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CORNELL UNIVERSITY

OFFICIAL PUBLICATION

MARCH 24, 1950

Graduate School

ANNOUNCEMENT

FOR 1950-1951 SESSIONS

CALENDAR

1950

FALL TERM

Sept. 9	Last day for completing all requirements (including payment of graduation fees) for September degrees.
Sept. 18–19	Registration.
Sept. 20	Instruction begins at 1 p.m.
Oct. 3	Last day for filing statement-of-courses blank and change-of-committee blank, and for new students to file candidacy blanks to receive residence credit for the term.
Oct. 10	Last day for payment of tuition for the term.
Oct. 21	Last day for taking qualifying and language examinations in order to have them considered as of the beginning of the term.
Nov. 22–26	Instruction ends at 12:50 p.m., Nov. 22. Thanksgiving recess.
Dec. 20	Instruction ends at 10:00 p.m. Christmas recess.

1951

Jan. 4	Instruction resumes at 8 a.m.
Jan. 19	Last day for completing all requirements (including payment of graduation fees) for February degrees.
Jan. 31	Term ends.

SPRING TERM

Feb. 2–3	Registration.
Feb. 5	Instruction begins at 8 a.m.
Feb. 17	Last day for filing statement-of-courses blank and change-of-committee blank, and for new students to file candidacy blanks to receive residence credit for the term.
Feb. 26	Last day for payment of tuition for the term.
March 1	Last day for filing applications for scholarships and fellowships for 1951–1952.
March 3	Last day for taking qualifying and language examinations in order to have them considered as of the beginning of the term.
March 24	Instruction ends at 12:50 p.m. Spring recess.
April 2	Instruction resumes at 8:00 a.m.
May 25	Last day for completing all requirements (including payment of graduation fees) for June degrees.
June 5	Term ends.
June 11	Commencement.

CORNELL UNIVERSITY OFFICIAL PUBLICATION

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ADMINISTRATION

CORNELIS WILLEM de KIEWIET, A.B., A.M., Ph.D., Acting President and Provost.

CHARLES WILLIAMS JONES, A.B., A.M., Ph.D., Dean of the Graduate School.

DAMON BOYNTON, B.S., Ph.D., Secretary of the Faculty.

GENERAL COMMITTEE

Professor DAMON BOYNTON, *at large, term expires* 1951.

Professor S. A. ASDELL, *at large,* 1952.

Professor H. H. DUKES, *at large,* 1950.

Professor M. S. KENDRICK, *at large,* 1950.

Professor H. A. WICHELNS, Group A *(Languages and Literatures),* 1951.

Professor HENRY GUERLAC, Group B *(History, Political Science, Philosophy, Psychology, Agricultural Economics, Farm Management, Rural Sociology),* 1950.

Professor L. P. SMITH, Group C *(Mathematics, Astronomy, Physics, Chemistry, Geology, Geography, Geodesy),* 1950.

Professor G. C. KENT, Group D *(Biological Sciences),* 1952.

Professor C. O. MACKEY, Group E *(Engineering, Architecture, Rural Engineering, Landscape Design),* 1951.

Professor C. V MORRILL, Group F *(Preclinical Departments of the Cornell University Medical College in New York City),* 1952.

Professor J. H. BRUCKNER, Group G *(Agricultural Sciences),* 1952.

Professor B. F. WILLCOX, Group H *(Law),* 1950.

Professor A. L. WINSOR, Group I *(Education),* 1951.

Professor J. W. MCCONNELL, Group J *(Division of Industrial and Labor Relations),* 1952.

THE SECRETARY OF THE FACULTY.

THE DEAN, *Chairman ex officio.*

The Office of the Graduate School is in the Administration Building, Room 125. The office hours are 8:30 a.m. to 12:00 m.; 1:00 p.m. to 4:00 p.m.

