supplement and extend the student's undergraduate experience; field work with families in their homes; conference and discussion groups; and research. Laboratory experience is provided in the nursery school in Martha Van Rensselaer Hall and in the Federal and Settlement Nurseries in Ithaca.

100. *The Home and the Family.* Survey course. Summer term, to be repeated in fall and spring terms. Credit two hours.

110. *Health of the Family.* Summer term, to be repeated in fall and spring terms. Credit two hours.

120. *Health in the Home and Community and Home Nursing.* Summer term, to be repeated in fall and spring terms. Credit two hours.

130. *Experience with Children.* Summer term, to be repeated in fall and spring terms. Credit two hours.

140. *Creative Materials in Child Development.* Summer term, to be repeated in fall and spring terms. Credit three hours.

150. *Children's Literature.* Summer term, to be repeated in spring term. Credit two hours.

210. *Principles for Child Guidance.* Summer term, to be repeated in fall and spring terms. Credit three hours.

260. *Family Relationships and Personality Development.* Fall term. Credit three hours.

270. *Marriage.* Summer term, to be repeated in spring term. Credit three hours.

300. **Special Problems.** Summer term, to be repeated in fall and spring terms. Credit and hours to be arranged individually. For students approved by the head

of the department and the instructor in charge for independent, advanced work on a problem not dealt with by other courses in the department. Fee determined by the problem.

330 a, b, c. **Participation in the Nursery School.** Summer term, to be repeated in fall and spring terms. Sections: **a. Junior Nursery School; b. Senior Nursery School; c. City Nursery Schools.** Credit three or four hours each section. Open to a limited number of seniors and graduate students by permission of the instructor. Prerequisite or parallel, Family Life 210. Family Life 140 strongly advised. Associate Professor REEVES, and Miss ————. Laboratory hours will be arranged individually, thirty for each hour of credit, or distributed throughout the term. Conference hour for each section with the teaching staff as follows: **a. T 12, Room 301. b. T 12, Senior Nursery School. c. Time and place to be arranged.** Fee, \$2.50 for each credit hour.

Observation and study of young children in their homes and in the Nursery School. Participation in their care and guidance. Some experience in planning a child-activity program and in cooperation with staff and parents concerned.

[340. **Principles of Child Guidance, Advanced Course.** Spring term. Credit three hours. Prerequisite, Family Life 210. Professor WARING. Given in alternate years, not offered in 1944-45.]

Observations on the behavior and guidance of young children, and analysis of narrative records for trends in the personality which indicate the conditions under which guidance may be effective.

350. **Seminar—Child Guidance.** (Rural Education 228.) Spring term. Credit two hours. Prerequisite, some work in Family Life. Professor WARING. F 4-6. Room G-58. Given in alternate years. Offered in 1944-45.

[400. **The Home and the Family Life.** Advanced course. Graduate section of course 100. Spring term. Credit three hours. Open to graduate students with adequate training in Family Life. Attendance at lectures and discussions of Family Life 100. Assistant Professor WOODRUFF. Fee, \$5. Not given in 1944-45.]

A course planned to give advanced students some experience in developing a simple organization of the various areas of home economics subject matter around the central theme of the life of the family in the home.

405. **Elementary Methods and Technics of Research in Child Development and Family Life.** Fall term. Credit two hours. Open to seniors and graduate students by permission of the instructor. Assistant Professor FORD. M W 3. Room 121. Fee, \$3.

Orientation in the sources of research material in Child Development and Family Life. Readings in current literature. Survey of experimental methods with particular attention to the conditions underlying the effective use of each method. Consideration of elementary statistical technics in terms of the use and interpretations.

410. **Principles for Child Guidance.** Graduate section of course 210. Summer term, to be repeated in fall and spring terms. Credit three hours. Open to qualified graduate students. Professor WARING. Lecture and discussion, M. W. F. 8. Room 124. Observation in the Nursery School. Fee, \$5.

The relation between behavior and guidance. Basic principles for guiding personality development in terms of this relationship. Scheduled hours in the Nursery School for observation of these principles at work. The use of observational records in making personality studies of individual children. Application to person-to-person relations at any age. Study of community undertakings in child care in war time.

430. **Research in Family Life.** Summer term, to be repeated in fall and spring terms. For graduate students who are actively engaged in research or in special studies in Family Life. Credit will vary according to the nature of the problem. Professors WARING and ROCKWOOD and Assistant Professor FORD.

[440. **Seminar—The Family.** Summer term, to be repeated in fall and spring terms. Credit two hours. Not given in 1944-45.]

460. **Family Relationships and Personality Development.** Fall term. Credit three hours. Professor ROCKWOOD. M W F 10 or 11 and T 2-4. Room 121. Fee, \$5.

Emphasis is placed upon the human-nature aspects of family life; how personality development takes place in the family setting; social interaction among members of the family at different stages of the family cycle and in different culture groups within the larger culture. Special attention will be given to the impact of the war on family life.

470. **Marriage.** Summer term, to be repeated in spring term. Credit three hours. Professors ROCKWOOD, and BULL, and Assistant Professor PEABODY. M W F 10 11, Room 124; and T 11-12:30, Room 301. Fee, \$5.

Marriage in wartime; affectional maturity and readiness for marriage; courtship and engagement; New York State marriage law; relation of hereditary and health factors to marriage; sex life in marriage; pregnancy, childbirth and parenthood; early marriage adjustment and marriage interaction; the administration of the home; the later years of married life.

#### FOOD AND NUTRITION AND INSTITUTION MANAGEMENT

Food and Nutrition: Professors HELEN MONSCH, CATHERINE PERSONIUS, L. A. MAYNARD, FAITH FENTON, HAZEL HAUCK, MARION PFUND; Associate Professor MILICENT HATHAWAY; Assistant Professors GRACE FOSTER, J. K. LOOSLI, GRACE STEININGER, CHARLOTTE YOUNG.

Institution Management: Professor KATHERINE HARRIS; Associate Professor ALICE BURGOIN.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Food and Nutrition 1, 2, 3, 4

Nutrition 1, 2, 3, 4

Food 2, 3, 4

Institution Food 2, 4

As a basis for graduate work in food and nutrition, elementary courses in the various divisions of home economics and courses in inorganic and organic chemistry are expected. A knowledge of quantitative chemical analysis, biological and physical chemistry, physiology, bacteriology, and physics is highly desirable.

Before applying for admission to the Graduate School a prospective student is advised to communicate with a member of the faculty in the field in which she wishes to do research or with the chairman of the department: Food and Nutrition, Professor PERSONIUS; Institution Management, Professor HARRIS. Animal Nutrition, see p. 77ff.

#### FOOD AND NUTRITION

100. *Food Preparation in Relation to Meal Planning.* Spring term. Credit three hours.

115. *Science Related to Food Preparation.* Fall Term. Credit five hours.

130. *Nutrition.* Summer term, to be repeated in fall and spring terms. Credit three hours.

190. *Nutrition and Health.* Fall term. Credit two hours.

210. *Food Preparation: Principles and Comparative Methods.* Fall term, to be repeated in spring term. Credit four or five hours depending on whether organic chemistry is offered as a prerequisite.

215. *Science Related to Food Preparation.* Summer term, to be repeated in spring term. Credit five hours.

230. *Nutrition, Advanced Course.* Summer term. Credit five hours. Spring term. Credit three hours.

240. *Food Preparation, Advanced Course.* Fall term, to be repeated in spring term. Credit three hours.

250. *Food Preservation.* Summer term. Credit three hours.

260. *Meal Planning and Preparation.* Summer term, to be repeated in fall and spring terms. Credit three hours.

300. **Special Problems.** Summer term, to be repeated in fall and spring terms. Credit and hours to be arranged. Registration with permission of the head of the department and the instructor in charge. Fee determined by the problem.

Independent advanced work on a problem not dealt with by other courses in the department.

305. **Food Demonstrations.** Fall term, to be repeated in spring term. Credit one hour. Registration with permission of the instructor. Assistant Professor FOSTER. T Th 8:30-11. Room 361. Fee, \$10.

Emphasis on the purposes and technics of demonstrations in relation to food preparation and nutrition, with application to teaching, extension, business, and social service.

310. **Science Related to Food, Advanced Course.** Fall term. Credit three hours. Prerequisite, Food and Nutrition 210 or 215, and 100, 240 or 260, or the equivalent. Registration with permission of the instructor. Professor PERSONIUS. M W F 8. Room 301. Fee, \$2.

The scientific principles necessary to the understanding of modern theory and practice in the field of food preparation.

320. **Experimental Cookery.** Summer term, to be repeated in spring term. Credit three hours. Prerequisites, Food and Nutrition 210 or 215 and 100, 240 or 260, or the equivalent. Registration with permission of the instructor. Professor PERSONIUS. Fee, \$10.

Independent laboratory work in the solving of practical problems in food preparation. Study of methods and technics used in experimental work in food. Judging of food products.

330. **Diet Therapy.** Fall term. Credit two hours. Primarily for seniors and graduate students. Prerequisite, Food and Nutrition 230 or the equivalent. Registration with permission of the instructor. Professor HAUCK. Fee, \$4.

Diet in those diseases such as fevers, gastro-intestinal disturbances, and diabetes, in the treatment of which choice of food is important.

340. **Family Nutrition, with Special Emphasis on Child Feeding.** Summer term, to be repeated in fall and spring terms. Credit for lecture, two hours; for each laboratory, one hour. Any laboratory may be taken either in the same term with the lecture or in any term following the lecture. Primarily for seniors and graduate students. Prerequisite, Food and Nutrition 130. Professor MONSCH and Miss LORENZEN. Lecture T 2-4, Room 339. Laboratories: (a) Infant Feeding, Th 2-4, Rooms 426, 432; (b) Feeding of Pre-school Children, W 2-4:20, Rooms 301, 432; (c) Feeding of School Children, F 2-4:20, Room 301. Fee, \$1 for lecture; \$7 for each laboratory.

Family nutrition with special emphasis upon the nutritional needs of the child. Relation of nutrition to physical growth and development. Experience in actual family situations in private homes, the well-baby clinic, the nursery school, and the public schools.

400. **Readings in Nutrition.** Spring term. Credit two hours. Registration with permission of the instructor. Professor HAUCK. Discussion T Th 9, Room 301. Fee, \$1.

Emphasis on the experimental data on which the principles of human nutrition are based. Critical review of current literature in this field.

410. **Research in Food and Nutrition.** Summer term, to be repeated in fall and spring terms. Credit and hours to be arranged. Registration with permission of the instructor. Professors MONSCH, PERSONIUS, MAYNARD, ADOLPH, FENTON, HAUCK, PFUND, Associate Professors HATHAWAY and LOOSLI, and Assistant Professors STEININGER and YOUNG. Fee determined by the problem, maximum \$25.

Individual research in food, human nutrition or animal nutrition.

420. **Seminar in Food and Nutrition.** Fall term, repeated in spring term. Emphasis on nutrition in fall term, on food in spring term. Credit one hour each term. Professors PERSONIUS, FENTON, HAUCK, and PFUND, Associate Professor HATHAWAY, and Assistant Professor STEININGER. Hours to be arranged. Fee, \$1.



*Note:* The attention of advanced and graduate students is called to the following courses offered in Animal Nutrition and in Biological Chemistry in the College of Agriculture (see the announcement of courses in that college): **Animal Husbandry 110, Principles of Nutrition; 111, Laboratory Work in Nutrition; 112, War Emergency Food Problems; 125, Endocrinology, Reproduction and Lactation; 215, History of Nutrition; 219, Seminar in Animal Nutrition. Biochemistry 316, Food Chemistry and Nutrition; 317. Food Processing and Nutrition.**

#### INSTITUTION MANAGEMENT

100. *Institution Food Service.* Summer term, to be repeated in fall and spring terms. Credit two hours.

220. *Food Selection and Purchase for the Institution.* Summer term, to be repeated in fall and spring terms. Credit three hours.

230. *Quantity Food Preparation: Principles and Methods.* Summer term, to be repeated in fall and spring terms. Credit five hours.

240. *Tea Room and Cafeteria Accounting.* Summer term, to be repeated in fall and spring terms. Credit three hours.

300. **Special Problems.** Summer term, to be repeated in fall and spring terms. Credit and hours to be arranged individually. For students approved by the head of the department and the instructor in charge for independent, advanced work on a problem not dealt with by other courses in the department. Fee determined by the problem.

[310. *Institution Organization and Administration, Elementary Course.* Fall term, Credit three hours. Not given in 1944-45.]

320. *Institution Organization and Administration, Advanced Course.* Summer term, to be repeated in spring term. Credit three hours.

330. *Quantity Food Preparation and Catering, Advanced Course.* Fall and spring terms. Credit five hours.

340. *Restaurant Cost and Sales Analysis.* Spring term. Credit two hours.

350. *Institution Practice.* Summer term, to be repeated in fall and spring terms. Credit four hours.

400. **Research in Institution Organization and Administration.** Throughout the year. For graduate students with training and experience satisfactory to the instructor. Professor HARRIS and Associate Professor BURGOIN. Hours to be arranged. Fee determined by the problem.

Individual research in the area in which the student is particularly interested. Food-control procedure, job analyses and specifications, experimentation and development of standardized procedures in food preparation and merchandising as applied to quantity production, determination of factors underlying operation and maintenance costs are suggestive of the fields in which there is vital need for research.

410. **Seminar in Institution Organization and Administration Problems.** Fall term, to be repeated in spring term. Credit one hour. For graduate students with adequate training in institution management. Professor Harris. Fee, \$1.

#### TEXTILES AND CLOTHING AND HOUSEHOLD ART

Textiles and Clothing: *Professor* BEULAH BLACKMORE; *Associate Professors* GLADYS BUTT, MARGARET HUMPHREY, RUTH SCOTT; *Assistant Professor* ELSIE FROST.

Household Art: *Assistant Professors* DORA ERWAY, VIRGINIA TRUE, and MABEL WILKERSON.

#### Approved Major and Minor Subjects (key to symbols on p. 42)

Textiles and Clothing and Household Art 2, 3, 4

Graduate work for the Master's degree is offered in Textiles and Clothing and Household Art. Emphasis may be placed upon either Textiles and Clothing or Household Art.

## TEXTILES AND CLOTHING

The work in Textiles and Clothing may emphasize either the economic side or the applied-art side of the subject.

100. *Introduction to Clothing Selection and Construction*. Summer term, to be repeated in fall and spring terms. Credit three hours.

110. *Clothing Construction*. Fall term, to be repeated in spring term. Credit two hours.

130. *Textiles: Clothing Fabrics*. Summer term, to be repeated in fall and spring terms. Credit two hours.

200. *Fitting and Pattern Making, Flat-Pattern Work, Modeling*. Summer term, to be repeated in fall and spring terms. Credit three hours. By permission of the department.

205. *Clothing of the Family*. Fall term, to be repeated in spring term. Credit two hours.

210. *Dress Selection and Design*. Summer term, to be repeated in fall and spring terms. Credit two hours.

220. *Commercial Clothing and Advanced Problems in Construction*. Summer term, to be repeated in fall and spring terms. Credit three, four, or five hours.

235. **Science Related to Textiles**. Fall term, to be repeated in spring term. Credit two hours. Prerequisites, Food and Nutrition 115 or its equivalent, Textiles and Clothing 130 or 310. Miss WARD. W F 8-10, Room 353. Fee, \$5.

A course concerned with the chemistry involved in the study of fabrics. Laboratory work includes the observation of the chemical properties of the major fibers used in clothing and household fabrics; analysis of anti-perspirants; stain removal by methods which can be adapted for home use; simple performance tests on fabrics and evaluation of these and standard tests.

300. **Special Problems**. Summer term, to be repeated in fall and spring terms. Credit and hours to be arranged individually. For students approved by the head of the department and the instructor in charge for independent, advanced work on a problem not dealt with by other courses in the department. Fee determined by the problem.

310. **Household Textiles**. Summer term, to be repeated in fall and spring terms. Credit two hours. Each section limited to twenty students. (Graduate students please see course 410 and consult with instructor). Professor BLACKMORE. T Th 9-11. Room 278. Fee, \$5; estimated cost of materials, \$2.

A study of the range in quality in household textiles and the methods of selecting the quality best suited to specific needs. Buying problems in the area of Household Textiles.

Technical information necessary for efficient buying. Identification of fibers and fabrics for properties which affect satisfactory use. Procedure and performance of standard and other physical tests will be evaluated. Specifications set up by various groups. Existing state laws governing the sale of certain household textiles.

A two-day trip to four or more manufacturing establishments to observe designing, weaving, making of certain household fabrics and methods used in preparing fabrics for the retail market. (Trips not taken in 1944-45.)

320. **Problems in Buying Clothing**. Summer term, to be repeated in fall and spring terms. Credit three hours. Associate Professor BRASIE. M W F 11-1. Room 216. Fee, \$5.

The course is planned to develop an appreciation of, and an alertness to the problems in buying clothing; an understanding of some of the problems involved in clothing production and marketing, consumer responsibility in this field, and skill in buying clothes.

Illustrated lectures and discussion of such topics as the relationship of such factors as labeling, design, construction, and fit, to the quality and the cost of similar types of wearing apparel; management problems met by people in choosing clothing best suited to their specific needs and desires; government regula-

tions; trends toward simplification and standardization; services provided by various government and commercial agencies; trends in fashion growing out of current events.

**400. Dress Design, Advanced Course.** Summer term, to be repeated in spring term. Credit three hours. Prerequisites, Textiles and Clothing 200 and 220, or the equivalent. Assistant Professor FROST. T Th 2-5. Room 216. Laboratory fee, \$5. Estimated cost of materials, \$5-25.

A course in advanced dress design with emphasis on the development of originality and beauty of execution. Approaches in design problems are made through experimental manipulation of fabric combinations; use of historic and contemporary design sources; draping; sketching.

The majority of the designs will be draped and fitted in muslin. The development of the designs into finished garments will depend on the needs and interests of the students.

**410. Seminar in Textiles.** Summer term, to be repeated in fall and spring terms. Credit one hour. Prerequisite or parallel, course 310. Open to graduate students by permission of the instructor, Professor BLACKMORE. Hours to be arranged.

[430. **Seminar in Textiles and Clothing.** Credit one hour by arrangement. For graduate students. Department Staff. Room 216. Not given in 1944-45.]

#### HOUSEHOLD ART

Before entering upon advanced work in Household Art the student should have had basic courses in color and design, house planning and house furnishing, family life and household management. Whether a student's preparation is adequate for advanced study can be determined only by special consideration of each case.

**100. Color and Design.** Summer term, to be repeated in fall and spring terms. Credit three hours.

**110. Applied Design.** Summer term, to be repeated in fall and spring terms. Credit two hours.

**120. Home Furnishings.** Summer term. Credit six hours.

[150. *Housing from the Standpoint of Home Economics.* Credit two hours. Not given in 1944-45.]

**160. Contemporary Art.** Fall term. Credit one hour.

[170. *Handicrafts.* Credit one hour. Given in alternate years. Not given in 1944-45.]

**200. Studio Course in Advanced Color and Design.** Fall term. Credit two hours.

**215. Applied Design.** Summer term, to be repeated in fall and spring terms. Credit two hours.

**220. Home Furnishing.** Fall and spring terms. Credit three hours.

**225. Home Furnishing.** Spring term. Credit three hours.

**235. Home Furnishing.** Summer session, fall and spring terms. Credit three hours.

[240. *House Planning.* Summer term, to be repeated in fall and spring terms. Credit three hours. Not given in 1944-45.]

**300. Special Problems.** Summer term, to be repeated fall and spring terms. Credit and hours to be arranged individually. For students approved by the head of the department and the instructor in charge for independent, advanced work on a problem not dealt with by other courses in the department. Members of Household Art Staff. Fee determined by the problem.

**305. Fashion Illustration.** Summer term, to be repeated in spring term. Credit three hours. Prerequisite, Household Art 100, at least one drawing course, or consent of instructor. Life drawing and clothing courses desirable. Limited to fifteen students. Assistant Professor TRUE. T Th 10-1. Room 327. Fee, \$12. Estimated cost of materials, \$2.

A course planned to introduce the student to the requirements of knowledge and skills for the fashion illustrator. Study of layouts for fashion advertisements,

technics for reproduction processes used in newspaper and magazine fashion illustration, fashion styles, and presentation of work.

320. *Historic Furniture and Interior Design*. Fall term. Credit two hours. Prerequisite, Household Art 220. Assistant Professor WILKERSON. T Th 2, Room 317. Fee, \$8.

#### EDUCATIONAL LEADERSHIP IN HOMEMAKING

The two courses in Educational Leadership in Homemaking, **Organization and Policies** and **Program Planning and Methods**, which were formerly listed among the offerings of both the College of Home Economics and the School of Education, are in the future to be listed in the School of Education only. See **Rural Education** 134b and 134c.



## HOTEL ADMINISTRATION

Professors H. B. MEEK, F. H. RANDOLPH, LOUIS TOTH, A. L. WINSOR, JOHN COURTNEY, C. I. SAYLES, and C. E. CLADEL.

### Approved Major and Minor Subjects (key to symbols on p. 42)

Hotel Management 2, 4

Hotel Accounting 2, 4

*Note.* A major or minor subject may be selected in the field of Hotel Administration provided the other subject is taken outside the department of Hotel Management and has the approval of the Dean of the Graduate School.

Graduate work for the Master's degree is offered in Hotel Administration. A foundation knowledge of hotel management is required of graduate students majoring in the field. Such students will choose a minor in a related or underlying field such as accounting, statistics, engineering, or one of the social sciences. Students majoring in the latter fields may find in the problems of the hotel industry a fertile field for research.

Through its contacts with the American Hotel Association and its subsidiary associations and with member hotels the University has possession of and access to a wide range of research material.

81 and 82. *Accounting.* Throughout the year. Credit eight hours.

114. *Psychology for Students of Hotel Administration.* Fall term. Credit three hours.

181 and 182. *Hotel Accounting.* Throughout the year. Credit six hours.

183. *Auditing.* First term. Credit three hours.

184. *Food and Beverage Control.* Spring term. Credit three hours.

187. *Tax Computation.* Fall term. Credit two hours.

240. *Tea Room and Cafeteria Accounting.* Fall term, to be repeated in spring term. Credit three hours.

282. *Accounting Practice.* Fall term. Credit three hours.

283. *Advanced Accounting.* Spring term. Credit three hours.

284. *Problems in Food Control.* Spring term. Credit one hour.

288. *Accounting Machines in Hotels.* Fall term, to be repeated in the spring term. Credit one hour.

340. *Restaurant Cost and Sales Analysis.* Spring term. Credit two hours.

[151. *Hotel Operation.* Fall term. Credit two hours. Not given in 1944-45.]

160. *Hotel Engineering Fundamentals.* Fall term. Credit four hours.

161. *Mechanical Service Applications.* Spring term. Credit four hours.

162a. *Steam Power and Heating, Lectures.* Fall term. Credit two hours.

162b. *Steam Power and Heating, Laboratory.* Fall term. Credit two hours.

163a. *Refrigeration and Electrical Equipment, Lectures.* Spring term. Credit two hours.

163b. *Refrigeration and Electrical Equipment, Laboratory.* Spring term. Credit two hours.

164. *Hotel Planning.* Fall term. Credit two hours. Prerequisite, Hotel Engineering 161. Open to a limited number of seniors and graduate students with the consent of the instructor. Professor RANDOLPH. Fee for materials, \$3.

Planning the layout for a proposed hotel, emphasizing floor plans and selection and arrangement of the equipment in various departments, including the kitchen and the laundry.

165. *Hotel Engineering Problems.* Spring term. Credit one hour. Prerequisites, Hotel Engineering 162a and 163a and consent of the instructor. Professor RANDOLPH.

The discussion and solution of practical problems involving the selection, use, and revision of mechanical and electrical equipment in hotels. Cases are based on actual problems encountered. Costs are given primary consideration.

**166a. Hotel Structures and Maintenance.** Lecture. Spring term. Credit two hours. Prerequisite, mechanical drawing. Associate Professor SAYLES. Materials fee, \$1.

Materials and methods of building construction; specification and repair of furniture; the usual methods employed by the trades in the alteration of hotel structures.

**166b. Hotel Structures and Maintenance.** Laboratory. Spring term. Credit one hour. Hotel elective with consent of instructor. Taken with or after 166a. Associate Professor SAYLES. Laboratory fee, \$5.

Laboratory construction of typical building elements, emphasizing problems of repair, maintenance, and decoration.

**167. Building Costs.** Spring term. Credit one hour. Prerequisite, Hotel Engineering 166a. Associate Professor SAYLES.

The customary procedure in estimating various building costs for construction, alteration, repair, and decoration.

**185. Hotel Accounting Problems.** Spring term. Credit two hours. Prerequisite, Hotel Accounting 183 or its equivalent. Assistant Professor TOTH.

Incorporating the hotel owning and operating companies. Financing bond issues and discounts. Accounting provisions in hotel leases and management contracts. Installation of hotel accounting systems.

**186. Interpretation of Hotel Financial Statements.** Spring term. Credit two hours. Prerequisite, Hotel Accounting 183 or its equivalent. Assistant Professor TOTH.

Study and discussion of hotel balance sheets and profit and loss statements. Typical balance sheets and operating ratios of representative hotels.

**189. Problems in Analysis and Interpretation.** Fall term, to be repeated in the spring term. Credit two or three hours, depending on work done. Registration limited. Assistant Professor COURTNEY. Martha Van Rensselaer G-1. Fee for materials, \$3.

A seminar course for graduate students or seniors in hotel administration. Application of statistical methods to problems in analysis and interpretation. Each student will solve one or more problems.

**153. Seminar in Hotel Administration.** Fall term, to be repeated in the spring term. Credit two hours. Prerequisite, Hotel Administration 151 or its equivalent. Registration limited. Professor MEEK.

A course devoted to the study of specific problems arising in the management of hotels.

**119. Personnel Administration in Hotels.** Spring term. Credit three hours. Prerequisite, Rural Education 114 or its equivalent. Professor WINSOR.

Study of the problems of human relations in industry. Methods and problems of recruitment, selection, placement, maintenance, organization, and government of employees are analyzed with particular reference to the hotel industry.

**219. Seminar in Personnel Administration.** Spring term. Credit two hours. Prerequisite, 119. Professor WINSOR.

An analysis of current problems in personnel administration.

## LAW

*Professors of Law* R. S. STEVENS, L. P. WILSON, G. J. THOMPSON, H. E. WHITESIDE, H. D. LAUBE, G. H. ROBINSON, W. H. FARNHAM, J. W. MACDONALD, A. J. KEEFFE, G. T. WASHINGTON; *Associate Professor* L. W. MORSE; and *Assistant Professor* K. B. LANE.

Nine members of the Law Faculty are expected to be in residence during the coming academic year.

*The Division of Law* consists of members of the Faculty of Law, representatives of the associated departments of Economics, Government, History, and Philosophy in the College of Arts and Sciences, Professors DONALD ENGLISH,

R. E. CUSHMAN, M. L. W. LAISTNER, and G. W. CUNNINGHAM, and such other members of the Graduate School Faculty as for the time being are serving on the special committees of candidates for the graduate degrees in law.

**Approved Major and Minor Subjects** (key to symbols on p. 42)

Jurisprudence 1, 2, 3, 4  
 Legal History 1, 2, 3, 4  
 Private Law 1, 2, 3, 4  
 Procedure 1, 2, 3, 4  
 Public Law 1, 2, 3, 4

Graduate work in law is organized under the direction of the Division of Law of the Graduate School, in which is vested authority to establish and administer rules for the admission to candidacy for, and graduation with, the degrees LL.M. and J.S.D.

This method of organizing graduate work in law is considered especially advantageous since it offers to graduate students in law an opportunity to correlate their work in law with work in allied fields in other departments of the University, such as those in philosophy, history, government, business, and finance.

Candidates for either of the graduate degrees in law must be in residence not less than one academic year.

The Master's degree is intended primarily for those who desire to increase their knowledge of the law by intensive work in special fields.

Work leading to the Doctor's degree is designed to train legal scholars and to stimulate original investigation in the purpose, administration, history, and progress of the law. It is expected that candidates for the Doctor's degree shall have had some professional practice or teaching experience after obtaining a first degree in law.

As each candidate for a graduate degree in Law is admitted and his program arranged on an individual basis, no courses, except Jurisprudence, are prescribed for all. The content of the program of any particular candidate will depend upon his individual needs. A description of Professor Laube's course in Jurisprudence will be found in the Announcement of the Law School.

Graduate students may pursue work in Administrative Law, Business Regulation, Commercial Law, Constitutional Law, International Law, Jurisprudence, Labor Law, Legal History, Procedure, Property, Taxation, or in any other field of the Law in which they have an interest. Candidates who can not receive the instruction they require in the regular established courses listed in the Law School Announcement may study under the personal supervision of the appropriate members of the Faculty.

A number of furnished offices are provided in the Law School building, Myron Taylor Hall, for graduate students in Law.

Further information in regard to graduate work in Law can be found in the Law School Announcement.

For the procedure to be followed by a candidate for LL.M. see p. 20 of this Announcement, and for J.S.D. see page 28.

# VETERINARY MEDICINE

Approved Major and Minor Subjects (key to symbols on p. 42)

Animal Pathology 1, 2, 3, 4  
Animal Physiology 1, 2, 3, 4  
Diseases of Large Animals 1, 2, 3, 4  
Diseases of Small Animals 1, 2, 3, 4  
Immunology 1, 2, 3, 4  
Pathogenic Bacteriology 1, 2, 3, 4  
Pharmacology 1, 2, 3, 4  
Poultry Diseases 1, 2, 3, 4  
Veterinary Anatomy 1, 2, 3, 4  
Veterinary Obstetrics 1, 2, 3, 4  
Veterinary Parasitology 1, 2, 3, 4  
Veterinary Surgery 1, 2, 3, 4

## ANIMAL BREEDING, HUSBANDRY, NUTRITION

See under ANIMAL SCIENCES, p. 76.

## VETERINARY ANATOMY

Professor EARL SUNDERVILLE and Assistant Professor MALCOLM E. MILLER.

The laboratories of the department are well equipped for classwork and research. In the regular courses offered, the anatomy of the domestic animals is given.

The following courses are open to graduate students. For details of subject matter, see the *Announcement of the New York State Veterinary College*.

1. *Comparative Osteology*. Fall term. Three hours.
2. *Arthrology*. Fall term. One hour.
3. *Myology and Viscera*. Fall term. Three hours.
4. *Myology, Thoracic, and Abdominal Viscera, Lymphatic System, and Organs of Special Sense*. Summer term. Six hours.
5. *Blood Vessels and Nerves of the Arm, Leg, and Head*. Fall term. Five hours.
6. *Canine Anatomy*. Summer term. One hour.

## PHYSIOLOGY

Professors H. H. DUKES, C. E. HAYDEN, and Associate Professor J. A. DYE.

The laboratories of the department are well equipped for research work in physiology. Adequate facilities are available for work in both the experimental and the chemical fields. The Flower Library, in James Law Hall, provides a good collection of periodicals and books on physiology and related subjects. These may be supplemented by the many works on physiology in other libraries of the University.

Graduate students who plan to do their major work in physiology must have had the basic courses of the department or their equivalents. Graduate students who plan to do minor work in physiology may undertake special problems or research work if they are qualified, or they may pursue work in the regularly scheduled courses of the department.

10. *Animal Physiology*. Fall term, to be repeated in spring term. Credit three hours.
11. *Chemical Physiology*. Fall term. Credit four hours.
12. *Physiology of the Domestic Animals*. Fall term. Credit three hours.
13. *Physiology of the Domestic Animals*. Summer term, to be repeated in spring term. Credit three hours.



14. *Experimental Physiology*. Summer term, to be repeated in spring term. Credit three hours.

15. *Applied Chemical Physiology*. Summer term, to be repeated in spring term. Credit two hours.

303. *Human Physiology*. Summer term, to be repeated in fall and spring terms. Credit three hours.

[16. **Advanced Experimental Physiology**. Spring term. Credit three hours. Prerequisites, 12 or 13, or the equivalent, and 14 and 15, or their equivalent. Registration by permission. Professor DUKES and Associate Professor DYE. F 9-1. A conference hour to be arranged. Laboratory fee, \$10. Not given in 1944-45.]  
A laboratory course in mammalian and avian physiology.

17. **Special Problems in Chemical Physiology**. Summer term, to be repeated in fall and spring terms. Registration by permission. Professor HAYDEN. Hours to be arranged. Laboratory fee, \$2 a credit hour.

This course will be adapted to the needs of students and will consist of laboratory work, conferences, collateral readings, and reports.

305. **Endocrinology and Metabolism**. Fall term. Credit three hours. Prerequisite, six or more hours each of biology and chemistry. Associate Professor DYE, M W F 11. Moore Laboratory 101.

18. **Research**. Both terms. Hours to be arranged. Professors DUKES, HAYDEN, and Associate Professor DYE.

#### ANIMAL PATHOLOGY, BACTERIOLOGY, AND IMMUNOLOGY

(See also under BACTERIOLOGY, p. 89)

Professors W. A. HAGAN, PETER OLAFSON; Associate Professors P. P. LEVINE and A. ZEISSIG; and Assistant Professors C. W. BARBER and M. S. HOFSTAD.

The laboratories of pathology and bacteriology are well equipped with apparatus for research in pathological anatomy, pathogenic bacteriology, and immunity. The department operates two diagnostic laboratories to which a great deal of pathological material comes. A variety of fresh material is thus made available for study. The Flower Library, in James Law Hall, has a very complete set of current periodicals, and the more important books and monographs dealing with the work of the department is available.

Candidates for advanced degrees, electing pathology or bacteriology as their major subject, must have had at least the corresponding general subjects given in this department, or their equivalents. Candidates electing a minor subject in this department may take up a research problem, if they possess sufficient preliminary training, or may pursue regular undergraduate course work, the courses taken being subject to the approval of the staff member who is in charge of the minor.

The following courses are open to graduate students. For additional information, see the *Announcement of the New York State Veterinary College*.

- x 40. *General Pathology*. Two hours.
- x 40a. *General Pathology Laboratory*. Two hours.
- o 41. *Special Pathology*. Two hours.
- o 41a. *Special Pathology Laboratory*. Two hours.
- x 42. *Pathology of Infectious Diseases*. Two hours.
- x 43. *General Bacteriology*. Two hours.
- x 43a. *General Bacteriology Laboratory*. Two hours.
- o 46. *Diseases of Poultry*. Three hours.
- o 48. *Food Hygiene*. Two hours.
- o 49. *Pathogenic Bacteriology and Immunity*. Two hours.
- o 49a. *Pathogenic Bacteriology Laboratory*. Three hours.
- 149. *Pathogenic Bacteriology Laboratory*. Two hours.

x Summer term, to be repeated in the spring term.

o Fall term.

- Spring term.

[151. **Immunological Methods.** Prerequisites, 49, and 49a or 149. Associate Professor ZEISSIG. Class limited to twelve students. T Th 1:40-4. Laboratory fee, \$10. Not given in 1944-45.]

152. **Advanced Work in Pathology and Bacteriology.** For students who have completed the undergraduate courses in pathology and bacteriology. Professors HAGAN and OLAFSON. Special problems or assignments will be given. Hours to be arranged. Laboratory fee, \$2 a credit hour.

153. **Hematology.** Spring term. One hour.

154. **Seminar.** Fall term, to be repeated in spring term. One hour, time to be arranged. Required of all graduate students.

(For dairy bacteriology, see Dairy Bacteriology; for soil bacteriology, see Agronomy.)

### DISEASES OF BREEDING CATTLE

(Also includes VETERINARY PARASITOLOGY)

Professors R. R. BIRCH, H. L. GILMAN, and Associate Professor D. W. BAKER.

The department maintains a herd of cattle to be used in research with diseases that interfere with reproduction. Ample facilities are at hand for the study of the clinical and laboratory aspects of this group of diseases, and special research problems are being worked out at all times. Excellent facilities are also available for investigation of parasitological problems.

The following courses are open to graduate students. For additional information, see the *Announcement of the Veterinary College*.

62. **Animal Parasitology.** Fall term. Two hours.

62a. **Parasites Laboratory.** Fall term. One hour.

63. **Advanced Work in Animal Parasitology.** Either term. Associate Professor BAKER. Hours by arrangement.

Special problems with the parasites of animals.

### VETERINARY PHARMACOLOGY AND DISEASES OF SMALL ANIMALS

Professors H. J. MILKS and H. C. STEPHENSON.

The laboratories of the department are well equipped for research in veterinary pharmacology. The clinic supplies abundant material for research both in external and internal diseases of small animals.

There is an operating room with modern equipment and facilities for handling approximately sixty animals. The library facilities are good.

20. **Pharmacology.** Summer term, to be repeated in spring term. Four hours.

21. **Materia Medica and Pharmacy.** Summer term, to be repeated in spring term. Two hours.

22. **Diseases of Small Animals.** Fall term. Two hours.

22a. **Diseases of Small Animals.** Fall term. Two hours.

23. **Recitations in Materia Medica and Therapeutics.** Fall term. Two hours.

24. **Advanced Work.** This course will consist principally of the study of the action of drugs upon well and sick animals, and of the diseases of small animals. This will be supplemented by collateral readings and reports.

25. **Small Animal Clinic.** Six actual hours a week.

### VETERINARY MEDICINE, AMBULATORY CLINIC, AND OBSTETRICS INCLUDING DISEASES OF THE GENITAL ORGANS

Professor M. G. FINCHER; Assistant Professors W. J. GIBBONS, S. J. ROBERTS, and S. D. JOHNSON.

Opportunity for the clinical study of internal diseases of animals is afforded by material in the ambulatory clinic. This clinic has gradually developed until it

demands a large part of the time of two clinicians. Especially abundant are affections of dairy animals. Students are required to report their observations. Files of notes on completed cases are available for additional information. Special and research students will be given individual instruction to meet their requirements, and may supplement their clinical experience with further study in the various laboratories of the College.

## VETERINARY SURGERY

*Professor J. N. FROST and Associate Professor A. G. DANKS.*

The laboratory in surgery is well equipped for research and special study along surgical lines especially in connection with diseases of bones, tendons, and tendon sheaths.

Candidates for advanced degrees should have as preliminary preparation, general pathology, physiology, general and special surgery.

32. *Special Surgery.* Summer term, to be repeated in spring term. Five hours. Professor FROST.

**Research in Surgical Diseases.** Professor FROST.

# THE MEDICAL SCIENCES

AS PRESENTED IN THE MEDICAL COLLEGE IN NEW YORK CITY

The Graduate Faculty of the Medical College (Group F of the Graduate School) at present consists of professors in the preclinical branches of medicine who accept properly qualified students as candidates for the higher academic degrees. The qualifications required of graduate students are in every particular those which are required of students in other divisions of the University. Students desiring to enter the Graduate School for work in the medical sciences can obtain application blanks at the office of the Dean of the Medical College. Professor C. V. Morrill, Chairman of the Group, may be consulted for additional information. Since the number of graduate students who can be accommodated is limited, a personal interview is required of all applicants *before the filing of forms*. For a description of the work in the Medical College in New York City, see the *Announcement of the Medical College*.

The Medical College in New York City now occupies a portion of the plant of the New York Hospital-Cornell Medical College Association. This new medical center is located on the bank of the East River north of the Rockefeller Institute for Medical Research. It occupies several city blocks extending from the East River on the east to York Avenue on the west, and from Sixty-eighth Street on the south to Seventy-first Street on the north.

The Medical College group consists of buildings in the western part of the plant, facing York Avenue, opposite Sixty-ninth Street. These buildings from north to south are occupied by the departments of Anatomy, Public Health, Bacteriology, Pathology, Physiology, Biochemistry, and Pharmacology. The library is located in the building of the department of Pathology and at present contains about 25,000 volumes.