GENERAL INFORMATION

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 Faculty requires 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 (M.S. in Agr.)[1]
Master of Fine Arts (M.F.A.)[2]
Master of Architecture (M.Arch.)[2]
Master of Landscape Architecture (M.L.A.)[2]
Master of Regional Planning (M.R.P.)[2]
Master of Metallurgical Engineering (M.Met.E.)[3]
Master of Chemical Engineering (M.Chem.E.)[3]
Master of Civil Engineering (M.C.E.)[3]
Master of Electrical Engineering (M.E.E.)[3]
Master of Engineering Physics (M.E.P.)[3]
Master of Mechanical Engineering (M.M.E.)[3]
Master of Education (M.Ed.)[4]
Master of Science in Education (M.S. in Ed.)[4]
Master of Science in Industrial and Labor Relations (M.S. in I.L.R.)[5]
Master of Laws (LL.M.)[6]
Doctor of the Science of Law (J.S.D.)[6]
Doctor of Education (Ed.D.)
Doctor of Philosophy (Ph.D.)

[1]Open only to students who have had a four-year course in Agriculture or the equivalent.

[2]Under the special jurisdiction of the Division of Architecture and Fine Arts.

[3]Under the special jurisdiction of the Division of Engineering.

[4]Under the special jurisdiction of the School of Education.

[5]Under the special jurisdiction of the Division of Industrial and Labor Relations.

[6]Under the special jurisdiction of the Division of Law.

ADMISSION

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.

Inquiries about admission should be addressed to *The Graduate School, Cornell University, Ithaca, New York.*

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. Information about the examination may be obtained and arrangements for taking it made by direct application to the Educational Testing Service, P.O. Box 592, 20 Nassau Street, Princeton, New Jersey.

For admission in the fall term, file application between January 1 and March 1; for Summer Session between March 15 and May 1. Though applications may be filed at any time, the officers cannot give assurance that the application will receive the same consideration that it would receive if filed during those periods.

An applicant is admitted to the Graduate School in one of the following categories: (1) a candidate for a degree; (2) a noncandidate; (3) a resident doctor; (4) an honorary fellow.

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.

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.

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 as printed on pp. 43–46, 127–128, 134–137, 168, or 173–174.

Noncandidates. A noncandidate is expected to pursue a co-ordinated program of graduate work approved by his adviser. The stuent selects his adviser from members of the Faculty of the Graduate School and must file with the Dean within two weeks of first registration a statement of the field in which he wishes to work, together with the adviser's signature indicating assent.

Students who register as noncandidates and who afterward wish to become candidates may so change their registration and obtain credit for work already done only if they were able to meet the language requirements at the time of their first registration.

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.

Honorary Fellows. 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 the laboratory and library fee. Actual residence at the University and regular registration in the Graduate School are required of incumbents.

HEALTH SERVICES AND MEDICAL CARE. . . These services are centered in the University Clinic (out-patient department) and in the Cornell Infirmary (hospital). Students are entitled to unlimited visits at the Clinic; laboratory and X-ray examinations indicated for diagnosis and treatment; hospitalization in the Infirmary with medical care for a maximum of fourteen days each term and emergency surgical care. The cost for these services is included in the College and University general fee.

The following health requirements for entering graduate students have been adopted by the Board of Trustees of Cornell University. The Board has also ruled that failure to fulfill these requirements

will result in a recommendation to the Registrar that the student be denied the privilege of registering the following term.

(1) *Vaccination against smallpox.* A satisfactory certificate of vaccination against smallpox must be filed at the Graduate School office before registration. It will be accepted as satisfactory only if it certifies that within the last five years a successful vaccination has been performed or three unsuccessful vaccination attempts have been made.

(2) *Health history.* Personal health record forms will be sent to students accepted for admission. Students are requested to answer all questions and return the forms promptly to the Graduate School office.

(3) *Chest X-ray film for permanent file at the Infirmary.* This chest film may be made by a private physician within a month of entrance and presented to the Clinical Director at the time of registration; otherwise a chest radiograph will be made during the orientation period or registration week. A charge of $2.00 for making this radiograph is included in the matriculation fee (see page 32). When a student has been away from the University for any reason for a year or more, he must have another X-ray upon re-entrance, for which he will be billed.