## ANATOMY

*Professors* J. C. HINSEY, J. F. NONIDEZ, C. V. MORRILL, G. N. PAPANICOLAOU, C. L. YNTEMA, C. O. WARREN, and W. HAMMOND.

Abundant material and sufficient apparatus are available for advanced study and work in the various branches of anatomy: embryology, histology, descriptive and experimental anatomy, neurohistology, and experimental neurology. Students desiring to pursue graduate work in any of these branches must have had in their college courses preliminary training in general zoology and comparative anatomy. A reading knowledge of German and French is essential.

The courses offered for the medical students appear in the *Announcement of the Medical College*, and are particularly recommended to those students who have not pursued work of this kind. In addition, the members of the staff offer work in the various phases of anatomy in which they are especially engaged. Technical and practical anatomical work are fully provided.

The requirements for either a major or a minor in anatomy will be determined for each individual case by the department of Anatomy, after consultation with the authorized representative of the other departments involved. As a prerequisite for graduate work in anatomy, each student will be expected to have a thorough training in the fundamental sciences of physics, chemistry, and biology such as is required for admission to the Medical College.

## BACTERIOLOGY AND IMMUNOLOGY

*Professors* JAMES M. NEILL, JOHN Y. SUGG, THOMAS P. MAGILL, and EDWARD J. HEHRE.

The course given to second-year students consists of lectures, laboratory work, and group conferences. Emphasis is placed upon the aspects of bacteriology and of immunology that are pertinent to an understanding of the etiology and pathogenesis of infectious diseases. The study of infectious material from patients is



included in the laboratory part of the course, not only to acquaint the student with the technical procedures but to illustrate the directness of application of the fundamental principles of the subject to the practical methods used in the examination of clinical material.

*Graduates and special students.* Opportunities for advanced study and for research will be offered to students particularly interested in bacteriology and immunology. Hours to be arranged.

### BIOCHEMISTRY

*Professors* V. DU VIGNEAUD, W. H. SUMMERSON, J. P. CHANDLER, and JOHN S. WOOD.

Opportunity is offered for advanced work and research in various phases of biochemistry. Adequate chemical and physical equipment and fundamental library facilities are provided for the investigation of a considerable variety of problems in the chemistry of the plant or the animal organism or of the human organism in health and disease.

Graduate students expecting to pursue investigations in biochemistry should have adequate preliminary training in inorganic, organic, analytical, and physical chemistry.

Students electing biochemistry as a minor subject are expected to complete the regular medical course in biochemistry, or its equivalent, as a minimum requirement.

### PATHOLOGY

*Professors* JOHN G. KIDD, JACOB FURTH, CHARLES T. OLCOTT.

The departmental laboratories are suitably equipped for carrying on graduate study and research problems in Pathology. Since members of the staff are engaged in varied investigations concerning etiology and pathogenesis, the department offers wide opportunity for the experimental study of disease. Adequate facilities for the care of animals are available. There is a small departmental library where some of the current journals and reference books are kept on file. The main library is situated on the floor immediately beneath the department, and is readily accessible. There is a carefully selected collection of mounted museum specimens, in addition to an active file of preserved gross material for study. The histological collection is likewise unusually rich in material. Autopsies for the entire hospital are performed by the members of the department, and offer an opportunity for the study of fresh pathological tissues.

No regular course of study is offered by the department for graduate students, but applicants in this field are given abundant opportunity for special work under the direct supervision of members of the department. Such work may include the investigation of some problem, and may be credited towards the applicant's graduate degree.

### PHARMACOLOGY

*Professors* MCKEEN CATTELL and HARRY GOLD.

Facilities are available for advanced work and research in both the chemical and pharmacodynamic aspects of pharmacology. In addition, arrangement can be made in special cases for correlating laboratory results with clinical studies. Special opportunities are offered for the investigation of the action of drugs on the circulation, the autonomic nerves, and muscles. The department is well equipped with special apparatus, including electrocardiographs with amplifying system, and galvanometers with accessories for the measurement of small temperature changes such as are employed for the measurement of heat production in tissues.

An adequate preliminary training in chemistry and physiology is prerequisite for graduate work in pharmacology.

## PHYSIOLOGY AND BIOPHYSICS

*Professors* EUGENE F. DU BOIS, DAYTON J. EDWARDS, WILLIAM H. CHAMBERS,\*  
JAMES D. HARDY,\* ROBERT F. PITTS, and CHARLES O. WARREN.

Graduate and research training is provided for students who wish to prepare themselves for teaching and research in the physiology aspects of biological science, with special emphasis on the physical and chemical approach; those who desire to prepare themselves more adequately for clinical practice and research by advanced training in some phase of physiology; and those who are entering a career in human biology.

Instruction is at first provided through the medium of formal basic courses in this and other departments of the Medical School, and in the departments of physics and chemistry of neighboring universities. This work is paralleled by similar courses which deal with specialized subjects on a more advanced level. Finally, the student is associated with various members of the staff on a tutorial basis for instruction in special research problems.

The laboratories are equipped for research in most fields of physiology and biophysics with special facilities for investigations in neurophysiology and metabolism. There is an excellent library in the department.

The Russell Sage Institute of Pathology, which houses the calorimeter in the New York Hospital, is under the direction of the head of this department.

## PUBLIC HEALTH AND PREVENTIVE MEDICINE

*Professors* WILSON G. SMILLIE and MORTON C. KAHN.

In this department candidates for the Ph.D. degree may elect Parasitology as a major subject. Members of this department have all carried on investigations in tropical countries, and an excellent collection of living and preserved parasitic material is available for study and research.

The medical school courses in both Public Health and Parasitology are acceptable as minor requirements for students who may desire to major in other departments of the University. The department welcomes graduate students who wish to register in special fields. Each application will be considered on its merits, and the work may be arranged in accordance with the desires and purposes of the candidate after consultation with the members of the department.

The laboratories are well equipped for research in public health, epidemiology, serology, and parasitology. Facilities at the Kips Bay-Yorkville District Health Center are available to a limited number of graduate students for the study of certain social aspects of Preventive Medicine and Public Health.

It is preferred that the candidate for advanced work in Public Health and Preventive Medicine should have a medical degree; he should also possess credit for or the equivalent of the basic course in Public Health given to the third year medical students in Cornell. The Department of Public Health and Preventive Medicine does not offer formal graduate courses in Public Health or in Preventive Medicine, and the University does not grant advanced degrees in Public Health.

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\*In military service.

# THE AGRICULTURAL SCIENCES

AS PRESENTED IN THE NEW YORK STATE EXPERIMENT STATION AT GENEVA

A. J. HEINICKE, *Director*

Since July 1, 1923, the New York State Experiment Station at Geneva has been under the administration of Cornell University. Research workers on its staff are eligible for membership on the Faculty of the Graduate School, and its facilities for research are available to graduate students.

The station is equipped to care for graduate students in certain specific lines of research, viz., Bacteriology, Chemistry, Economic Entomology, Plant Pathology, Pomology, Seed Investigations, and Vegetable Crops. Ample accommodations are available from the standpoint of laboratory facilities, reference library, etc., for research in the laboratory sciences. Greenhouses and also a farm of approximately 200 acres are available for work with fruits and vegetables.

Certain phases of the investigations now being conducted at the Station and other problems for which the facilities of the Station are suitable may be used as thesis problems by graduate students.

Students who plan to do part of their graduate work at Geneva should correspond with the Dean of the Graduate School concerning special regulations as to residence credit, special committees, etc.

## BACTERIOLOGY

*Professors* R. S. BREED, H. J. CONN, G. J. HUCKER, C. S. PEDERSON, \_\_\_\_\_, and A. W. HOFER.

Members of this Division are engaged in a study of problems in fermentation, food bacteriology, fundamental physiological and taxonomic studies of bacteria, and applied dairy and soil bacteriology. Thesis problems may be elected in any of these fields as follows:

**Dairy Bacteriology.** Professor BREED.

**Biological Stains.** Professor CONN.

**Food Poisoning.** Professor HUCKER.

**Food Packaging.** Professor HUCKER.

**Food and Fermentation Bacteriology.** Professor PEDERSON.

**Taxonomy of Bacteria.** Professor BREED.

**Soil Bacteriology.** Professors CONN and HOFER.

## CHEMISTRY

*Professors* E. H. STOTZ, A. W. CLARK, D. C. CARPENTER, Z. I. KERTESZ, H. G. BEATTIE, L. B. NORTON, G. L. MACK, G. W. PEARCE, F. A. LEE, and J. C. MOYER.

Opportunities for graduate research in the following fields are offered: the chemistry and technology of food preservation by freezing or dehydration; the nutritive values of fruits and vegetables; plant metabolism; protein chemistry; the chemistry of pectin and pectic enzymes; insecticides and fungicides; and vitamins of animal feeds.

**Nutritive Value of Foods.** Professor STOTZ.

**The Chemistry of Fruits and Vegetables.** Professor STOTZ.

**The Preservation of Fruits and Vegetables.** Professors STOTZ, LEE, and MOYER.

**The Technology of the Preservation of Fruit Juices.** Professor BEATTIE.

**Vitamins of Animal Feeds.** Professor CLARK.

**Plant Metabolism.** Professors STOTZ and KERTESZ.

**Protein Chemistry.** Professor D. C. CARPENTER.

**The Chemistry of Pectin and Pectic Enzymes.** Professor KERTESZ.

**Insecticides and Fungicides.** Professors NORTON and PEARCE.

## ENTOMOLOGY

*Professors* P. J. PARROTT, H. GLASGOW, F. Z. HARTZELL, S. W. HARMAN, P. J. CHAPMAN, E. H. WHEELER, D. M. DANIEL,\* G. E. R. HERVEY, F. G. MUNDINGER, H. C. HUCKETT, F. L. GAMBRELL, L. A. CARRUTH, J. A. ADAMS, and R. W. DEAN.

The staff of this Division is engaged in research work on a variety of agricultural insect pest problems of the State. Students may obtain, by arrangement, supervision of work on advanced research problems falling within the following fields: insect pests affecting deciduous fruits, vegetable crops, nursery and ornamental plants; biological control of insects, and applications of biometry and ecology in applied entomology.

**Fruit Insects.** Professors PARROTT, CHAPMAN, HARTZELL, HARMAN, MUNDINGER, and DEAN.

**Vegetable Insects.** Professors GLASGOW, HUCKETT, HERVEY, and CARRUTH.

**Insect Pests of Nursery and Ornamental Plants.** Professor GAMBRELL.

**Applied Ecology.** Professor HARTZELL.

**Applications of Biometry.** Professor HARTZELL.

**Biological Control of Insects.** Professors WHEELER and ADAMS.

## PLANT PATHOLOGY

*Professors* O. A. REINKING, J. M. HAMILTON, W. O. GLOYER, H. S. CUNNINGHAM, R. O. MAGIE, D. H. PALMITER, R. F. SUIT, and W. T. SCHROEDER.

The Division offers opportunities for graduate research in diseases of fruits, vegetables, canning crops, and hops; fungicides; diseases caused by *Fusaria*; taxonomy of *Fusaria*; and ecology of plant diseases. Students may select problems as indicated below:

**Diseases of Fruits.** Professors HAMILTON, REINKING, PALMITER, and SUIT.

**Diseases of Vegetables.** Professors SCHROEDER, REINKING, GLOYER, and CUNNINGHAM.

**Diseases of Canning Crops.** Professors SCHROEDER, MAGIE, and REINKING.

**Diseases of Hops.** Professor MAGIE.

**Fungicides.** Professors HAMILTON, SUIT, and SCHROEDER.

**Diseases Caused by *Fusaria*.** Professor REINKING.

**Taxonomy of *Fusaria*.** Professor REINKING.

**Ecology of Plant Diseases.** Professors SCHROEDER, and REINKING.

## POMOLOGY

*Professors* A. J. HEINICKE, R. WELLINGTON, H. B. TUKEY, R. C. COLLISON, G. D. OBERLE, JOHN EINSET, and N. J. SHAULIS.

This Division is engaged in research in the following fields: genetics of fruit breeding; plant propagation and rootstocks including stock and scion relations; developmental morphology of deciduous fruits; orchard-soil management; orchard management; cytology, applied and theoretical. No formal courses are offered, but students may register for work on problems as indicated below:

**Fruit Breeding Problems.** Professors WELLINGTON and OBERLE.

**Developmental Morphology of Deciduous Fruits.** Professor TUKEY.

**Rootstock Problems, including Stock and Scion Relations.** Professor TUKEY.

**Fertilization and Nutritional Studies with Trees.** Professor COLLISON.

**Orchard Soil Technology.** Professors COLLISON and SHAULIS.

**Cytology.** Professor EINSET.

**Physiology of Fruit Plants.** Professor A. J. HEINICKE.

\*On leave for military service.



## SEED INVESTIGATIONS

*Professors* M. T. MUNN and W. F. CROSIER.

Seed investigations covering the wide field of seed production, distribution, and control are under way at the Station. By special arrangement qualified students can undertake graduate research in analytical methods, physiology of germination, taxonomy of incidental plant seeds, histology of seed structure, seed-borne microorganisms, seed control and improvement, and a few closely allied fields.

**Seed Investigations.** Professors MUNN and CROSIER.

## VEGETABLE CROPS

*Professors* C. B. SAYRE and W. T. TAPLEY.

Students may obtain, by arrangement, supervision of work on problems in the history and description of varieties, vegetable breeding, plant nutrition, fertilizers, and fertilizer placement for vegetable crops. Factors affecting quality of cannery vegetables, cropping systems, and improved methods of crop production and field plat technique. Studies in these fields of work can be best undertaken during the summer.

**Effects of Fertilizers on Yield and Quality of Vegetables for Manufacture.** Professor SAYRE.

**Fertilization and Nutritional Studies with Vegetables.** Professor SAYRE.

**Variety Studies of Vegetables.** Professor TAPLEY.

**Vegetable Breeding Problems.** Professor SHAFER.

**Vegetable Canning Crop Research Problems.** Professor SAYRE.

## FELLOWS: SCHOLARS: ROSTER OF DEGREES

### FELLOWS AND GRADUATE SCHOLARS IN 1942-43

#### RESIDENT DOCTORS

- Hassan Ahmed Baghdadi, Ph.D., University of California, 1941.  
Gertrude Aby Hanchett, Ph.B., University of Chicago, 1914; M.A., Syracuse University, 1934; Ph.D., Syracuse University, 1939.  
El Sayed Mohamed Sakr, B.S., University of California, 1936; M.S., University of California, 1939; Ph.D., Cornell, 1942.  
Pritam Sen, B.Sc., University of Allahabad, 1936; M.Sc., University of Allahabad, 1938; Ph.D., Cornell, 1942.

#### ENDOWED AND UNIVERSITY FELLOWS

- The Anna Cora Smith Fellowship in Home Economics:* Hazel Luella Ingersoll, B.Sc. in Home Ec., University of Nebraska, 1934; M.A., University of Nebraska, 1942.  
*The Cornell Fellowship in English:* Jean V. E. Whitehead, B.A., M.A., McGill University, 1939, 1941.  
*The Edgar J. Meyer Memorial Fellowship in Engineering Research:* Bal Dattatrey Kalelkar, B.E., Bombay University, 1940; M.S., Massachusetts Institute of Technology, 1941.  
*The Erastus Brooks Fellowship in Mathematics:* Irma Moses, B.A., Cornell, 1942.  
*The Fellowship in Greek and Latin:* Mary Roberta Irwin, A.B., A.M., Indiana University, 1934, 1937.  
*The Henry Strong Denison Fellowships in Agriculture:* George Wilson Cochran, B.S. in Agr., Kansas State College, 1941; M.S., Kansas State College, 1942.  
Gunvantlal Amritlal Patel, B.S., University of Bombay, 1938.  
*The duPont Fellowship in Chemistry:* Hugh K. Clark, A.B., Oberlin College, 1939.  
*The President White Fellowship in Physics:* Albert C. Beer, A.B., Oberlin College, 1941.  
*The President White Fellowship in Political and Social Science:* Roland Stucki, B.S., Brigham Young University, 1930; M.S. (in Economics), University of Utah, 1932; M.B.A., Stanford University, 1935.  
*The Sage Fellowship in Chemistry:* Harlan L. Tuthill, B.S., Houghton College, 1939.  
*The Sibley Fellowship in Mechanical and Electrical Engineering:* Wing-Ching Lam, B.S. in M.E., University of Colorado, 1942.  
*The Susan Linn Sage Fellowship in Psychology:* Harold K. Fink, A.B., Princeton University, 1938; M.S., California Institute of Technology, 1941.  
*The University Fellowship in Agriculture:* Willie Garland Woltz, B.S., North Carolina State, 1939.  
*The University Fellowship in Architecture, Landscape Architecture, and Fine Arts:* Leslie Stott O'Gwynn, Jr., B.Arch., Alabama Polytechnic Institute, 1941.  
*The University Fellowship in Romance Languages:* Edward A. Jones, B.A., Morehouse College, 1926; A.M., Middlebury College, 1930.  
*The Susan Linn Sage Fellowships in Philosophy:* Robert Alvin Kennedy, B.A., University of Toronto, 1942. Anna Margaret Weber, A.B., Wilson College, 1942.

#### SPECIAL TEMPORARY FELLOWSHIPS

- Allied Chemical and Dye Corporation Fellowship:* Howard E. Sheffer, B.S., Union College, 1939; M.S., Rensselaer Polytechnic Institute, 1940.  
*G. L. F. Poultry Fellowship:* James McGinnis, B.S., North Carolina State College, 1940.  
*Innis, Speiden and Company Fellowship:* Frank L. Stark, Jr., B.S. in Agr., M.S., Rhode Island State College, 1937, 1939.

- Juice Clarification Fellowship*: Robert Louis Messier, B.S., Worcester Polytechnic Institute, 1940; M.S., Massachusetts State, 1941.
- Nassau County Farm and Home Bureau Association Fellowship*: Fred M. Gordon, B.S., Massachusetts State College, 1941.
- Near Eastern Homemaking Fellowship*: Mrs. Margaret Florea, B.S. in Ed., Kansas State Teacher College, 1939.
- New York Florists' Club Entomology Fellowship*: John J. Pratt, Jr., B.S., Massachusetts State College, 1939; M.S., North Carolina State College of Agriculture and Engineering, 1941.
- Staten Island Growers' Fellowship*: Aubrey Alfred Foster, B.S., Cornell, 1939.
- Texas Gulf Sulphur Company Livestock Insect Fellowship*: John George Matthyse, B.S., Iowa State College, 1940.
- Tobacco By-Products and Chemical Company Insecticide Fellowship*: Martin M. Barnes, B.S., University of California, 1941.
- Western Condensing Company Fellowship*: Milton L. Scott, A.B., University of California, 1937.

## SCHOLARS

- The Comstock Graduate Scholarship*: Cecil Su-sin Lee, B.S., Madison College, 1940; M.S., Michigan State College, 1941.
- The Graduate Scholarship in Architecture, Landscape Architecture, and Fine Arts*: Leslie T. C. Kuo, B. Comm., Nankai University, 1933; A.M., Ph.D., Cornell, 1939, 1941.
- The Graduate Scholarship in Civil Engineering*: Donald MacLean Dewart, B.S. in C.E., University of Vermont, 1938. (Summer term only).
- The Graduate Scholarship in Civil Engineering*: Richard Hsueh-Jui Pian, B.S. in C.E., Hautes Etudes, Tientsin, China, 1941.
- The John McMullen Graduate Scholarships*: George Pershing Baumann, B.S., Illinois Institute of Technology, 1941. David Edwards Cook, B.S. in Chem. Eng., Drexel Institute of Technology, 1941. Joseph Garcia, B.C.E., Rensselaer Polytechnic Institute, 1937; M.C.E., Cornell, 1940. Robert L. Lewis, B.S. in C.E., Colorado State College, 1934. Richard Nicholas Work, A.B., Cornell, 1942.
- The Scholarships in Greek and Latin*: Stephanie Jakimowitz, A.B., Hunter College, 1942. Helen Florence North, A.B., Cornell, 1942. Warren Harding Miller, B.A., Cornell, 1942.
- The Susan Linn Sage Graduate Scholarship in Psychology*: Jozef Bertram Cohen, B.S., University of Chicago, 1942.