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." This registration takes place in Barton Hall on registration day. A fee of $5 is required for late registration by matriculated students.

Candidates for advanced degrees granted under special jurisdiction (see p. 7) 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 $20.00.

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 in order to obtain an official leave of absence, a withdrawal, or an honorable dismissal.

Registration of Courses. At the beginning of each term a candidate shall make out in triplicate a list of all the courses and other work 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 research or essay writing required by the Special Committee for candidates for the Master's degree under Plan B should be entered with semester-hour equivalents. The three copies must be filed in the office of the Graduate School within two weeks after registration. Any subsequent change in this list of courses must be recorded on forms to be obtained at the office.

Grades. Grade reports are made available each term to all students. Information concerning grade reports is published by the Registrar's office. Formal transcripts of Cornell records are issued from the Registrar's office, and all requests for transcripts should be made to that office.

RESIDENCE CREDIT

All advanced degrees require a minimum period of residence at the University, calculated as residence credit according to the following regulations:

1. One term of residence credit is predicated upon one academic term of full-time work satisfactorily completed.

2. If in any term a candidate's work is unsatisfactory in either the major or a minor subject, he may not receive the full residence credit for which he is otherwise eligible, and the amount he may receive will be determined by his Special Committee.

3. Candidates holding appointments in the University as instructors, assistants, teaching fellows, teaching assistants, or research assistants will be eligible for residence credit in accordance with the following formula:

(a) A maximum of one term of residence credit if appointment requires not more than six clock-hours a week.

(b) A maximum of three-fourths of a term of residence credit if appointment requires more than six but not more than twenty clock-hours a week.

(c) A maximum of five-eighths of a term of residence credit, if appointment requires more than twenty but not more than twenty-five clock-hours a week.

(d) A maximum of one-half term of residence credit if appointment requires more than twenty-five but not more than thirty clock-hours a week.

4. A candidate engaged in nonacademic work, or part-time academic work not indicated above, which in the judgment of his Special Committee interferes with his academic program will be eligible for only partial residence, as determined by his Special Committee within the provisions of the preceding formula.

5. Students registered for a normal program of study at the graduate level in the Summer Session are eligible to receive residence credit providing the study is properly a part of the program for the degree for which they are candidates. Such residence may be counted at the rate of three summer sessions for one term of credit, and five sessions for two terms. To obain such credit the candidate must register both in the Summer Session and in the Graduate School.

Students in the Graduate School who hold appointments as assistants while registered in the Summer Session cannot receive residence credit for the period of the Summer Session.

6. *Extramural Students*

(a) A candidate registered extramurally for *fewer than six* semester hours a term in courses given on the campus during the regular academic year may accumulate residence credit by such work, on recommendation of his Special Committee, up to a maximum of one term (or three summer sessions). For such work in the amount of *six or more* semester hours a term, maximum residence credit will be allowed as for work done in the Summer Session.

(b) A candidate registered extramurally in courses given at off-campus centers authorized by the University may accumulate residence credit, on recommendation of his Special Committee, up to a maximum of two summer sessions.

(c) Residence credit earned by extramural work will be recorded only in blocks of six semester hours, each such block being regarded as the equivalent of one summer session of residence credit.

7. A candidate for an advanced degree is expected to complete his residence with reasonable continuity. Under any circumstances, a candidate who fails to register during a period of four or more years before he has completed minimum residence requirements may continue only after the General Committee has stipulated the amount of additional residence to be required. The Committee will be guided in its decision by a written estimate made by the candidate's Special Committee of the period of study needed by the candidate to recover ground lost. 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.

REQUIREMENTS FOR THE MASTERS' DEGREES

RESIDENCE REQUIREMENTS . . .

The minimum residence requirement for a Master's degree is two full 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. However, a student who before matriculation successfully completed a course of study at the graduate level in one Summer Session at Cornell may petition for transfer of this work, on approval of his Special Committee, after he has matriculated in the Graduate School.