## TUITION SCHOLARS

- Robert McCrillis Carter, Jr., University of Wisconsin, 1926; M.S., University of Vermont, 1939.
- Yuan Ying (Stella) Cheng, B.A., West China Union University, 1932; M.A., Yenching University, 1938.
- Georg Frostenson, B.S.C. (in Agronomy), Upsala College, 1938.
- Emma Corinne Brown Galvin, A.B., Shaw University, 1929; M.A., University of Pennsylvania, 1931.
- Sarah C. Harris, B.S., Russell Sage College, 1942.
- Susanne Elisabeth Heimann, A.B., Barnard College, 1940; A.M., Columbia University, 1942.
- Cecil Su-sin Lee, B.S., Madison College, 1940; M.S., Michigan State College, 1941. (Summer term only).
- Pao-Wah (Ruby) Lee, B.S., Pennsylvania State College, 1942.
- Mei-yung Li, B.A., Ginling College, 1930; M.Ed., University of Rochester, 1943.
- Reva M. Lincoln, B.S., Pennsylvania State College, 1937.
- Edward A. Miller, C.E., Cornell, 1943.
- Jaroslav Vaclav Monik.
- Peggy Porter Muirhead, A.B., Carleton College, 1942.
- Marion Chiyoko Okimoto, B.S., University of Hawaii, 1934; M.S., Cornell, 1943.
- Myron A. Rice, B.S., University of California, 1916; M.S., Cornell, 1925.
- Josephine Rickard, A.B., Houghton College, 1925; A.M., Cornell, 1932.

- Alice Sperduti, B. A., Ladycliff College, 1939.  
 Mary Dorothy Rettger, A.B., Cornell, 1942.  
 Clyde Newton Rogers, B.A., Hamline University, 1940.  
 Ruth Margaret Thomas (Mrs.), Ph.B., Wheaton College, 1937.  
 Werner E. Warmbrunn, A.B., Cornell, 1942.

## LATIN-AMERICAN TUITION SCHOLARS

- Taygoara Fleury de Amorim, Chemico Industrial Agricola, Escola Superior de Agricultura e Medicina Veterinaria, 1925.  
 Victor Lionel Guzman, Ingeniero Agronomo, National School of Agriculture and Veterinary Medicine, Lima, Peru, 1940. (Summer term only).  
 Julio Oscar Morales, B.S. in Agr., University of Puerto Rico, 1938.  
 Luis Arcesio Perez-Medina, Diplom-Chemiker, Georg-August University, 1938.  
 Jose Antonio Zelaya, Graduated, Agricultural and Veterinary Medicine, National School of Peru, 1941. M.S., North Carolina State College of Agriculture and Engineering, 1942.

## ADVANCED DEGREES CONFERRED IN 1941-42

## MASTERS OF ARTS

CONFERRED SEPTEMBER 24, 1941

- Christine Albanese, A.B.; Social Studies.  
 Mary Ruth Andrews, A.B.; Mathematics. Thesis: Foci of Algebraic Curves.  
 David Alonzo Avant, Jr., A.B.; Dramatic Production, Dramatic Literature. Thesis: Staging Requirements of George Bernard Shaw's Plays.  
 Wilmot Thomas Bartle, A.B.; English Renaissance, Old English. Thesis: *The Example* (1637), by James Shirley, Edited with Introduction and Notes.  
 Donald Congdon Blanding, B.S.; English, American History. Thesis: Byron and His Circle.  
 Robert Van Buren Burdick, B.S.; Dramatic Production, Rhetoric and Public Speaking. Thesis: Symbolism in the Drama: Being an Investigation of a Literary Movement Particularly in France as it Affected the French Theatre from 1890 to 1914.  
 John Wallace Dallenbach, A.B.; Psychology, Physiological Psychology. Thesis: The Effects of Bitter-Adaptation on Sensitivity to the other Taste Qualities.  
 Florence Edith Darnell, A.B.; Latin Language and Literature, English. Thesis: A Study of *Sermo Vulgaris* in Six Comedies of Plautus.  
 William McGregor Deller, A.B.; Histology and Embryology, Neuroanatomy. Thesis: The Development of the Thyroid in the Chick.  
 Vinson Allen Edwards, A.B., B.D.; Sociology, Farm Management. Thesis: Negro Leadership in Rural Georgia Communities.  
 Ruth Gallagher, B.S.; Sociology, Anthropology. Thesis: Important Developments in American Social Psychology during the Past Decade.  
 Ruth Gold, A.B.; American Literature, The English Drama. Thesis: Puritanism in the Literary Criticism of Emerson.  
 Wayne Clinton Hayward, B.A.; Dramatic Production, Rhetoric and Public Speaking. Essay: Solomon Franklin Smith Pioneer American Actor-Manager.  
 Margaret Hermine Heinbockel, A.B.; Dramatic Production and Public Speaking.  
 Kate Langley Hopkins, A.B.; Dramatic Production, Dramatic Literature. Thesis: Fanny Kemble's Theory of the Theatre.  
 Viola Marie Kuhne, B.S.; Educational Psychology, Secondary Education. Thesis: A Study of Six Cases of Maladjusted Adolescents.  
 Senatro Dominick LaBella, A.B.; Dramatic Production, Speech and Phonetics. Essay: Carlo Goldoni.  
 Hilda Matilda Laubenstein, B.A.; Social Studies.  
 Jane Malmgren, A.B.; Dramatic Production, Dramatic Literature. Essay: An Interpretation of Chekhov and His Plays.  
 Isabel Riexinger Mettler, A.B.; Dramatic Production, Speech and Phonetics. Thesis: August Strindberg and His Plays.



- Mary Rose Micucci, A.B.; American Literature, Speech Training and Phonetics. Thesis: Whitman's Debt to Emerson.
- Herbert Phillippi, A.B. in Ed.; Dramatic Production, Theatre Technique. Thesis: Adaptations, Notes, and Designs for Modern Productions of *Ralph Roister Doister*, *Epicoene*, or *the Silent Women*, and *The Gentleman Dancing Master*.
- Gwendoline Lillian Reid, A.B.; Literary Theory, Education. Thesis: Plutarch's Use of Aristotle's *Ethics*.
- Alice Mary Ritter, A.B.; Botany. Zoology. Thesis: A Biological Survey of a Sandy Area West of Albany, Albany County, N. Y.
- Virginia Paine Rogers, A.B.; Dramatic Production, Speech. Thesis: The History and Methods of the Moscow Art Theatre, 1898-1941.
- David Murray Schneider, B.S.; Anthropology, Sociology. Thesis: Aboriginal Dreams.
- Dorothy Helen Smith, A.B.; Social Studies.
- Jane Case Stoutenburg, A.B.; American History, Education. Thesis: A History of Taxation in Colonial New York.
- Sami Semsiddin Tekiner, Bach. of Laws; Economic Theory, Statistics. Thesis: Economic Stability and Planning of Public Works.
- Ella Haines Thompson, A.B.; Foreign Languages. Thesis: Syllabus in "General Language" for the Small School.
- Hulda Van Steeter, A.B.; Child Guidance and Parent Education, Family Relationships and Personality Development. Essay: Development of a Plan for a Curriculum in Family Life at the University of Utah.

## CONFERRED JANUARY 31, 1942

- Marjorie Deborah Abrahams, A.B.; Plant Physiology. Plant Anatomy. Thesis: Growth Hormone Content and Percentage Germination of Maize Seeds.
- Kathryn Betts De Boer, B.S.; Speech and Phonetics, Dramatic Literature. Thesis: The Rhymes of Philip Freneau as a Criterion of Eighteenth Century American Pronunciation.
- Roger Dan Derby, B.A.; Musicology, German Literature. Thesis: The Lute in England and Scotland before 1550.
- Marian Elizabeth Elliott, A.B.; Dramatic Literature, Elizabethan Literature. Thesis: A Study of Tamburlaine in Romance and Tragedy.
- Kathryn Elizabeth Esposito, A.B.; English.
- Benedict Willis Law, A.B.; Foreign Languages.
- Helen Lee Mordoff, A.B.; Dramatic Literature, Public Speaking. Thesis: Dramatic Theories of Maxwell Anderson.
- Alfred Milton Peiser, A.B.; Geometry, Algebra. Thesis: Covering Spaces and Covering Homeomorphisms.
- Helen Reece, A.B.; Geometry, Analysis. Thesis: Polynomials Associated with Regular Polygons.

## CONFERRED MAY 25, 1942

- Mary Louise Benoit-Smullyan, A.B.; English Language and Literature, Writers on Art. Thesis: Principles of Comedy in the Towneley *Secunda Pastorum*—An Analysis Based upon Lane Cooper's *An Aristotelian Theory of Comedy*.
- Louis Charles Boochever, A.B.; Government, Sociology. Thesis: A Study of the Factors Involved in the Passage of the 1929 Bill for Reapportionment of the House of Representatives.
- Shirley Ruth Dushkind, B.A.; Psychobiology, Animal Breeding. Thesis: A Psychosomatic Investigation of the Oestrus Cycle in Normal Women.
- Howard Spencer Dye, A.B.; Public Finance, Prices and Statistics. Thesis: The Banking Act of 1935: Its History, Consequences and Related Issues.
- Walter Eilers, A.B.; Physics, Mathematics. Thesis: The Hyperfine Structure of  $\lambda$  5056 and  $\lambda$  6806 of the Antimony Spectrum.
- Joan Fischer, A.B.; Speech and Phonetics, Educational Psychology. Thesis: The Pronunciation of a Selected Group of Nursery School Children.

- Julia Ann Flohr, B.S. in Ed.; Speech and Phonetics, American Literature. Thesis: The Rhymes of Joel Barlow as a Criterion of Eighteenth Century American Pronunciation.
- Joseph Eldon Hall, A.B.; Medieval Literature, Bibliology. Thesis: A Study of the Early Monastic Libraries of St. Gall, Reichenau and Bobbio, with Special Emphasis on the Irish Influence.
- Genevieve Heagney, B.S.; Public Speaking, Dramatic Production. Thesis: A Course of Study in Speech for a Public School System, Grades 1-12.
- Gladys Myers Hickman, B.S. in Ed.; Foreign Languages.
- Betty Jeanne Isaacs, A.B.; Physics, Mathematics. Thesis: A Revision of the Isotopic Mass Scale.
- Frances Ruby Ivey, B.S.; English.
- Roger Westcott Marsters, A.B.; Physiology, Biochemistry. Thesis: Metabolism of the Lower Fatty Acids and Ketone Body Production.
- Arthur Ellsworth Niedeck, B.O.E.; Dramatic Production, Educational Administration. Thesis: A Sketch of the Theatres of Ithaca 1842-1942. vol. 1, II.
- Mary Helen O'Connor, B.S. in General Studies; American History, Modern European History. Thesis: Potawatomie Land Cessions in the "Ole Northwest".
- Betty Frances Scherer, A.B.; Foreign Languages.
- Thorvaldur Thorarinnsson, Cand.jur.; International Law and Relations, Constitutional Law. Thesis: The International Status of Iceland.
- Helen Anthony Vasiliou, B.A.; Public Speaking and Dramatics.

#### MASTER OF ARTS IN EDUCATION

CONFERRED SEPTEMBER 24, 1941

Dorothy King, B.S.

CONFERRED JANUARY 31, 1942

Louis Eugene Johnson, B.S.

#### MASTERS OF SCIENCE

CONFERRED SEPTEMBER 24, 1941

- Benjamin Franklin Barrentine, B.S.; Animal Nutrition, Biochemistry. Thesis: The Influence of Sodium Metaphosphate and Sodium Orthophosphate upon the Mineral Nutrition of the Rat.
- Louise Grace Campbell, A.B.; Family Life, Economics of the Household and Household Management. Thesis: A Study of the Development of a Leadership-Training Series in Family Relationships: Sex in Character Education.
- Victor Hugo Campbell, B.A.; Agricultural Economics.
- Harry Bugbird Copelin, B.Chem.; Organic Chemistry, Physical Chemistry. Thesis: Synthesis of Some Monosubstituted Piperazines.
- Will Giles Crandall, B.S.; Agricultural Education, Agricultural Economics. Thesis: A Study of a Rural Community for the Purpose of Determining Some Factors that Should Be Considered in Providing Instruction in Vocational Agriculture.
- Charles McNeil Crawford, B.S.; Bacteriology, Biochemistry. Thesis: Response of Certain Commercial Yeasts to Accessory Growth Factors.
- Gwen Edwards, B.S.; Home Economics.
- Dorothea Floyd Hall, A.B.; Botany, Mathematics. Thesis: A Study of Plant Hairs and Their Functions, with Special Reference to the Family Loasacea.
- Franklin Albert Hamm, B.S.; Organic Chemistry, Physical Chemistry. Thesis: A Study of the Mercuration of Polynuclear Hydrocarbons.
- Norman Hervey High, B.S.A.; Education.
- Jerome Heartwell Holland, B.S.; Sociology, Education. Thesis: The Role of the Negro Church as an Organ of Protest.

- Karl Walton Kenyon, B.A.; Ornithology, Invertebrate Zoology. Thesis: A Study of the Old Nest as a Visual Stimulus to Re-Nesting in the Baltimore Oriole, *Icterus Galbula* (Linnaeus) Including Supplementary Life History Observations.
- Margaret McCoy, B.S.; Education.
- Saul Mirel, A.B.; Organic Chemistry, Inorganic Chemistry. Thesis: The Preparation of Solid Tertiary Alcohols and Hydrocarbons.
- Helene Moore Priester, B.S. in H.E.; Home Economics. Thesis: The Dating Practices of One Hundred and Six High School Seniors in an Urban Community.
- Jay Sanford Roth, B.S.; Organic Chemistry, Inorganic Chemistry. Thesis: The Reactions of Benzyl Fluorides.
- Mabel Slack, B.S.; Botany, Ornithology. Thesis: A Survey of the Flora of Cherokee Park at Louisville, Kentucky.
- Mabel Watkins Smith, B.S.; Biological Sciences.
- Adella Elizabeth Strouss, B.S.H.E.; Family Life, Economics of the Household and Household Management. Thesis: Responsibilities of Home, Personal and Social Activities Reported by Rural High School Girls.

## CONFERRED JANUARY 31, 1942

- Elizabeth Johanna Bottcher, B.S.; Bacteriology, Cytology. Thesis: Determining the Relative Amount of Bacteriophage in Soils.
- Frederic Lewis Faber, B.S.; Marketing, Business Management. Thesis: The Egg and Poultry Marketing Cooperatives of New York State.
- Helen Louise Farmer, B.S., B.S. in Home Ec.; Home Economics.
- Robert George Latimer, B.S.; Marketing, Farm Management. Thesis: Condensery Milk Prices.
- James Daniel Stroupe, Jr., A.B.; Physical Chemistry, Physics. Thesis: The Structure of Cesium Hexafluotantalate.

## CONFERRED MAY 25, 1942

- Keith Morrissey Baldwin, B.S.; Dairy Science, Bacteriology. Thesis: Factors Involved in Removal of Casein from Milk which Influence its Determination by Specific Gravity Difference.
- John Mark Bishop, B.S.; Pomology, Agricultural Economics. Thesis: A Survey of the Apple Juice Industry.
- Norman John Bowman, A.B.; Organic Chemistry, Analytical Chemistry. Thesis: A Study of the Chemistry of Chrysene.
- James Rolland Carson, B.S.; Animal Breeding, Histology and Embryology. Thesis: Breed Differences in Bactericidal Power of the Blood Plasma in Chickens. Over *Salmonella pullorum*.
- Stephan Woodman Eaton, A.B.; Biological Sciences.
- Henry Morse Emerson, A.B., A.M.; Social Studies.
- Elizabeth Jane Feldmeier, B.A.; Foods, Nutrition. Thesis: A Study of Loss of Liquid and Heat Penetration during Processing in Glass Jars in a Pressure Cooker.
- Marie Theresa Folsom, B.S.; Nutrition, Family Life. Thesis: The Effect of Vitamin C and Citrates on the Phosphorus Metabolism of a Pre-school Child.
- Emilio E. Gautier, B.S. in Agr.; Economic Entomology, Insect Taxonomy. Thesis: Federal Plant Quarantines versus Insect Pests.
- Elizabeth Ann Grawemeyer, B.S.; Foods, Nutrition. Thesis: Observations on the Phenomena Occurring during the Thickening of Eggs in Cream Fillings.
- Agnes Irene Muller, B.S. in Ed.; Biological Sciences.
- Wilbur Stanley Newcomer, B.S.; Biological Sciences.
- Ralph Raul Romo, D.V.M.; Diseases of Large Animals, Animal Pathology. Thesis: The Relative Efficiency of the More Commonly Recommended Disinfectants on *Brucella Abortus*.
- Jane Dyer Sanford, B.A.; Nutrition, Animal Nutrition. Thesis: Renal Threshold for Ascorbic Acid in Ten Normal Adults with a note on Tissue Saturation at a 75 Milligram Level of Intake.

- William Lawrence Sippel, B.S., V.M.D.; Animal Pathology, Veterinary Surgery. Thesis: Equine Degenerative Arthritis.
- Karen Van Derzee, B.S.; Home Economics.
- Vicente Velasco, Ingeniero Agronomo; Economic Entomology, Medical Entomology. Thesis: The Plant Quarantine Situation in Colombia, S. A., and Some Suggestions for its Improvement.
- John Frederick Wanamaker, B.A.; Ornithology, Nature Study. Thesis: A Study of the Courtship and Nesting of the Eastern Cardinal *Richmondia c. cardinalis* (Linnaeus).
- Mildred Elsie Ward, A.B.; Biological Sciences.
- Margaret Naughton Whelan, B.S. in H.E.; Nutrition, Family Life. Thesis: The Effect of Ascorbic Acid and Citrates on the Nitrogen Retention of Pre-School Children.
- Marietta Nyman White, B.S.; Nutrition, Family Life. Thesis: Factors Affecting Milk Secretion.
- Herbert Fessenden Wright, A.B.; Organic Chemistry, Biochemistry. Thesis: The Preparation of Sulfabenzedrine.

## MASTERS OF SCIENCE IN EDUCATION

CONFERRED SEPTEMBER 24, 1941

- Agnes Weir Benedix, A.B., A.M.
- Morris Caplan, A.B.
- Frank Armand Da Brescia, B.S.
- George Raymond Daulton, A.B.
- Clarence Raymond Dixon, B.S.; Thesis: A Testing Program for the Selection and Placement of the Shop Personnel of the Allen-Wales Co.
- Chester Stanley Driver, A.B.
- Karl Daniel Ebers, B.S.
- James Morris Farmer, B.S.
- Anna Carol Fults, B.S. in H.Ec.
- Vera Le Masurier Gillespie, B.S.
- Marion Post Hallock, B.S.; Thesis: A Study of the Development of Schools in Certain Sections of the Appalachians under the Presbyterian Church, U.S.A.
- Mabel Agnes Hastie, B.S.; Thesis: An Experimental Study Comparing Two Types of Guide Sheets Used as a Method of Inducting Student Teachers into Directed Observation.
- Maurice Thomas Heeter, B.S.
- William John Hendron, Jr., B.S.
- Alexander Nedelkovich Hesse, A.B., B.S., E.E.
- Russell Lowell Hogue, B.S. in Ed.
- Genevieve Maretta Kyer, B.S.
- Clair Burton McCarty, A.B.
- Ralph J. Meade, B.S.
- John Chester Moore, A.B.; Thesis: A Practicable Plan for Financial Accounting in the School System at Horseheads, New York.
- Richard David Morrison, B.S.; Thesis: Farms as Determinants in the Construction of a Land-Grant College Curriculum: A Comparative Study in Alabama.
- Edward Maurice Pierson, M.E.
- Arline Jeannette Pinkham, B.S.
- Kathryn Margery Pollock, B.S.
- Erma Inez Rhodes, B.S.
- Julia Maria Rodriguez, B.S. in Ed.
- Dorothy Kathryn Strom, A.B.
- Sarah Deena Van Hanegem, B.S. in Ed.; Thesis: The Contributions of Eli W. Weaver to the Development of Vocational Guidance.
- William Donald Wittenburg, A.B.; Thesis: Speech Education for High Schools.