The satisfactory completion of the candidate's work, term by term, must be attested by the members of his Special Committee.

Work under Personal Direction.[7] A candidate who lacks not more than one-half of a term's residence credit for completion of the residence requirement may, on recommendation of his Special Committee and with approval of the Dean, be permitted to register under Personal Direction for completion of the requirement during the summer. Application for permission must be made at least one week *in advance* at the office of the Graduate School, and the student must

[7]While allotments are in force, this rule applies also to candidates for Masters' degrees who have one term of residence credit.

register with the Registrar and the Graduate School on the day the study begins. Satisfactory completion of the work must be certified by the supervising professor. There is no course credit for work under Personal Direction.

A candidate registered under Personal Direction during the summer may be admitted to the classes of the six-week Summer Session. Candidates 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.

Additional Requirements of Residence for Deficiency in Foreign Language. Candidates for the degree of A.M., M.S., M.Arch., M.L.A., M.F.A., or M.R.P. are subject to the following special requirements 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. The student must be enrolled in the Graduate School at the time such an examination is taken.

(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 the 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; they are 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.Chem.E., M.C.E., M.Met.E., M.E.E., M.M.E., or M.E.P.

Plan A is intended for those candidates who wish to acquire competence in a restricted field of work.

The candidate works under the direction of a Special Committee, usually of two faculty members, representing a Major and a Minor 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 course announcement of each field of instruction. Before selecting his major and minor subjects the student should consult members of the Faculty regarding suitable combinations of subjects. The candidate will devote the major portion of his time 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 Committee. After the candidate has chosen 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 candidate 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 candidate and the members concerned.

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 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, with approval slip signed by all members of the Special Committee, must be on file in the office of the Graduate School. On the approval slip the name of the student and the title of the thesis must be identical with those on the title page of the thesis as indicated in the form below. Under no circumstances may the final examination be given before the thesis has been accepted and filed.

The thesis must be typewritten, double-spaced, on a durable rag bond, 8 by 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]

[Month and year in 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[8] 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

[8]The candidate should consult the chairman of his Committee to ascertain if additional copies are required by the department.

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 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 candidate's Special Committee and are open to all members of the Faculty. At the discretion of the Special Committee, those under whom the candidate 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 the final examination, whether passed or failed, shall be filed by the Special Committee in the office of the Dean. By permission of his Special Committee, a candidate who has failed in a final examination may present himself for one re-examination but only within a period of from three to six months after the failure.

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 ac-

ceptable expository or critical essay or problem in research; 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 partial list of titles indicates the scope: American Culture, Agricultural Arts, Botanical Science, Education, Foreign Languages, General Science, History and Criticism of Art, Labor and Industry, Literature, Physical and Mathematical Sciences, Social Studies, Technical Agriculture, Zoological Science. This list is merely descriptive, and it is not the intention of the Faculty to confine selection to the fields named. The candidate will choose a title for his field of concentration in consultation with his Special Committee; that title is subject to the approval of the Dean.

Special Committees. The candidate 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 candidate may change the membership of his Special Committee with the approval of both 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 candidate and the members concerned.

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 in some other way, is left to the Special Committee in consultation

with the candidate. The completed essay or report of research must be submitted to the members of the Special Committee, but not to the office of the Graduate School.

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 research or essay as well as work done in formal courses and seminars. The examination 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 candidate's Special Committee and are open to all members of the Faculty. At the discretion of the Special Committee, those under whom the candidate 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. By permission of his Special Committee, a candidate who has failed in a final examination may present himself for one re-examination but only within a period of three to six months after the failure.

SPECIAL REQUIREMENTS FOR PROFESSIONAL DEGREES . . .

Additional requirements for professional degrees under special jurisdiction of divisions of the Graduate School will be found below in the course announcements of the divisions concerned, as follows:

Master of Fine Arts (M.F.A.), Master of Architecture (M.Arch.), Master of Landscape Architecture (M.L.A.), Master of Regional

Planning (M.P.R.)—in the Division of Architecture and Fine Arts, pp. 43–46.