## ROSTER OF DEGREES

201

CONFERRED JANUARY 31, 1942

Harold Emil Wenzel, A.B.; Thesis: An Analysis of Aid Granted by the Several States for the Promotion of Pupil Transportation.

CONFERRED MAY 25, 1942

Mary Case Colgrove, B.S.  
Glenn Richard Greenwood, B.S.  
Elizabeth Hester Gunn, B.S.  
Eleanor Louise Haitz, B.S. in Ed.  
Manuel Rodriguez-Diaz, A.B. in Ed.; Thesis: The Rural School in Puerto Rico.

### MASTERS OF SCIENCE IN AGRICULTURE

CONFERRED SEPTEMBER 24, 1941

Charles Alston Holdridge, B.S.; Agricultural Engineering, Agricultural Education. Essay: A Study to Determine What Should be Taught in Water Supply and Sewage Disposal in High School Departments of Vocational Agriculture.  
Newton Mack Penny, B.S.A.; Marketing, Farm Management. Thesis: Cotton Marketing Facilities and Practices in Some Organized Cotton Improvement Communities in Georgia.  
Martin Varney Rockwell, B.S.; Marketing, Business Management. Thesis: A Study of the Demand for Dairy Products and Milk Delivery Service in Ithaca, New York.

CONFERRED JANUARY 31, 1942

Fernando Carvajal-Barahona, B.S., B.Agr.Sci., Ing.Agron.; Plant Pathology, Mycology. Thesis: Experiments to Determine the Effect of the Standard Hot Formaldehyde Treatment on the Sprouting of Chippewa and Katahdin Seed-Potato Tubers.  
Robert Birney Child, B.S.; Agronomy, Farm Management. Thesis: Soil Types in Relation to Crop Yields, Land Use, and Practices on 45 New York State Cost-Account Farms.  
Max Myers, B.S.; Farm Management, Marketing. Thesis: Economic Relationships Between Size of Cow and Milk Production Per Cow on New York State Dairy Farms.

CONFERRED MAY 25, 1942

Jorge de Alba, B.S.; Animal Breeding, Animal Husbandry. Thesis: A Study of the Possible Hormonal Qualities of Levulinic Acid.  
Juan Rafael Martino, B.S.; Land Economics and Farm Finance, Prices and Statistics. Thesis: An Analysis of the Lending Operations of the Puerto Rico Branch of the Federal Land Bank of Baltimore from Its Organization in 1922 to November 30, 1940.  
Deboise Arthur Van Slyke, B.A.; Business Management, Farm Management. Thesis: Factors Affecting Membership Turnover of the Batavia Production Credit Association, 1934 to 1941.

### MASTER OF ARCHITECTURE

CONFERRED MAY 25, 1942

Ricardo Ernesto Cirilo de Bary-Tornquist, Arquitectura; Architectural Design, Regional and City Planning. Thesis: A Pilgrimage Retreat Center near Phoenix, Arizona.

### MASTERS OF SCIENCE IN ENGINEERING

CONFERRED SEPTEMBER 24, 1941

John Campbell Georgian, B.M.E.; Machine Design, Mechanics. Thesis: Vibration Models.

- Harrison Scott Nesbit, B.S.; Highway Engineering, Structural Engineering. Thesis: Soil Stabilization with Admixtures for Low Cost Roads.  
 William Walter Rigrod, B.S. in E.E.; Electrical Communication, Physics. Thesis: The Distortionless Modulation of The Split-Plate Magnetron.

CONFERRED JANUARY 31, 1942

- Lorenzo Mejia-Uruena, Ingen. Civil; Hydraulic Engineering, Sanitary Engineering. Thesis: Study of a Problem of Water Supply in Western New York.

CONFERRED MAY 25, 1942

- Vivencio Dalipe Dayot, B.S.E.E.; Electrical Communications, Heat-Power Engineering. Thesis: Frequency Bridge Demodulators.  
 Lee Wilbur Gibson, Geol.Eng.; Fluid Mechanics, Experimental Mechanical Engineering. Thesis: Petroleum Reservoir Behavior.  
 Robert Bond Glassco, B.S. in Eng.; Mechanics, Materials of Engineering. Thesis: Aspects of the Inelastic Deformation of Metals.  
 Richard Hsueh-Jui Pian, B.S. in C.E.; Hydraulic Engineering, Structural Engineering. Thesis: A Review of Flood Control Project of the Yung Ting River, China.  
 Bayard Elmer Quinn, B.S. in M.E.; Mechanics, Machine Design. Thesis: The Application of the Calculus of Finite Differences to Engineering Problems.  
 Wen Hsiu Wang, B.S. in C.E.; Hydraulic Engineering, Structural Engineering. Thesis: Nomographic Charts for Canal Design.

MASTER OF CHEMICAL ENGINEERING

CONFERRED MAY 25, 1942

- Clifton Camperson Sutton, B.Ch.E.; Chemical Engineering, Physical Chemistry. Thesis: A Basket Centrifuge Used as a Dissolver.

MASTERS OF CIVIL ENGINEERING

CONFERRED SEPTEMBER 24, 1941

- John Dmitri Jarema, B.S. in M.E.; Hydraulic Engineering, Management Engineering. Thesis: An Economic Study of Petroleum Pipe Line Design.  
 Merton Joseph Willis, B.S. in C.E.; Hydraulic Engineering, Highway Engineering. Thesis: An Experimental Study of the Flow in Pipes Partly Full.

CONFERRED MAY 25, 1942

- Chi Cheng Chang, B.C.E.; Highway Engineering, Regional and City Planning. Thesis: Low Cost Roads for China.  
 John Erwin Kinney, B.C.E.; Sanitary Engineering, Organic Chemistry. Thesis: Study on the Digestion of Wood Pulp Using Phosphates as Catalyst.  
 Neil Purnell Richards, B.S. in C.E.; Materials of Engineering, Structural Engineering. Thesis: Bond between Concrete and Steel under Repetitive Loading.

DOCTOR OF THE SCIENCE OF LAW

CONFERRED MAY 25, 1942

- Pablo L. Sosa, A.B., LL.B.; Jurisprudence, Labor and Industrial Relations, Public Law. Thesis: Legal Medicine and Occupational Diseases in the Workman's Compensation Act.

## DOCTORS OF PHILOSOPHY

CONFERRED SEPTEMBER 24, 1941

- Vitold Arnett, A.B., A.M.; Physiology, Biochemistry, Anatomy. Thesis: Rhythmic Muscle Potentials in the Electroencephalogram of the Temporal Region.
- Charles Kenneth Beach, B.S., M.S.; Industrial Education, Educational Psychology, Secondary Education. Thesis: A Study of Certain Factors Which Have Bearing upon the Prediction of Success in Shop Courses in a Technical and Industrial School.
- Kenneth Robert Bennett, B.S. in Agr.; Prices and Statistics, Farm Management, Money, Banking, and International Finance. Thesis: Factors Affecting Prices of Feedstuffs.
- George Willoughby Bodamer, B.S. in Chem.; Organic Chemistry, Physical Chemistry, Inorganic Chemistry. Thesis: The Dehydration Rearrangement of 2-Butene-1, 4-Diol. Related Reactions of 3-Butene-1,2-Diol and Vinylethylene Oxide.
- Mary Louise Carlson, A.B., A.M.; Latin Literature, Greek Literature, Ancient History. Thesis: Roman Examples in the Latin Christian Apologists.
- Metellus Eugene Cravens, Jr., B.S. in Agr., M.S. in Agr.; Marketing, Farm Management, Prices and Statistics. Thesis: Retail and Wholesale Distribution of Apples, Upstate New York, 1938.
- Victor Macomber Cutter, Jr., A.B.; Cytology, Mycology, Plant Taxonomy. Thesis: A Cytological Investigation of Fifteen Species of the Mucorales.
- Erwin Rudolph Draheim, B.S., M.S.; Agricultural Education, Agricultural Economics, Rural Secondary Education. Thesis: Factors of Parental Assistance and Cooperation Affecting the Establishment of Sons in Farming or Other Occupations: A Study of 181 Young Men in New York State.
- Louis James Edgerton, B.S. in Agr.; Pomology, Plant Physiology, Agronomy. Thesis: Influence of Variations of Hydrogen-Ion Concentration and of Potassium on Apple Plants Grown in Artificial Media.
- William Howard Ewart, B.A., M.S.; Economic Entomology, Plant Physiology. Agronomy. Thesis: Studies of the Control of the Onion Thrips, *Thrips tabaci* Lindeman.
- Hilda Mary Fife, A.B., A.M.; Elizabethan Literature, Dramatic Production, Dramatic Literature. Thesis: *Gli Asolani* by Pietro Bembo: A Translation with an Introduction.
- Malcolm Curtis Gaar, B.S., M.S.; Vocational Education in Agriculture, Rural Education, Farm Management. Thesis: Determining Potential Centers for Vocational Agricultural Departments in Eastern Panhandle Counties of West Virginia.
- William Gilbert, A.B.; History of Renaissance and Reformation, Medieval History, Modern European History, Thesis: The Culture of Basel in the Fifteenth Century: A Study of Christian Humanism.
- Earl Dahl Hansing, B.S. in Agr., M.S.; Plant Pathology, Genetics, Cytology. Thesis: A Study of the Control of the Yellow Dwarf Disease of Potatoes.
- James William Hatch, B.S., M.S.; Agricultural Education, Secondary Education, Farm Management. Thesis: Opportunities for Establishment in Farming Relative to the Needs of Young Men.
- Milton Hecht, B.S., M.S.; Educational Psychology, Science Education, Applied Psychology. Thesis: Prognostic Measures of Achievement in Ninth-Year Science.
- Raymond William Hoecker, B.S. in Agr., M.S. in Agr.; Farm Management, Marketing, Economic Theory. Thesis: Production and Marketing of Cabbage in New York State.
- Gordon Alexander Johnsgard, B.S., M.S.; Soils, Farm Management, Geography. Thesis: A Simplified Classification and Map of the Soils of Dutchess County, New York, and the Relationship of Some Soil Characteristics to Land Use.
- John Ethelbert King, A.B., M.S.; Secondary Education, Educational Psychology, Rural Social Organization. Thesis: A Comparison of Selected Groups of Rural and Urban Pupils in the Same Urban Senior High School Situation.

- Robert Hervey Lafferty, Jr., B.S.; Analytical Chemistry, Physical Chemistry, Organic Chemistry. Thesis: The Thermal Decomposition of Barium Carbonate.
- Wilbur Reed Le Page, E.E., M.S.; Electric Circuit Analysis, Mathematics, Physics. Thesis: The Use of Lumped Networks to Represent Transient Conditions in Circuits Having Distributed Characteristics.
- Vivian Hope Melass, B.S., M.S.; Animal Husbandry, Animal Nutrition, Veterinary Physiology. Thesis: Further Investigations of the Cause of the Stiff-Lamb Disease.
- Katherine Merry, A.B.; Ornithology, Nature Study, American History. Thesis: A Study in the Life History of the Eastern Phoebe, *Sayornis phoebe* (Latham).
- Donald Smith Miller, B.A., A.M.; Mathematical Analysis, Algebra, Theoretical Physics. Thesis: Some Properties of Caratheodory and Gillespie Linear Measure.
- Leonard Leslie Morris, B.S. in Agr., M.S. in Agr.; Vegetable Crops, Plant Physiology, Physical Chemistry. Thesis: Physiological Responses of Certain Vegetables to Treatment with Wax Emulsions.
- Walter Ludwig Nelson, B.S. in Chem., M.S. in Chem.; Animal Nutrition, Biochemistry, Animal Physiology. Thesis: Some Chemical Aspects of Retarded Growth in the Albino Rat.
- Earl Gerald Planty, A.B., M.A.; Secondary Education, Educational Psychology, Rural Social Organization. Thesis: A Study of Students of Low Normal Intelligence in Six Small High Schools.
- Edith Svoboda Rasmussen, B.S., M.S.; Animal Nutrition, Animal Physiology, Biochemistry. Thesis: The Influence of Dietary Fat on Lactation Performance in Rats.
- Lewis Henry Rogers, B.S.Ch.E.; M.S.; Analytical Chemistry, Chemical Microscopy, Soils. Thesis: Comparison of Micromethods for the Determination of Molybdenum in Plants and Soils.
- William Arvid Seleen, B.S.; Bacteriology, Physical Chemistry, Biochemistry. Thesis: A Study of Green-Fluorescent Pigment-Producing Organisms.
- Edfred Loren Shannon, B.S., M.S.; Economic Botany, Plant Morphology, Systematic Zoology. Thesis: A Study of the Production of Root-hairs by Aquatic Plants.
- Clarice Evelyn Short, A.B., M.A.; English Literature, English Language, German Literature. Thesis: The Poetic Relationship of Keats and William Morris.
- Thomas Sproston, Jr., B.S. in Agr.; Plant Pathology, Cytology, Genetics. Thesis: Studies on Sclerotinia Trifoliorum Erik.
- Walter Arthur Thurber, B.S. in E.E., M.S.; Nature Study, Science Education, General Biology. Thesis: A Study of the Activity-Suggestions in Courses of Study in Nature Study and Elementary Science.
- Mary Ann Tibbetts, A.B., A.M.; Greek Literature, Latin Literature, Comparative Study of Literature. Thesis: The Myths in the *Odyssey*.
- Mary Alberta Tingley, B.S., M.S.; Plant Physiology, Cytology, Pomology. Thesis: Concentration Gradients in Plant Exudates with Reference to the Mechanism of Trans-Location.
- Archibald Van Doren, B.S. in Agr.; Pomology, Plant Physiology, Plant Anatomy. Thesis: The Influence of Controlled Atmospheres on the Storage Life and Keeping Qualities of Certain Varieties of Apple Fruits.
- Hugh Jeremiah Williams, B.S., M.S.; Rural Sociology, Secondary Education, Psychology for Students of Education. Thesis: The Organization of Weekday Religious Education in Rural Communities of New York State.
- Robert Haworth Williams, B.S.; Plant Physiology, Plant Pathology, Cytology. Thesis: Physiological Studies on the Germination of Spores of *Polypodium aureum*.

## CONFERRED JANUARY 31, 1942

- Ann McIntyre Aikin, B.S., M.A.; Economics of the Household and Household Management, Family Life, Public Finance. Thesis: A Study of Credit Bureaus from the Consumer's Point of View, New York State, 1940.
- Franklin Pierce Batdorf, A.B., B.S. in Ed., A.M.; Eighteenth Century Literature, Victorian Literature, Literary Criticism. Thesis: A Study of George Crabbe's Tales.



- Clare August Becker, B.S.; Farm Management, Prices and Statistics, Economic Theory. Thesis: Farm Management Adjustments, Northern Livingston County, New York, 1908-1938.
- Leon Bernstein, B.S.; Plant Physiology, Cytology, Bacteriology. Thesis: Carbohydrates and Amylases in the Endosperm of Corn.
- Orman Blake Billings, A.B., A.M.; Inorganic Chemistry, Physical Chemistry, Organic Chemistry. Thesis: Cryoscopic Studies of the Tendency of the Alkyls of the Third Group Elements to Polymerize.
- Glenn Elwin Carman, B.S.; Economic Entomology, Insect Physiology, Plant Physiology. Thesis: Studies on the Control of Codling Moth, *Carpocapsa pomonella* Linn. with Dusts.
- Charles Marston Clark, A.B., A.M.; English Prose Fiction, Eighteenth Century Literature, Seventeenth Century Literature. Thesis: *The Life of Mr. Jonathan Wild the Great* by Henry Fielding. Edited with Introduction and Notes.
- Ralph Hazen Cole, A.B., A.M.; Farm Management, Marketing, Prices and Statistics. Thesis: The Appraisal of Farm Real Estate.
- Albert Daniel Dotter, A.B. in Ed., A.M.; Educational Administration, Rural Social Organization, Public Finance. Thesis: The Development of a Means for Evaluating School Plants Accommodating Both Elementary and Secondary Grades.
- Ernest Mapp Dunton, Jr., B.S., M.S.; Soils, Plant Physiology, Analytical Chemistry. Thesis: Some Effects of Organic Matter on Phosphate Fixation in New York Soils.
- William Monroe Epps, B.S.; Plant Pathology, Plant Physiology, Plant Breeding. Thesis: Purple-top Wilt of Potatoes.
- Dorothy Alice Fisher, B.S., M.S.; Nature Study, Systematic Botany, Zoology. Thesis: A Study of the Establishment of Small-Community Museums with Special Reference to the Use of Natural History Material.
- Miles Parker Givens, B.S.; Experimental Physics, Theoretical Physics, Mathematics. Thesis: The Optical Dispersion of Copper and Beryllium.
- Carl Gustav Gustavson, A.B., A.M.; Modern European History, History of the Renaissance and Reformation, English History. Thesis: The Gothic Dynamic. An Attempt at a Psychological Interpretation in German History.
- Harry Reno Hoppe, A.B., M.A., M.A.; Elizabethan Literature, Seventeenth Century Literature, English Drama. Thesis: The First Quarto of *Romeo and Juliet*: A Bibliographical and Textual Study.
- Roscoe Conklin Howard, B.S., M.S.; Invertebrate Zoology, Physiology, Histology and Embryology. Thesis: The Comparative Morphology, Variation and Seasonal Studies on the Genitalia of Local Species of the Family Polygridae.
- James Charles Moyer, B.S.A., M.S. in Agr.; Biochemistry, Organic Chemistry, Foods. Thesis: The Thiamin Content of Certain Vegetables.
- Herbert Frank Newhall, A.B.; Experimental Physics, Mathematics, Theoretical Physics. Thesis: Proton Production by Electron Collisions in Molecular Hydrogen.
- Morley James Oretzki, B.S., M.S.; Experimental Physics, Theoretical Chemistry, Mathematics. Thesis: Investigation of the Crystal Structure of Tartaric Acid.
- Naginbhai Madhavbhai Patel, B.Agr.; Plant Breeding and Genetics, Cytology, Rural Education. Thesis: Inheritance of Loose Smut Reaction in Crosses with Victoria and Smut Resistant (Cornell) -6 under Field Conditions of Growth and Infection.
- William Taylor Phillipps, A.B.; Money, Banking, and International Finance, Economic Theory and its History, Organization and Control of Industry. Thesis: The History and Operation of the Office of the Comptroller of the Currency.
- Irving Rappaport, B.S., M.S.; Parasitology, Biochemistry, Pathology. Thesis: The Pathogenicity of Three Strains of *Trichinella spiralis* as indicated by Longevity and Sex Ratio of the Adults and the Degree of Muscle Parasitism.
- Robert Sigmund Reich, B.S.; Ornamental Horticulture, Floriculture, Educational Psychology. Thesis: A Study of Perception and Appreciation in Landscape Design.

- El Sayed Mohammed Sakr, B.S., M.S.; Vegetable Crops, Genetics, Cytology. Thesis: A Study of Some Ecological Factors Influencing Seedstalk Development in Carrots (*Daucus carota* L.).
- Everett Morrill Schreck, A.B., M.S., M.F.A.; Drama and the Theatre, Dramatic Literature, Rhetoric and Public Speaking. Thesis: Drama as a Medium for Propaganda.
- Joseph Bjorn Skaptason, B.S. in Agr., M.S.; Plant Pathology, Plant Physiology, Bacteriology. Thesis: Studies on the Bacterial Ring Rot Disease of Potatoes.
- Robert Jocelyn Sumner, B.A.; Biochemistry, Organic Chemistry, Analytical Chemistry. Thesis: The Enzyme Lipoxidase and Its Relation to Carotene Oxidation.
- Rohn Truell, B.S.; Experimental Physics, Physical Chemistry, Theoretical Physics. Thesis: Ranges of Secondary Electrons in Magnesium.
- Gordon Loftis Walker, B.S., A.M.; Geometry, Mathematical Analysis, Physics. Thesis: Direct Product and Lorentz Matrices.
- Alvin Richard Whitehill, A.B.; Bacteriology, Botany, Physical Chemistry. Thesis: Variability of the Group of *Bacillus Pasteurii*.
- Thomas Wilbur Young, B.S. in Forestry, M.S. in Agr.; Pomology, Plant Physiology, Soils. Thesis: Investigations on the Unfruitfulness of the Haden Mango (*Mangifera indica*, Linn.) in Florida.

## CONFERRED MAY 25, 1942

- Francis Binkley, B.S., M.S.; Biochemistry, Organic Chemistry, Physiology. Thesis: Formation of Mercapturic Acids.
- Robert Oliver Bock, A.B., M.S.; Experimental Physics, Theoretical Physics, Astrophysics. Thesis: The Optical Properties of Some Divalent Metals.
- Robert Frink Brooks, B.S.; Bacteriology, Biochemistry, Genetics. Thesis: A Study of Certain Members of the Genus *Corynebacterium* from Animal Sources.
- Stuart MacDonald Brown, Jr., B.S.; Philosophy of Religion, History of Philosophy, Ethics. Thesis: An Exposition and Criticism of Schleiermacher's Religious Philosophy.
- William Randall Brown, B.S., M.A.; Petrology, Structural Geology, Economic Geology. Thesis: Geology of the Lynchburg-Rustburg Area, Virginia.
- Leland Gwaltney Cox, B.S.; Plant Physiology, Organic Chemistry, Forest Soils. Thesis: A Physiological Study of Embryo Dormancy in the Seed of Native Hardwoods and Iris.
- Phares Decker, B.S. in Agr., M.S.; Plant Pathology, Plant Breeding, Entomology. Thesis: A Study of the Pathogenicity of Some Actinomyces from the Soil.
- Carlos Arthur Efferson, B.S., M.S.; Agricultural Education, Rural Secondary Education, Rural Sociology. Thesis: The Relation of Certain Pre-Employment Background and Activity to Behavior as Teachers of Vocational Agriculture.
- Lewis Eldred, A.B., A.M.; Educational Psychology, Education, Labor and Industrial Relations. Thesis: A Critical Analysis of Student Personnel Work in Selected Northeastern Liberal Arts Colleges.
- Joseph Andrew Evans, B.S.; Economic Entomology, Insect Ecology, Pomology. Thesis: Apple Insects of New York: Their Regional Distribution, Seasonal Development and Economic Importance in Relation to Control Measures.
- Alvin Theodore Finkelstein, A.B., A.M.; Experimental Physics, Theoretical Physics, Mathematics. (Title of thesis withheld for military reasons.)
- Richard Mather Forbes, B.S., M.S.; Animal Nutrition, Animal Physiology, Organic Chemistry. Thesis: Ketosis in the Ruminant Species.
- Arthur Donald Gilbert, A.B.; Organic Chemistry, Physical Chemistry, Inorganic Chemistry. Thesis: The Mercuration of Certain 1,3-Dienes.
- Elizabeth Chase Greisen, B.S.; Bacteriology, Biochemistry, Genetics. Thesis: The Oxidation of Alcohol by *Streptococcus mastitidis*.
- Kimball Parker Hall, A.B.; Organic Chemistry, Industrial Chemistry, Physical Chemistry. Thesis: The Reaction of the Butadiene Dihalides with Sodium Cyanide.
- Richard Berend Hasbrouck, B.S.; Organic Chemistry, Inorganic Chemistry, Biochemistry. Thesis: The Synthesis of Indole Derivatives Related to Gliotoxin.

- George Herbert Hildebrand, Jr., A.B.; Labor Economics, Economic Theory and its History, Money, Banking, and International Finance. Thesis: The Theory of Markets and the Problem of Economic Crises from Quesnay to Marx: A Study in the History of Economic Thought.
- P'eng Ch'eng Hsu, B.S., M.S.; Animal Nutrition, Biochemistry, Animal Physiology. Thesis: The Effect of Exercise on the Thiamine and Riboflavin Requirements of Albino Rats.
- Ernest Paul Imle, B.S. in Agr., M.S.; Plant Pathology, Plant Physiology, Biochemistry. Thesis: The Basal Rot Disease of Lilies.
- Walter Caspar Jacob, B.S., M.S.; Vegetable Crops, Plant Breeding, Plant Physiology. Thesis: Analysis of Border Effect in Field Experiments with Potatoes and Cauliflower.
- Vincent Joseph Keenan, A.B., M.S.; Organic Chemistry, Physical Chemistry, Inorganic Chemistry. Thesis: A Study of the Configuration of 1,4-Diiodo-2,3-Dimethoxybutane.
- Hsuan Kuo, B.C.E., M.S.; Hydraulic Engineering, Structural Engineering, Geology and Soil Mechanics. Thesis: Flow in Open Channels with Artificial Roughening.
- Wayne Austin Lee, B.S., M.S.; Marketing, Prices and Statistics, Economic Theory and Its History. Thesis: Competition between Potatoes and Other Vegetables at Retail, Buffalo, New York, 1940.
- William Murray Longhurst, A.B., M.A.; Vertebrate Zoology, Ornithology, Botany. Thesis: The Biology of Certain Mammals in Costilla County, Colorado with Especial Reference to the Prairie Dog.
- Robert Ruel Raphael Luckey, A.B., B.S., A.M.; Mathematical Analysis, Algebra, Physics. Thesis: Certain Applications of Fourier Integrals.
- John Charles Ludlum, B.S., M.S.; Structural Geology, Geomorphology, Economic Geology. Thesis: Structural-Stratigraphic Interpretations of a Part of the Bannock Range, Idaho.
- Richard Moody, B.A., M.A.; Drama and the Theatre, Dramatic Literature, Rhetoric and Public Speaking. Thesis: Romanticism in American Drama and the Theatre from the Beginning to 1900.
- Arden Wesley Moyer, A.B., M.S.; Biochemistry, Physiology, Bacteriology. Thesis: The Specificity of Choline in Transmethylation.
- Jonathan Alexander Munro, B.S.A., M.S.; Apiculture, Economic Entomology, Medical Entomology. Thesis: The Viscosity and Thixotrophy of Honey.
- Jack Sylvester Olsen, B.A., M.A.; Analytical Chemistry, Organic Chemistry, Inorganic Chemistry. Thesis: The Determination of Fluorine Using Cerous Nitrate.
- William Edward Parkins, B.S. in E.E.; Experimental Physics, Theoretical Physics, Mathematics. (Title of thesis withheld for military reasons.)
- Lester Carl Peterson, B.S.; Plant Pathology, Entomology, Plant Morphology. Thesis: Studies on the Late Blight of Potatoes and its Casual Organism, *Phytophthora infestans* (Mont.) de Bary.
- Stephen Alexander Pieniazek, Ph.M., M.S.; Pomology, Plant Physiology, Plant Breeding. Thesis: A Study of Factors Influencing the Rate of Transpiration of Apple Fruits.
- Joseph Beaven Platt, B.A.; Experimental Physics, Theoretical Physics, Mathematics. Structure in the X-Ray K Absorption Edge of Potassium.
- Ralph Banner Priddy, B.A., M.A.; Vertebrate Zoology, Insect Taxonomy, Invertebrate Zoology. Thesis: Population Levels of Small Mammals in Various Habitats of Central New York.
- Maynard Jack Ramsay, B.A., M.A.; Economic Entomology, Vertebrate Zoology, Insect Taxonomy. Thesis: Biology and Control of the Mexican Bean Beetle *Epilachna varivestis* Mulsant.
- Pritam Sen, B.Sc., M.Sc.; Theoretical Physics, Experimental Physics, Mathematics. Thesis: The Range of Tensor Neutron-Proton Interaction.
- Sofia Simmonds, A.B.; Biochemistry, Organic Chemistry, Bacteriology. Thesis: A Study of Transmethylation in the Animal Body.

- Karl Leroy Smiley, B.S.; Bacteriology, Biochemistry, Physical Chemistry. Thesis: The Nutritive Requirements of *Streptococcus Salivarius*.
- John Elbridge Snow, A.B., M.S.; Organic Chemistry, Chemical Microscopy, Inorganic Chemistry. Thesis: Derivatives of Sulfanilamide.
- George Fredrick Somers, Jr., B.S., B.A., B.Sc.; Plant Physiology, Biochemistry, Physical Chemistry. Thesis: Some Factors Influencing Acid Changes in Leaves of Kalanchoe (*Byrophyllum*) *Daigremontiana*.
- Aubrey Porter Stewart, Jr., A.B.; Dairy Chemistry, Organic Chemistry, Physical Chemistry. Thesis: The Effect of the Interaction of Casein and Lactose on Certain Properties of Milk and Milk Products.
- Fred Wilbur Tanner, Jr., B.S., M.S.; Bacteriology, Biochemistry, Dairy Chemistry. Thesis: The Yeast Flora of New York State Wine Grapes.
- John Nathaniel Vincent, Jr., B.S., M.A.; Musical Composition, Musicology, Education. Thesis: 3 Musical Compositions: *Three Jacks*: Music for orchestra for a ballet in three tableaux; *Quartet in G*: for string quartet; *Three Grecian Songs*: for mixed a cappella chorus of eight parts.
- Marian Lilley Warren, A.B., A.M.; The Romantic Period, Victorian Literature; Guidance in Secondary Education. Thesis: The Life and Works of Susan Edmonstone Ferrier.
- Robert Stephen Weisz, A.B.; Inorganic Chemistry, Chemical Microscopy, Physical Chemistry. Thesis: A Hydrothermal Study of Equilibria in the System Alumina-Water.
- Robert Henry White-Stevens, B.S.A., M.S.; Vegetable Crops, Plant Physiology, Genetics. Thesis: The Relation of Chlorophyll Content to Quality in Celery.
- Lawrence Thomas Wright, Jr., B.S. in M.E.; Heat-Power Engineering, Mathematics, Experimental Mechanical Engineering. Thesis: Steam-Jet Ejectors.
- James L'Woods Zwingle, A.B., A.M.; Literary Criticism, The English Drama, The English Renaissance. Thesis: A Short History of the Personifications of Wisdom.

## ADVANCED DEGREES CONFERRED IN 1942-43

### MASTERS OF ARTS

CONFERRED SEPTEMBER 30, 1942

- Edward William Borgers, A.B.; Speech and Drama.
- Charles Wright Cox, A.B.; Dramatic Production, Dramatic Literature. Essay: A Theory of the Theatre.
- Catherine Elizabeth Crook, A.B.; Physics, Mathematics. Thesis: The Use of Filtered X-Rays for the Laue Experiment.
- Marian Mather Day, A.B.; Educational Psychology, Mathematics. Thesis: An Intensive Study of Arithmetical Performance in a Second Grade Class.
- Helen Marguerite Dunn, A.B.; English.
- Ruth Wilson Fancher, A.B.; Education.
- Lucille Fuller, A.B.; Dramatic Production, Dramatic Literature. Essay: Luigi Pirandello in the English and American Theatre.
- Geraldine Walburga Gartlein, A.B.; Foreign Languages. Thesis: A Study of *Sermo Plebeius* in the Six Plays of Terence.
- Florine Harrell Greenwood, A.B.; Social Studies.
- Beulah Wiley Hodge, B.A.; Dramatic Production, Dramatic Literature. Essay: A Study of John Galsworthy's Ideas on the Drama and Theatre, and His Use of Theatre Techniques.
- Beatrice Rashleigh Johnson, A.B.; Applied Psychology, Psychology. Thesis: Personal History Data and Interest Scores in the Selection of Route Salesmen of Bakery Products.
- Rose Molly Levine, A.B.; Education, English. Thesis: A Study of Individual Differences in a "Homogeneous" Sixth Grade, Including a Comparison of Intelligence Quotient Ratings.
- Richard Henry Lipscomb, B.A.; Dramatic Production, Dramatic Literature. Essay: Tolstoy's Ideas on Art and the Drama.



- Mary McCulley, A.B.; Social Studies.  
 Thomas Vincent Maloney, A.B.; Dramatic Literature, Elizabethan Literature.  
 Thesis: A Reevaluation of the Plays of J.M. Synge as a Contribution to the Celtic Renaissance.  
 Dorothy Powis Marcuse, B.A.; Sociology, Social Psychology. Thesis: Factors in the Adjustment of Jewish-Gentile Marriages.  
 Catherine Adams Morrison, A.B.; Plant Physiology, Cytology. Thesis: The Effect of the Treatment of Seeds with Indoleacetic Acid upon the Germination and Subsequent Growth of Hybrid and Inbred Corn.  
 Catherine Elizabeth Neary, A.B.; Education, Latin. Thesis: A Survey of the Examination System with Reference to New York State with Some Emphasis on the Situation in the Latin Classes in Oswego, N. Y., Schools.  
 Ruth Elizabeth Polson, B.A.; Rhetoric and Public Speaking, Phonetics and Speech Training. Essay: Discussion in the Junior High School.  
 George William Pratt, B.A.; American History, Economic Theory and its History. Thesis: History of the New York Ontario and Western Railroad.  
 Randall William Reyer, A.B.; Vertebrate Zoology, Genetics. Thesis: The Morphology of the Pubic Symphysis in the Field Mouse (*Microtus pennsylvanicus*).  
 Marian Biscoe Spielman, A.B.; French Literature, Education. Thesis: Travel in France in the Seventeenth Century.  
 Sanford Giles Wheeler, A. B.; Dramatic Production, Playwriting and Dramatic Literature. Essay: Plays on American Civil War Themes.  
 Margaret Scoon Wilson, A.B.; Sociology, Statistics. Thesis: Measuring Social Classes in a New York Village.

## CONFERRED JANUARY 28, 1943

- Bettina Azzarito, A.B.; Dramatic Production, Speech Training and Phonetics.  
 Essay: Tragic Values in Eugene O'Neill's Plays.  
 Jeanne Ann Morris, A.B.; French Literature, Spanish Literature. Thesis: A Study of the Poetic Diction of Paul Valery.  
 Catherine Mary Rickert, B.A.; Education.

## CONFERRED MAY 24, 1943

- Marthé Marie Baratte, B.A., A.B.; French Literature, French Language. Thesis: La Critique d'Albert Thibaudet sur le Romantisme dans la Nouvelle Revue Française de 1922 à 1936.  
 Henry Ralph Cain, B.S.; School Administration, Curriculum Building. Essay: Daughters of the American Revolution School, Tamasee, South Carolina.  
 (Anna) Barbara Corliss, A.B.; Social Studies.  
 Muriel Huldah Dixon, B.A.; Education.  
 Stephanie Marie Jakimowitz, A.B.; Latin Literature, Greek Literature. Thesis: Four Greek Orations: *Odysseus* of Alcidas, *Palamedes* of Gorgias, *Ajax* and *Odysseus* of Antisthenes—Rendered into English with Notes.  
 Loretta Emily Klee, B.S. in Ed.; Elizabethan Literature, Dramatic Literature. Thesis: Samuel Daniel: A Defence of Ryme with an Essay and Commentary.  
 Sister Helen Daniel Malone, S.S.J., B.A.; Speech and Drama.  
 Warren Harding Miller, A.B.; Foreign Languages.  
 Helen Florence North, A.B.; Latin Literature, Greek Literature. Thesis: Erasmus' *De Copia*, Book II, Rendered into English.  
 Marian Prote Porter, A.B.; Social Studies.  
 Paul Dean Proctor, B.A.; Economic Geology, Structural Geology. Thesis: The Geology of the Bulley Boy Mine, Piute County, Utah.  
 Mary Dorothy Rettger, A.B.; Foreign Languages.  
 Alice Sperduti, B.A.; Foreign Languages.  
 Anna Margaret Weber A.B.; History of Philosophy, Philosophy of Religion. Thesis: Edward Caird's Philosophy of Religion.  
 Lucille Neumann Wright, A.B., B.S. in Library Science; Literary Criticism, Dramatic Literature. Thesis: The Plays of Beaumont and Fletcher as Examples of Tragedy, Comedy, or Tragicomedy.

## MASTERS OF SCIENCE

CONFERRED SEPTEMBER 30, 1942.

- William Siddall Barnhart, A.B.; Analytical Chemistry, Organic Chemistry. Thesis: The Amperometric Determination of Cobalt.
- Ruth Elizabeth Buckingham, B.S. in H.E.; Home Economics.
- Helen Clara Carroll, B.S.; Home Economics.
- Jean Elizabeth Conn, A.B.; Bacteriology, Botany. Thesis: A Comparison of Two Pigment-Producing Strains of Actinomyces.
- Eugene William Dehner, B.S.; Vertebrate Zoology, Economic Botany. Thesis: Studies on Avian Morphology: The Shoulders and Wing of the Rock Pigeon (*Columba livia*) and Ground Dove (*Columbagallina passerina*).
- Albert Thomas Edwards, B.S.; Plant Morphology, Plant Physiology. Thesis: Anatomy of the Orchid Flower with Reference to Inversion of Flower in Some Genera.
- Evelyn Snedaker Fisher, B.S.; Home Economics.
- Helen Marie Hageman, B.S.; Nature Study, Systematic Zoology. Thesis: An Experimental Study in the Elementary Grades of the Placement of Selected Experience in Chemistry, Dealing with the Senses of Smell, Taste, and Sight, with Oxidation, and with Some of the Properties of Lime.
- Corinne Jeanette Heaton, B.S.; Education.
- Ruth Bryant Jefferson, B.S. in H.E.; Home Economics.
- Marion Soun Lew, S.B.; Nutrition, Animal Nutrition. Thesis: The Effect of Ascorbic Acid and Citrates on the Nitrogen Retention of Pre-School Children.
- Dorothy Margaret Lohmeyer, B.S. in H.E.; Family Life, Nutrition. Thesis: Home Visiting as a Means of Changing Food Habits. A Six Months Study of Five Families on Limited Food Budgets.
- Barbara Morrell Mai, A.B.; Foods, Economics of the Household. Thesis: The Distribution of Iron within Potatoes and the Influence of Preparation and Cooking on the Iron Content.
- Margaret Ethel Maxwell, B.S.; Home Economics.
- Rosalind Bremmer Mendell, A.B.; Physics, Physical Chemistry. Thesis: Specific Ionization and Range-Energy Relation for Alpha Particles in Argon.
- Reid Venable Moran, A.B.; Plant Taxonomy, Cytology. Thesis: A Revision of *Dudleya*, subgenus *Stylophyllum*.
- Robert Walter Parry, B.S.; Soils, Plant Physiology. Thesis: A Study of the Molybdenum Blue Reactions for the Determination of Phosphorus.
- Gunvantlal Amritlal Patel, B.S.; Insect Ecology, Economic Entomology. Thesis: The High Lethal Temperatures of Full Grown Larvae of Codling Moth (*Carpocapsa pommonella* Linne'), and the Thermal Insulation of its Cocoons.
- Malcolm Nevil Pilsworth, Jr., A.B.; Experimental Physics, Theoretical Physics. Thesis: An Application of the Absorption Method to the Study of the Beta Ray Spectra of  $\text{Br}^{80}$  and  $\text{Br}^{82}$ .
- Jane Greenleaf Scranton, B.S. in H.E.; Home Economics.
- David Stein, B.A., B.S.; Biological Sciences. Thesis: Mitochondria or Chondriosomes.
- Marie Straszheim, B.S. in Ed.; Home Economics.
- Robert Folger Thorne, A.B.; Economic Botany, Plant Morphology. Thesis: Distribution of Aquatic Plants in New York: Dicotyledons.
- Gino Robert Treves, Doctor of Agricultural Science; Animal Nutrition, Biochemistry. Thesis: Fat Metabolism and Lactation.
- Ruh-Tsuin Tsui, B.S.; Farm Management, Prices and Statistics. Thesis: Farm Management Study of Two Hundred Fruit Farms near Sodus, Wayne County, New York, 1940.
- Doris Elaine Urquhart, B.S. in H.E.; Home Economics.
- Jeremiah James Wanderstock, B.S.; Animal Husbandry, Animal Breeding. Thesis: The Relative Value of Linseed Meal, Corn Gluten Meal, Soybean Oil Meal, and Ground Soybeans as Protein Supplements for Fattening Yearling Steers.