Master of Metallurgical Engineering (M.Met.E.), Master of Chemical Engineering (M.Chem.E.), Master of Civil Engineering (M.C.E.), Master of Electrical Engineering (M.E.E.), Master of Engineering Physics (M.E.P.), Master of Mechanical Engineering (M.M.E.)—in the Division of Engineering, pp. 134–137.

Master of Education (M.Ed.), Master of Science in Education (M.S. in Ed.)—in the Division of Education, pp. 127–128.

Master of Laws (LL.M.)—in the Division of Law, pp. 173–174.

Master of Science in Industrial and Labor Relations—in the Division of Industrial and Labor Relations, pp. 168–171.

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 Languages," p. 22) 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 during the time student allotments are in force.)

At least two of the last four terms 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 candidate'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 Session. Residence credit toward the Ph.D. degree earned in Summer Sessions or extramurally 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 will not ordinarily be granted to a student until he has completed at least one 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. Application for permission must be made at least

one week *in advance* at the office of the Graduate School, and the student must register with the Registrar and the Graduate School on the day the study begins. The supervising professor must certify to satisfactory completion of the work. 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-week Summer Session. Candidates 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 candidate's program. 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 and except from the Cornell Aeronautical Laboratory at Buffalo, N.Y., such allowable compensation being in the form of a research assistantship or its equivalent.

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

(c) Permission to count such times 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 applicant'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 candidate acquire a total of more than two terms' residence under these provisions.

(d) A candidate 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.

REQUIREMENTS IN FOREIGN LANGUAGES . . . A candidate for the Ph.D. degree whose native language is English must demonstrate while in residence 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.[9] 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.

On recommendation of the Special Committee, English may be presented as a foreign language by a candidate whose native language is other than English. The examination will test the candidate's knowledge of the spoken as well as the written language, and the candidate's native language may not be presented as the second language. This examination will be given by the chairman of the candidate's Special Committee.

The examination in at least one foreign language must be passed immediately upon admission to candidacy; otherwise, a minimum of seven terms of residence credit is required. 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 candidate is not receiving residence credit.

The second language examination should be taken as soon as possible after admission to candidacy. Until it is passed no residence credit will be allowed after four terms of credit have been earned.

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

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 course announcement of each field 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

[9]Such examinations are given only on assignment by the Dean of the Graduate School to the appropriate examiner in the field which includes the candidate's major subject.

minor subjects, he must select a member[10] 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 candidate and the members concerned.

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 thesis must be approved by all members of the Special Committee and must be acceptable in both scholarship and 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 "Examinations," pp. 25–27). During the five days immediately preceding this examination a typewritten copy, with approval slip signed by all members of the Special Committee, shall be on file in the office of the Graduate School. On the approval slip the name of the student and the title of the thesis must be identical with those inserted on the title page of the thesis as indicated in the form below. Under no circumstances may this final

[10]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 will designate one of them as Chairman.

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 by 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 Doctor of Philosophy

By

[Author's name in full]

[Month and year in 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[11] 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 by 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. At present there is no provision for the publication of these abstracts.

EXAMINATIONS . . .

Qualifying Examination. A candidate for the Ph.D. degree must pass a qualifying examination given by his Special Committee, which may be oral or written or both. The primary purposes of this examination are: (1) to ascertain whether the candidate is qualified to continue work for the doctorate; and, if so, (2) to aid in planning

[11]The candidate should consult the chairman of his Committee to ascertain if additional copies are required by the department.

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 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. In any event, until the examination is taken no residence credit will be allowed after the term in which the candidate is credited with four terms of residence. The examination must be taken within one month after the beginning of a term if it is to be counted as having been taken in that term.

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 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. At the time of taking this examination, whether the two parts are given separately or in combination, the candidate must be registered in the Graduate School, either regularly or as a candidate for degree only.

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 may 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 above. This examination may be oral, or both oral and written, at the discretion of the Special Committee.

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 above. 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 above.