- Palmer Jennings Washien, A.B.; Plant Physiology, Education. Thesis: The Diurnal Variations in Dry Weight and Carbohydrates of Alfalfa.  
 David Allan Young, Jr., B.A.; Insect Taxonomy, Botany. Thesis: The Leafhoppers of Kentucky (Homoptera Cicadellidae).

## CONFERRED JANUARY 28, 1943

- Barbara Winifred Barnes, B.S.; Foods, Biochemistry. Thesis: The Effect of Cooking Upon the Vitamin C and Thiamin Content of Certain Fresh and Quick Frozen Vegetables.  
 Thressa Elizabeth Campbell, B.S., Bacteriology, Biochemistry. Thesis: A Study of the Growth Requirements of Certain Lactic Acid Bacteria.  
 Edna Rublee Clausen, B.A.; Economic Botany, Plant Taxonomy. Thesis: Medicinal Plants of New York.  
 Avery Homes DeGolyer, B.S.; Agricultural Engineering, Agricultural Economics. Thesis: A Study of Roofs on Farm Buildings.  
 Edith Cavell McComb, B.S.; Home Economics.  
 Betty-Sue McCready, B.S.; Home Economics.  
 June Murielle Nickerson, B.S.; Economics of the Household and Household Management, Institution Foods. Thesis: Consumer Purchases of Canned Tomatoes Labeled in Various Ways, Buffalo, New York, November 1941 to January 1942.  
 Marion Chiyoko Okimoto, B.S.; Plant Morphology, Cytology. Thesis: Morphology and Anatomy of the Pineapple Inflorescence and Fruit.  
 Maurice Prober, B.S.; Organic Chemistry, Physical Chemistry. Thesis: A Study of the Vapor Phase Fluorination of Acetyl Fluoride.  
 Winston Eugene Pullen, B.S.; Marketing, Farm Management. Thesis: An Analysis of the Grade Quality and Price of Potatoes Sold at Wholesale, Buffalo and Rochester, 1940-41 and 1941-42 Seasons.  
 Howard Anthony Schuck, B.S.; Fisheries, Statistical Methods of Analysis. Thesis: A Survey of Methods for Evaluating the Survival of Hatchery Trout When Planted in Streams.  
 George Martin Weimann, A.B.; Organic Chemistry, Physical Chemistry. Thesis: The Use of Trichloroacetyl Chloride as a Reagent for the Separation and Characterization of Organic Amines.  
 Natalie Browning Whitford, B.S. in Biology; Plant Morphology, Plant Taxonomy. Thesis: I. Some Morphological and Anatomical Investigations on the Flowers of the Genus *Potamogeton*. II. Variation in Stone Cells in "Seed" Coats of Different Species of the Genus *Najas*.

## CONFERRED MAY 24, 1943

- Vera Floyd Alderson, B.S. in H.E.; Home Economics.  
 Carmen Bellavista-Torres, B.S. in Ed.; Foods and Nutrition, Educational Leadership. Thesis: The Work of the Nutritionist in State Departments of Public Health.  
 Constance Blakely Burgess, B.S. in Ed.; Home Economics.  
 Mary Agnes Frances Carlin, B.S., M.A.; Home Economics. Thesis: The Vitamin C Content of Raw Fresh, Frozen, and Cooked Market Samples of Baby Beef, Lamb, and Pork Liver.  
 Charles Burleigh Cooper, B.S.; Experimental Physics, Theoretical Physics. Thesis: The Optical Properties of Thin Copper Films.  
 Harry Wesley Coover, Jr., B.S.; Organic Chemistry, Inorganic Chemistry. Thesis: The Preparation of Cerotic Acid and Ceryl Alcohol from Chinese Insect Wax.  
 Kathleen Lucile Cutlar, B.S.; Institution Foods, Foods and Nutrition. Thesis: A Study of the Effects of Quantity Cookery Procedures, Using Various Types of Institution Cooking Equipment, on the Ascorbic Acid Retention in Fresh Market Spinach.  
 Nancy Keesee Dickerson, B.S.; Foods, Nutrition. Thesis: The Effect of Different Household Cooking Methods on the Ascorbic Acid Content of Fresh Market, Home Quick-Frozen and Commercially Dehydrated Spinach.

- Alice Alberta Drew, B.S.; Home Economics.  
 Frances Helen Elliott, B.S.; Floriculture and Ornamental Horticulture, Plant Breeding. Thesis: *Hymenocallis calathina*, the Peruvian Daffodil.  
 Margaret Johnson Florea, B.S. in Ed.; Economics of the Household and Household Management, Institution Foods. Thesis: The Planning, Building and Equipping of a Mobile Kitchen that Can be Reproduced at a Moderate Cost.  
 Lawrence Irving Grinnell, A.B.; Ornithology, Botany. Thesis: A Study of the Common Redpoll *Acanthus linaria linaria* Linnaeus.  
 Catherine Rohrer Gross, B.S. in H.E.; Home Economics.  
 Saul Milton Katz, B.S.; Sociology, Anthropology. Thesis: The Security of Co-operative Farming.  
 H. Alan Luke, B.S.; Marketing, Land Economics and Farm Finance. Thesis: Consumers' Attitudes Toward Some Economy Measures in Retail Milk Delivery in Jamestown, New York.  
 Janie McDill, A.B., B.S.; Home Economics.  
 Elizabeth Heather MacMillan, B.Sc.; Home Economics.  
 Homer Noble Metcalf, B.S.; Vegetable Crops, Soils. Thesis: A Brief Summary of Information Relative to Rapid Plant Tissue Tests for Plant Nutrients.  
 Peggy Porter Muirhead, A.B.; Biological Sciences.  
 Raymond August Pitzrick, A.B.; Physical Sciences. Thesis: The Climatic Factor as it Affects the Occurrence, Discovery and Development of Mineral Deposits.  
 James Frederick Smithcors, B.S. in Agr.; Animal Breeding, Zoology. Thesis: The Relation of the Thyroid to the Development of the Mammary Gland with Special Reference to the Male.  
 Elinor Shaw Whelan, B.S. in H.E.; Nutrition, Family Life. Thesis: Some Factors Affecting Calcium Retention of Preschool Children.  
 Lois Clise Will, B.A.; Animal Nutrition, Animal Physiology. Thesis: The Influence of Retarded Growth upon the Basal Metabolism of the Albino Rat.

#### MASTER OF EDUCATION

CONFERRED MAY 24, 1943

Mary Windsor Murdoch, A.B.

#### MASTERS OF SCIENCE IN EDUCATION

CONFERRED SEPTEMBER 30, 1942

- Lawrence Gifford Benson, A.B.  
 John Edgar Bills, A.B.  
 Muriel Cabot Buckley, B.S.  
 Florence Emma Eckhardt, B.S.; Thesis: A Systematic Study of the Hamburg Grade School.  
 Margaret Elizabeth Elliott, B.S.  
 Bernadette Mary Heagney, B.S.  
 Ivan Franklin Hilfiker, A.B.  
 Kenneth Happich Hotchkiss, A.B.; Thesis: The Use of Group Tests for the Selection and Placement of Defense School Students.  
 Robert Henry Hubbell, B.S. in Ed. Thesis: A Study of the Guidance Program of the Frank David Boynton Junior High School, Ithaca, N.Y., with Suggestions for Possible Improvement.  
 Major Boyd Jones, B.S.  
 Marvin Bronk Loveys, B.S.  
 Paul Thomas McCarty, A.B., B.S.  
 Vera Reed Mason, B.S.  
 Orvil Edward Mirtz, A.B., Th.B.  
 Catherine Newbold, B.A.  
 Elmore Edgar Pogar, B.S. in Ed.; Thesis: The Status of Pupil Transportation in Eight Districts in Wyoming County, Pennsylvania.



Harold Wells Ranney, E.E.  
 Ruth Evalee Robinson, A.B.  
 Abraham Lincoln Schimel, B.S. in E.E.  
 Herbert Lester Seidelman, B.S.  
 Audrey Smith Shively, B.S. in Ed.  
 Marjorie Alice Swift, B.S.  
 Mary Elizabeth H. Taylor, B.S.  
 Glenn Eugene Underwood, B.S.  
 Edith Maude Weaver, A.B.  
 Edith Maude Weaver, A.B.  
 Mary Benedict Wood, B.S.

CONFERRED MAY 24, 1943

Ruth Mitchell Laws, B.S.  
 Arthur Joseph McTaggart, A.B.; Thesis: Vocational Rehabilitation in the United States.  
 Nerissa Brown Strong, B.S. in H.E.  
 Ruth Hatcher Thomas, Ph.B.: Thesis: Curricular Adaptations in a Chinese Rural School.

MASTERS OF SCIENCE IN AGRICULTURE

CONFERRED SEPTEMBER 30, 1942

Archie Roy Crouch, B.A., B.Th.; Rural Sociology, Rural Education. Thesis: What Happens to the Sons and Daughters of Parents Now Living on Sub-Marginal Lands in New York State?  
 Felix Edward Stanley, B.S.; Marketing, Farm Management. Thesis: Packages, with Special Reference to Consumer Packages for the 1940-41 Apple Crop in New York.  
 Pierre Georges Sylvain, Bachelier en Droit; Technical Agriculture.  
 Hector Zayas-Chardon, B.S. in Agr.; Business Management, Marketing. Thesis: Financial Plans of Three Farmers' Cooperatives.

CONFERRED JANUARY 28, 1943

Edwin Joseph Rousek, B.S. in Agr.; Animal Husbandry, Animal Nutrition. Thesis: A Study of the Percentage of Total Protein Required in the Ration for Fattening Lambs.  
 Ichuen Wang, B.S.; Land Economics and Farm Finance, Business Management. Thesis: History and Organization of the Farm Security Administration and an Analysis of its Operations in Tompkins County, New York, to April 30, 1942.

MASTER OF LAWS

CONFERRED JANUARY 28, 1943

Manuel Rivera Umpierre, A.B., LL.B.; Procedure, Legal History, Jurisprudence.

MASTER OF REGIONAL PLANNING

CONFERRED MAY 24, 1943

Leslie Stott O'Gwynn, Jr., B. Arch.; Regional Planning, Architectural Design. Thesis: Study of a Southern Seaport.

MASTERS OF SCIENCE IN ENGINEERING

CONFERRED SEPTEMBER 30, 1942

Hai-chang Benjamin Koo, B.S. in C.E.; Structural Engineering, Soil Mechanics. Thesis: A Comparative Study of Single Span Rigid Frame and Continuous Girder Bridges.

CONFERRED JANUARY 28, 1943

- Tsz-Foh Chu, B.S.C.E.; Railroad Engineering, Regional and City Planning. Thesis: "A Master Plan of Railroad System in China".  
 Hamilton Horth Mabie, B.S.; Experimental Engineering, Industrial Engineering. Thesis: A Study of Fuel Distribution and the Manifold Characteristics of an Internal-Combustion Engine.

CONFERRED MAY 24, 1943

- Tsen Chow Woo, B.S. in Eng.; Structural Engineering, Hydraulic Engineering. Thesis: A Study of Sheet Piling Bulkheads.  
 John Robert Young, S.B. in Ch.E.; Experimental Mechanical Engineering, Industrial Accounting. Thesis: The Hot Strength of Foundry Sand Mixtures.

#### MASTERS OF CHEMICAL ENGINEERING

CONFERRED SEPTEMBER 30, 1942

- Azro Jack Cheney, Jr., B.Chem.E.; Chemical Engineering, Organic Chemistry. Thesis: Mass Transfer in Tube Banks.  
 Frank Lilburn Wells, B.S.; Chemical Engineering, Physical Chemistry. Thesis: Vapor Liquid Equilibria.

CONFERRED MAY 24, 1943

- Frank Willard Dittman, B.S. in Chem. E.; Chemical Engineering, Physical Chemistry. Thesis: Mass Transfer Coefficients for Gas Streams.

#### MASTERS OF CIVIL ENGINEERING

CONFERRED SEPTEMBER 30, 1942

- Marvin Bogema, B.S.; Hydraulic Engineering, Mechanics. Thesis: Water Hammer Studies for Toledo, Ohio Lake Erie Pipe Line.  
 Arturo Botero-Hoyos, Ingenieur-Constructeur; Hydraulic Engineering, Structural Engineering. Thesis: Moose River Hydroelectric Power Project.

CONFERRED MAY 24, 1943

- Robert Lloyd Lewis, B.S.; Structural Engineering, Mechanics. Thesis: Strength of Steel Roof Decks.

#### MASTER OF ELECTRICAL ENGINEERING

CONFERRED MAY 24, 1943

- Nanubhai Bhailalbhay Amin, S.B. in E.E.; Electrical Design, Machine Design. Thesis: Determination of Torque in Three Phase Induction Motor When Unbalanced Impedances Are Put in the Stator Phases.

#### MASTERS OF MECHANICAL ENGINEERING

CONFERRED SEPTEMBER 30, 1942

- Ata Husnu Berker, B.M.E.; Experimental Mechanical Engineering, Mechanics. Thesis: Analysis of the Forces within an Internal Combustion Engine as a Function of Both Load and Speed.

CONFERRED MAY 24, 1943

- Louis Leslie Otto, M.E.; Experimental Engineering, Mechanics. Thesis: Carburetion and Ignition Requirements of Propane as a Fuel for Internal Combustion Engines.

## DOCTORS OF PHILOSOPHY

CONFERRED SEPTEMBER 30, 1942

- William John Argersinger, Jr., A.B.; Physical Chemistry, Inorganic Chemistry, Physics. Thesis: A Parallel Plate Method for the Determination of Surface Tension; The Zeta-Potential and the Observed Surface Tension of Electrolytes.
- Carl Tristan Arlt, A.B.; Economic Theory and its History; Money, Banking, and International Finance; Organization and Control of Industry. Thesis: State and Local Restrictions on Intrastate Trade.
- William Elmer Black, B.Sc. in Agr.; Marketing, Farm Management, Public Administration and Finance. Thesis: Consumer Demand for Apples and Oranges, Syracuse, New York, 1939-40 and 1940-41.
- Charles Arthur Bratton, B.S. in Agr.; Public Administration and Finance, Farm Management, Economic Theory and its History. Thesis: Fiscal Procedures in Rural New York Counties.
- Robert Webster Bratton, B.S. in Agr., M.S.; Animal Husbandry, Animal Nutrition, Genetics. Thesis: Influence of Quality of Protein in the Concentrate Mixture on the Milk Production of Dairy Cows Fed Mixed Hay and Corn Silage as Roughage.
- John Grobe Brereton, B.S., M.S.; Biochemistry, Biophysics, Organic Chemistry. Thesis: Electrode Decomposition Potentials and Migration of Milk Constituents When Subjected to a Direct Current.
- Patricia Ann Cain, A.B.; Applied Psychology, Psychology, Psychobiology. Thesis: Individual Differences in Susceptibility to Monotony.
- Bernardo Guillermo Capo, B.S., M.S.; Soils, Statistical Methods of Analysis, Prices and Statistics. Thesis: Available Nutrient Contents of Puerto Rican Soils as Determined by Pot Tests.
- Marlin George Cline, B.S.; Soils, Farm Management, Glacial Geology. Thesis: The Significance of Differences among Mapping Units and a Method of Generalization of the Detailed Soil Map of Northern Livingston County, New York.
- William Earle Colwell, B.Sc., M.S.; Soils, Plant Physiology, Analytical Chemistry. Thesis: A Biological Method for Determining the Relative Boron Content of Soils and Chemical Studies on Certain Metaborates.
- Lewis Dalcin Conta, B.S., M.S.; Experimental Mechanical Engineering, Mechanics, Mathematics. Thesis: Some Ideas Concerning the Mechanism of the Formation and Decomposition of Tetragonal Martensite.
- Milton Cotzin, A.B., A.M.; Experimental Psychology, Psychobiology, Applied Psychology. Thesis: The Rôle of Pitch and Loudness in the Perception of Obstacles by the Blind.
- Laurence Kremer Cutkomp, A.B.; Economic Entomology, Insect Toxicology, Ornithology. Thesis: Toxicity of Rotenone and Derris Extracts Administered Orally to Birds.
- Anna Louise Dunham, A.B., A.M., M.A.; Vertebrate Zoology, Nature Study, Botany. Thesis: A Synonymic Glossary of the Dermal Scalation of Snakes.
- Julia Eaton, A.B., A.M.; Drama and the Theatre, Rhetoric and Public Speaking, Dramatic Literature and Playwriting. Thesis: Classic and Popular Elements In English Comedy of the Eighteenth and Nineteenth Centuries.
- John Einset, B.S.; Cytology, Genetics, Plant Physiology. Thesis: A Cytological and Genetic Study of Primary Trisomic Types in *Zea Mays*.
- David Maldwyn Ellis, A.B., A.M.; American History, Modern European History, Constitutional Law. Thesis: An Agrarian History of Eastern New York, 1790-1850.
- Gordon Roy Finlay, B.Sc., M.Sc.; Inorganic Chemistry, Physical Chemistry, Physics. Thesis: A Study of Some Addition Compounds of Boron Trifluoride.
- Raymond Maurice Gilmore, A.B., A.M.; Vertebrate Zoology, Paleontology, Neurology. Thesis: Review of *Microtus Voles* of the Subgenus *Stenocranius* (Mammalia: Rodentia: Muridae), with Special Discussion of the Bering Strait Region.

- Floyd Wilson Green, A.B.; Inorganic Chemistry, Physical Chemistry, Organic Chemistry. Thesis: A Study of the Fluocolumbates of Lithium, Potassium, Rubidium, and Cesium.
- Shaw Earl Grigsby, B.S., M.A.; Rural Social Organization, General Sociology, Agricultural Economics. Thesis: Erin: A Socio-Economic Study of Families Living on Marginal Land.
- John Fessler Haller, B. Chem.; Inorganic Chemistry, Chemical Microscopy, Analytical Chemistry. Thesis: A Study of the Preparation, Structure, Properties and Decomposition of Azine Fluoride and of Difluorodiazene.
- Helmuth Winfrid Hörmann, A.B., A.M.; Dramatic Production, Dramatic Literature, History of Painting. Thesis: From Weimar to Meiningen. A Century of Theatrical Direction in Germany.
- Charles Francis Hunter, B.S. in Ed., A.B., Ph.M.; Rhetoric and Public Speaking, Speech and Phonetics, Social Psychology. Thesis: Four Speeches of Thomas Hart Benton, Edited with Notes and an Introduction.
- Duane Isely, B.A., M.S.; Economic Botany, Genetics, Entomology. Thesis: A Study in the Identification of Weeds in the Vegetative Condition.
- Harold Frederick Kaufman, A.B., A.M.; Sociology, Rural Sociology, Economic Theory. Thesis: A Social Psychological Study of a New York Rural Community.
- Jake Luther Krider, B.S.; M.S.; Animal Husbandry, Animal Nutrition, Genetics. Thesis: Vitamin, Protein, and Mineral Supplements for Growing and Fattening Fall Pigs Fed in Dry Lot.
- Stephen Krop, B.S., M.S.; Pharmacology, Physiology, Biochemistry. Thesis: The Influence of "Heart Stimulants" on the Contraction of Isolated Mammalian Cardiac Muscle.
- John Clark Lapp, B.A., M.A.; French Literature, French Language, English Renaissance. Thesis: The New World in French Poetry of the Renaissance.
- Britton Charles McCabe, B.S., Sc.M.; Vertebrate Zoology, Histology and Embryology, Nature Study. Thesis: The Distribution of Fishes in the Streams of Western Massachusetts.
- Walter Cox McCrone, Jr., B.Chem.; Organic Chemistry, Physical Chemistry, Chemical Microscopy. Thesis: I-Derivatives of Endomethylene Tetrahydrophthalic Acid II-Fusion Methods in the Study of Crystals.
- John Joseph Gerald McCue, A.B.; Experimental Physics, Theoretical Physics, Mathematics. Thesis: The Ionization Cross Section of the Silver LIII Shell.
- Frederick Lawrence Marcuse, B.A., M.A.; Psychobiology, History of Psychology, Neurology. Thesis: Experimental Studies of Physiological Patterns in Normal and Abnormal Animal Behavior.
- Albert Raymond Mead, B.S.; Invertebrate Zoology, Entomology, Vertebrate Zoology. Thesis: The Taxonomy, Biology, and Genital Physiology of the Giant West Coast Land Slugs of the Genus *Ariolimax* Morch (Gastropoda: Pulmonata).
- Anna Kathrine Miller, A.B., M.S.; Bacteriology, Animal Nutrition, Histology and Embryology. Thesis: Pyruvic Acid Metabolism by *Streptococcus fecalis* (10C1).
- Lawrence Henry Mouat, A.B., A.M.; Rhetoric and Public Speaking, Speech and Phonetics, Social Psychology. Thesis: Methods for Describing a Public Discussion Applied to the United States Neutrality Debates 1935-1941.
- Mary Louise Neville, B.A., A.M.; English Language and Literature, Latin, Greek. Thesis: Studies for an Edition of Wordsworth's Prelude, Book 7.
- Anne Rebecca Oliver, A.B., A.M.; Experimental Physics, Theoretical Physics, Mathematics. Thesis: The Structure of Evaporated Films of Chromium and Aluminum on Glass.
- Noel Printiss Ralston, B.S. in Agr., A.M.; Animal Husbandry, Animal Nutrition, Animal Physiology. Thesis: The Relative Feeding Value of Silages Fed to Dairy Cows for Milk Production and to Growing Dairy Heifers.
- Robert James Schatz, B.S. in Ch.E., M.S.; Physical Chemistry, Organic Chemistry, Theoretical Physics. Thesis: A Polythermal Study of the System Lithium Iodide-Iodine Water.