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 candidate's Special Committee and are open to all members of the Faculty. At the discretion of the Special Committee, those under whom the candidate 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. By permission of his Special Committee, a candidate who has failed in any of these final examinations may present himself for one re-examination, but only within a period of from six to twelve months after the failure.

Final examinations must be completed within four years after the minimum residence requirement 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 the J.S.D., the applicant shall have met the general requirements for admission to the Graduate School as stated above, pages 8–10 (or have done work equivalent to that required for such a degree); shall have re-

ceived the degree of 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, Business and Public Administration, Industrial and Labor Relations, 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 Committee in the office of the Graduate School. By permission of his Special Committee, a candidate who has failed in a final examination may present himself for one re-examination but only within a period of from six to twelve months after the failure.

For more information about this degree see page 173 in this *Announcement* and see also the Cornell Law School's *Announcement.*

REQUIREMENTS FOR THE ED.D. DEGREE

The program for the degree of Doctor of Education is designed to prepare the candidate, within a broad cultural context, for professional proficiency in a selected field of education. Candidates for this degree must show evidence of competency in a field of educational activity and of ability to assume a position of leadership in education. The requirements for the degree include (1) a minimum of six terms of residence credit; (2) the satisfactory completion, under the direction of a Special Committee, of a major field of concentration and two minor fields of distribution; (3) competency in two foreign languages or in the use of statistics or educational law; (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. A candidate for this degree is expected to complete his residence with reasonable continuity. All requirements, including the final examination, must be completed within four years after the minimum residence requirement for the degree has been satisfied. Two terms of residence must be consecutive, of which one may be secured under personal direction; ordinarily, these two terms should be the final terms of residence. All other requirements pertaining to residence are the same as those for the Ph.D.

Special Committees. Regulations pertaining to the establishment and functions of Special Committees are the same as those for the Ph.D.

Major and Minor Fields. A candidate for the Ed.D. degree must select a major field of concentration and two minor fields of distribution properly related to and supporting the field of concentration. Fields of concentration approved for this degree are the same as the major fields listed on page 127 for the Ph.D. in education. Fields of distribution will be determined in consultation with the professor representing the major field.

The candidate should consult members of the Faculty regarding his choice of a major field.

Special Requirements of Competency. A candidate for the Ed.D. degree must demonstrate by examination competency in two of the following areas: (1) an approved foreign language; (2) a second foreign language; (3) statistics as applied in education; (4) law as ap-

plied in education; (5) accounting as applied in education; or (6) some other area recommended by the Special Committee and approved by the Dean of the Graduate School. Competency in each of these areas will be determined by examination by staff members appointed for the purpose. Preparation for these examinations must be made when the candidate is not receiving residence credit, and examinations must be passed within the time limits operative in the Ph.D. program.

Thesis. The thesis required must meet the Ph.D. standard of scholarship and literary quality but may emphasize the critical application of knowledge to a professional problem rather than attempt to contribute new knowledge. All regulations governing the preparation and publication of the thesis and abstracts are the same as those for the Ph.D.

Examinations. A candidate for the Ed.D. degree must take a special written scholastic aptitude examination selected and administered by the School of Education in addition to the Qualifying Examination given by his Special Committee. The Committee shall decide the weight to be attached to the candidate's performance on this test in evaluating his fitness for candidacy. The aptitude test shall include ability to read and interpret educational literature, ability to analyze educational problems, proficiency in written English, and other aptitudes considered to be indicative of appropriate ability.

Rules governing the qualifying and final examinations are the same as those for the Ph.D.

TUITION AND OTHER FEES

GENERAL REGULATION . . . 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-week 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 10 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 20 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 . . .

Registration Deposit. A deposit of $30 must be made by every applicant for admission after the applicant has received provisional notice of acceptance, unless the candidate has previously matriculated as a student at Cornell University. Of this deposit $18 is used to pay the matriculation fee, chest X-ray, and examination blank charge; the $12 balance is a guaranty fund that must be maintained with the Treasurer until the student graduates or permanently withdraws.