- Ralph Albert Smith, B.A., M.S.; Vertebrate Zoology, Nature Study, Botany. Thesis: The Biology of a Small Mammal Community in a Central New York Woodlot.
- William Martin Smith, Jr., B.S. in Agr., M.S.; Rural Sociology, Sociology, Agricultural Economics. Thesis: Participation of Rural Young Married Couples in Group Activities.
- Cecil Lloyd Spellman, B.S., M.S.; Agricultural Education, Rural Sociology, Agricultural Economics. Thesis: The Basis for a Program of Rural Secondary Education for Negroes in Wilson County, North Carolina, with Implications for Curriculum Content.
- Orville John Sweeting, A.B.; Organic Chemistry, Inorganic Chemistry, Physical Chemistry. Thesis: The Addition of Bromine to 2,3-Dimethylbutadiene, and some Related Reactions, with Particular Regard to Stereochemistry of the Products.
- Joel Trapido, A.B., A.M.; Drama and the Theatre, Dramatic Literature, Seventeenth Century Literature. Thesis: An Encyclopaedic Glossary of the Classical and Mediaeval Theatres and of the *Commedia Dell'Arte*.
- Clarence Archer Tryon, Jr., B.S.; Mammology, Ornithology, Limnology and Fisheries. Thesis: The Biology of the Pocket Gopher, *Thomomys talpoides*.
- Clifford Charles Volkerding, B.S.; Soils, Mineralogy, Plant Physiology. Thesis: A Study of Some Chemical and Biological Properties of Metaphosphates and their Utilization as Soil Fertilizers.
- Wayne Paul Wallace, B.E. in C.E., C.E.; Structural Engineering, Soil Mechanics, Mechanics. Thesis: On the Stability of Cantilevers and Beams of Arbitrary Thin-Walled Open Section.
- Ellen Kemp Watson, B.S.; Child Nutrition, Family Life, Biochemistry. Thesis: A Study of the Influence of Ascorbic Acid and Potassium Citrate on the Calcium Metabolism of Preschool Children.
- Roscoe Derrick Watson, B.S., M.S.; Plant Pathology, Plant Physiology, Plant Breeding. Thesis: Ozone as a Fungicide.
- Ned Weissberg, A.B.; Constitutional Law, International Law and Relations, Public Administration. Thesis: The Federal Child Labor Amendment—A Study in Pressure Politics.
- James Edward Welch, B.S., M.S.; Genetics, Cytology, Vegetable Crops. Thesis: Linkage in Autotetraploid Maize.
- Mary Hitchcock Wilde, B.S., M.S.; Plant Morphology, Cytology, Zoology. Thesis: A New Interpretation of Coniferous Cones with Special Reference to the Podocarpaceae.
- Martin Chun Yang, B.S., M.S.; Rural Sociology, Anthropology, Agricultural Economics. Thesis: The Market Town and Rural Life in China.

## CONFERRED JANUARY 28, 1943

- Kenneth Ellsworth Anderson, B.S., M.S.; Bacteriology, Physical Chemistry, Organic Chemistry. Thesis: Some Studies on Amino Acid Metabolism by the Genus *Proteus*.
- Ivan Rae Bierly, B.S.; Farm Management, Marketing, Money, Banking and International Finance. Thesis: Costs and Returns in Producing Milk in Five Areas in New York, 1939-40.
- John Harvey Bondurant, B.S.A., M.S.; Farm Management, Land Economics and Farm Finance, Economic Theory and its History. Thesis: An Economic Study of Agriculture in Shelby County, Kentucky.
- Wayne Alexander Bowers, A.B.; Theoretical Physics, Experimental Physics, Mathematics. Thesis: Wave Functions and Energy Levels in Metallic Sodium.
- Orson Silver Cannon, B.S., M.S.; Plant Pathology, Plant Physiology, Genetics. Thesis: *Fusarium* Wilt of Spinach.
- Perry Thomas Cupps, B.S. in Agr.; Animal Breeding and Nutrition, Animal Physiology, Biochemistry. Thesis: A Study of the Estrous Cycle in Cattle.
- Lawrence Bryce Darrah, B.S. in Agr., M.S.; Land Economics and Farm Management, Economic Theory and its History, Public Administration and Finance. Thesis: Commercial Poultry Farming in New York State.

- George Ernst Detmold, A.B., A.M.; Dramatic Literature, The English Renaissance, English History. Thesis: The Origins of Drama.
- Alice Jean Ferguson, B.S., M.S.; Pathogenic Bacteriology, Dairy Industry, Bio-Chemistry. Thesis: A Bacteriological Study of the Role of Udder Injuries in Establishing the Various Infections of Bovine Mastitis.
- Orville Deacy Frampton, A.B., A.M.; Biochemistry, Physical Chemistry, Organic Chemistry. Thesis: Studies on Cytochrome C.
- Erland Gjessing, B.S., M.S.; Biochemistry and Dairy Chemistry, Organic Chemistry, Physical Chemistry. Thesis: Synthetic Peroxidases.
- Kenneth Ingvard Greisen, B.S.; Theoretical Physics, Mathematics, Experimental Physics. Thesis: Intensity of Cosmic Rays at Low Altitude and the Origin of the Soft Component.
- Lowell Stewart Hardin, B.S. in Agr.; Farm Management, Marketing, Economic Theory and its History. Thesis: An Economic Study of Low Income Rural Areas in New York, 1940.
- Emile Newton Hooker, B.S., M.S.; Farm Management, Prices and Statistics, Business Management. Thesis: An Economic Study of Farms Operated by Negro Farmers in Dallas County, Alabama.
- Dallas Thane Hurd, A.B., M.A.; Inorganic Chemistry, Physical Chemistry, Organic Chemistry. Thesis: Crystalline Elementary Boron.
- Margaret Hutchins, B.S., A.M.; Education, Sociology, Economics of the Household and Household Management. Thesis: Cooperative Tendencies of Eighth Grade Children in the Ithaca Junior High School.
- Neal Frederick Jensen, B.S.; Plant Breeding, Plant Physiology, Agronomy. Thesis: Powdery Mildew of Barley. Studies of the Yield Losses and the Inheritance of Disease Resistance.
- William Kirk, Jr., B.S.; Organic Chemistry, Inorganic Chemistry, Physical Chemistry. Thesis: Derivatives of Benzothiazole.
- Jean Stirling Lindsay, A.B., A.M.; Elizabethan Literature, Middle English, The Romantic Period. Thesis: A Survey of the Town-Country and Court-Country Themes in Non-Dramatic Elizabethan Literature.
- Henry Laurence Lucas, Jr., B.S.; Animal Nutrition, Biochemistry, Animal Physiology. Thesis: Studies on the Role of Fat in Lactation.
- Boyce Dawkins McDaniel, B.A., M.S.; Experimental Physics, Theoretical Physics, Mathematics. (Title of thesis withheld for military reasons.)
- Robert Edwin McDonald, B.S.; Chemical Engineering, Heat Power Engineering, Mechanics. Thesis: A Study of Engine Performance with Simultaneous Control of Spark Setting and Fuel-Air Ratio.
- Archibald McLeod, A.B., M.A.; Drama and the Theatre, Dramatic Literature, Rhetoric and Public Speaking. Thesis: The Nature of the Relations between the Theatre Audience, the Drama, and the Mise-en-Scene.
- Robert Lee Metcalf, A.B., A.M.; Insect Physiology, Insect Toxicology, Animal Nutrition. Thesis: Fluorescence-microscopic Studies of the Physiology and Biochemistry of the Malpighian System of *Periplaneta americana* (L.).
- Vessie Howard Nicholson, B.S. in Agr., M.S.; Marketing, Prices and Statistics, Economic Theory. Thesis: Regional Markets in Up-State New York.
- Elmer Arthur Palmatier, B.S., M.S.; Plant Morphology, General Zoology, Plant Taxonomy. Thesis: Some Studies of the Floral Anatomy and Morphology of the Sexifragaceae.
- William Francis Royce, B.S.; Vertebrate Zoology, Aquiculture, Statistical Methods of Analysis. Thesis: The Reproduction and Studies on the Life History of the Lake Trout *Cristivomer Namaycush Namaycush* (Walbaum).
- Grace Bernice Ruckh, B.A., A.M.; Greek Language and Literature, Latin Language and Literature, Ancient History. Thesis: The Influence of Theocritus in Antiquity.
- Howard Eugene Sheffer, B.S. in Chem., M.S. (Chem.); Organic Chemistry, Physical Chemistry, Inorganic Chemistry. Thesis: The Preparation, Proof of Configuration, and Dehydration of *cis*-2-Butene-1, 4-diol.
- Don Lee Stockton, B.S. in Ch.E.; Chemical Engineering, Physical Chemistry, Heat Power Engineering. Thesis: Grinding Studies.

- Conrad Paul Straub, B.S. in C.E., M.C.E.; Sanitary Engineering, Bacteriology, Chemistry. Thesis: Digestion Studies.
- Harold Trapido, B.S., A.M.; Vertebrate Zoology, Botany, Science Education. Thesis: The Snakes of the Genus *Storeria*.
- John Wilson Trischka, B.S.E.E.; Experimental Physics, Theoretical Physics, Mathematics. Thesis: Structure in the X-Ray K Absorption Edges of Potassium and Chlorine in Potassium Chloride.
- Herbert Warren Walker, S.B.; Physical Chemistry, Mineralogy and Crystallography, Optical Chemistry. Thesis: Catalytic Reactions of Ethylene. (Work completed in 1927.)
- Carlton Eugene Wright, B.S. in Agr., M.S.; Agricultural Education, Farm Management, Agricultural Engineering. Thesis: Occupational Distribution, Entrance into Farming and Opportunities for Farming, of Former Students of Vocational Agriculture. A Critical Review of Research in One Phase of Agricultural Education.

## CONFERRED MAY 24, 1943

- Roice Hyrum Anderson, B.S., M.S. Marketing, Farm Management, Economic Theory and its History. Thesis: Consumer Demand for Meat, Syracuse, New York, 1942.
- Russell Baldock, A.B., A.M., M.S.; Experimental Physics, Theoretical Physics, Applied Mathematics. Thesis: Production of Positive Ions by Electron Bombardment of Solid Calcium and the Measurement of the Shift of the Relative Abundance of the  $Ca_{44}$  Ions in Two Different Samples.
- Ewart Merlin Baldwin, B.S. in Geol., M.S. in Geol.; Structural Geology, Stratigraphy, Economic Geology. Thesis: Structure and Stratigraphy of the Northern Half of Lost River Range, Idaho.
- M. Noble Bates, A.B., A.M.; Histology and Embryology, Anatomy, Physiology. Thesis: The Early Development of the Hypoglossal Musculature in the Cat.
- Robert McCrillis Carter, Jr., A.B., M.S.; Land Economics and Farm Finance, Rural Sociology, Marketing. Thesis: The People and Their Use of Land in Nine Vermont Towns.
- Hugh Kidder Clark, A.B.; Physical Chemistry, Physics, Mathematics. Thesis: An X-Ray Study of Rotation of the Cyanide Group in Sodium Cyanide. The Crystal Structure of Boron Carbide.
- Shirley Cooper (Mr.), A.B., A.M.; Rural Education, Rural Economics, Rural Social Organization. Thesis: An Evaluation of the County Unit of School Administration in West Virginia.
- Martelle Loreen Cushman (Mr.), A.B., A.M.; Educational Administration, Rural Sociology, Public Finance. Thesis: An Evaluation of Rural School District Reorganization in Michigan.
- Russell Fessenden, A.B., A.M.; Literary Criticism, English History, Medieval Literature. Thesis: An Edition of Wordsworth's *Prelude*, Book Third.
- Harold Kenneth Fink, A.B., M.S.; Experimental Psychology, Social Psychology, History of Psychology. Thesis: A Comparative Study of Learning Performance in Reptiles and Higher Vertebrates.
- Emma Corinne Brown Galvin, A.B., M.A.; American Literature, The Romantic Period, Literary Theory and Criticism. Thesis: The Lore of the Negro in Central New York State.
- Douglas Edward Greenwood, B.S.; Economic Entomology, Pomology, Insect Ecology. Thesis: Life History Studies of Six Species of Leaf Rollers Infesting Apple in Western New York.
- Theodore Hailperin, B.S.; Algebra, Mathematical Analysis, Theoretical Physics. Thesis: A Set of Axioms for Logic.
- William George Hardy, Ph.B., A.M.; Rhetoric and Public Speaking, Speech and Phonetics, Dramatic Literature. Thesis: Some Semantic Theories.
- Clayton Henry Johnson, Jr., A.B., A.M. Petrology, Structural Geology, Economic Geology. Thesis: Igneous Metamorphism in the Orofino Region, Idaho.
- Edward Allen Jones, A.B., A.M.; French Literature, French Literature of the 17th Century, French Language. Thesis: A Study of Traditionalism in the Works of Paul Bourget.

- Josephine Brown Jones, A.B., M.S.; Foods and Nutrition, Organic Chemistry Biochemistry. Thesis: The Effect of Several Household Cooking Methods on the Ascorbic Acid Content of Certain Fresh and Home Quick-Frozen Vegetables.
- Jerome Kurshan, A.B.; Experimental Physics, Theoretical Physics, Mathematics. (Title of thesis withheld for military reasons.)
- Fred Herbert Lewis, B.S.; Plant Pathology, Pomology, Plant Physiology. Thesis: Studies on Spray and Dust Schedules for Control of Apple Scab in Western New York.
- Jane Grennell McDaniel, B.S., A.M.; American History, International Law and Relations, Constitutional Law. Thesis: Some Phases of Social Reform in the United States 1870-1890.
- Harry Alexander MacDonald, B.S., M.S.; Field Crop Production, Plant Breeding, Plant Physiology. Thesis: Birdsfoot Trefoil (*Lotus corniculatus*).
- William Charles MacQuown, Jr., A.B., M.S.; Structural Geology, Stratigraphy, Geomorphology. Thesis: Structure and Stratigraphy of the White River Plateau near Glenwood Springs, Colorado.
- Oliver Wendell Margrave, B.Ed., A.M.; Musical Composition, Musicology, German Literature. Thesis: Four Musical Compositions and One Transcription: I. Darest Thou Now, O Soul; II. Psalm 150; III. First String Quartet; IV. Concert Piece for Symphonic Band; V. The Triumph of St. Michael.
- William Glenn Mayes, B.S. (Chem.), M.S.; Organic Chemistry, Physical Chemistry, Microscopy. Thesis: Cis-Trans Isomerism in Derivatives of Cyclopentadiene.
- Esther Rutherford Metcalf, B.S., M.S.; Nutrition, Family Life, Animal Nutrition. Thesis: A Study of Citric Acid Metabolism in Four Preschool Children.
- Hiroshi Minami, B.A.; Experimental Psychology, Social Psychology, Psychobiology. Thesis: The Effect of Activity upon Learning and Retention in the Cockroach, *Periplaneta Americana*.
- Clyde Dewey Mueller, B.S. in Agr., M.S.; Animal Breeding, Histology and Embryology. Thesis: Studies of Genetic Viability in the Fowl.
- Harry Brooks Naylor, B.S.; Bacteriology, Dairy Science, Organic Chemistry. Thesis: The Behavior of *Streptococcus lactis* at Low Temperatures.
- John Strong Niederhauser, B.S.; Plant Pathology, Botany, Plant Breeding. Thesis: The Rust of Greenhouse-grown Spearmint and its Control.
- Joseph Aurele Richard, B.A., B. of Surveying, B. of Forestry; Soils, Physical Geography, Meteorology. Thesis: Studies on the Nature of Podzolization.
- William Milton Rogoff, B.S.; Insect Morphology and Histology, Invertebrate Zoology, Medical Entomology. Thesis: The Anatomy and Metamorphosis of the Cephalic Ganglia of the Mosquito.
- Harold Rosegay, B.S., Sc.M.; Neuroanatomy and Anatomy, Histology and Embryology, Animal Pathology. Thesis: An Experimental Investigation of the Connections between the Corpus striatum and Substantia nigra in the Cat.
- Franklin Wallburg Southwick, B.S., M.S.; Pomology, Plant Physiology, Plant Anatomy. Thesis: The Volatile Production of Apples and its Possible Relation to the Apple Scald Disease.
- Robert Lamb Sproull, A.B.; Experimental Physics, Theoretical Physics, Physical Chemistry. Thesis: Title withheld for military reasons.
- Henry Miller Stevenson, Jr., A.B., M.S.; Ornithology, Botany, Vertebrate Zoology. Thesis: The Winter Distribution of Land Birds in the Southeastern States.
- William Jouette Tapp, B.S.; Organic Chemistry, Inorganic Chemistry, Biochemistry. Thesis: Studies Relating to the Nitroolefins.
- William Oscar Trapp, A.B., A.M.; American Governmental Institutions, American History, Public Administration and Finance. Thesis: The Constitutional Doctrines of Owen J. Roberts.
- Atwell Rufus Turquette, A.B., M.A.; Logic and Epistemology, History of Philosophy, Mathematics. Thesis: A Study and Extension of *M*-Valued Symbolic Logics.



- Donald LeRoy Van Horn, B.Sc., M.S. in Agr.; Field Crop Production, Plant Breeding, Plant Physiology. Thesis: Effect of Competition on Emergency Forage Crop Plot Technic.
- Leslie Oswald Weaver, B.S.A.; Plant Pathology, Plant Physiology, Pomology. Thesis: Effect of Temperature and Relative Humidity on Occurrence of Blossom Blight of Stone Fruits.
- George Wallis Woodbury, B.S., M.S.; Vegetable Crops, Plant Breeding, Plant Physiology. Thesis: A Study of Factors Influencing Floral Initiation and Seed-stalk Development in the Onion, *Allium Cepa* Linn.
- Stuart G. Younkin, B.S., M.S.; Plant Pathology, Plant Breeding, Botany. Thesis: Suscept Range of the Potato Yellow Dwarf Virus.

## INDEX OF MEMBERS OF THE STAFF

- Adams, G. P., 65.  
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