A *Tuition Fee* of $150 a term is to be paid by all students registered in the Graduate School with major concentration in subjects within the state-supported colleges of the University; all others must pay a fee of $225 a term. This fee 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 and Honorary Fellows upon recommendation.
3. In addition to students exempt under the charter of the University from the

payment of tuition the following persons, to the extent herein mentioned, shall also be exempt from 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 may be made to a member of the teaching or scientific staff subject to the following limitations:

(a) If the salary for the academic year is not greater than $1600, the tuition fee may be waived entirely;

(b) If the salary is greater than $1600, but not greater than $1700, 25% of the tuition will be charged and 75% waived;

(c) If the salary is greater than $1700, but not greater than $1800, 50% of the tuition will be charged and the balance waived;

(d) If the salary is greater than $1800, but not greater than $1900, 75% of the tuition will be charged and the balance waived;

(e) If the salary is greater than $1900, no waiver will be made.

The word salary as used above means total pay, that is, base pay plus any bonus.

Graduate assistants on the nine- or twelve-month basis who reside here during the summer, who are registered under Personal Direction for credit in the Graduate School, and who are required to give service in their department or college during that period, may be recommended for waiver of tuition during the summer period under the above limitations. This waiver of tuition does not apply if the student registers in the Summer Session. Those who are engaged only in graduate study and not doing productive work for the department during the Summer may not have their tuition waived. The amount of tuition to which the above percentages will be applied is the prorated amount of the full tuition fee based upon the maximum amount of residence credit that can be earned.

By recent action of the Board of Trustees, candidates who have completed minimum residence requirements are no longer eligible for waiver of tuition except within the limits stated above.

A *College and University Fee* of $50.00 a term, payable at the beginning of each term, is required of all students registered in the Graduate School except Honorary Fellows and Resident Doctors. This general fee contributes toward the services supplied by the Libraries, Clinic and Infirmary, and the student union in Willard Straight Hall and pays a portion of the extra costs of laboratory courses and general administration.

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 $20.

A *Matriculation and X-ray Fee* of $18 is required of every student upon his first entrance into the University. This fee is deducted from

the registration deposit of $30, which must be paid when the student is approved for admission.

A *Graduation Fee* of $10 is required of every candidate for an advanced degree. The fee will be returned if the degree is not conferred.

A *Laboratory and Library Fee* of $12.50 a term is required of graduate students registered as Honorary Fellows or Resident Doctors.

Refunds of tuition and other fixed fees will be made to students who withdraw from the University, prior to the completion of a term, for reasons accepted as satisfactory. For students who do not complete a term, tuition and other fees will be charged at the rate of 10 per cent for each week, or fraction of a week, from the first day of registration to the date of withdrawal as certified by the College; provided, however, if withdrawal is made within six days of the date of registration, no charge is assessed. The matriculation fee will not be refunded, nor will refund of the Health and Infirmary fee be made to a student who has been admitted to the Infirmary.

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 $80 for each Summer Session, a health service and infirmary fee of $5, and laboratory fees as listed in the *Announcement of the Summer Session.*

Motor Vehicle Registration and Parking Fees. 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, within the immediate 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 $2 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 5–10–1. (Exceptions from the insurance requirement 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, which includes obtaining a registration sticker and paying the fee, must be completed within the registration days at the beginning of the first term if the 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 $2.

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

Student Parking on the campus during University hours is *prohibited.* Exemption may be granted by the Campus Patrol when the use of the car is essential to the student's attending classes or carrying on his academic or departmental work.

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 here indicated 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 College and University General Fee of $50.00; provided, however, that one half of this fee will be remitted if the registration is for a period not exceeding eight weeks. Such payment admits the student 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 Administration Building, Room 144. 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, and introduce them to other University officials and members of the Faculty.

LIVING FACILITIES

It is the responsibility of each graduate student to arrange for his own living quarters. Graduate men students are, upon application, assigned to space, when available, within the Men's Residential Halls. Graduate women students are, upon application, assigned to space, when available, within the Graduate Women's Residential Halls. Graduate women under 21 may apply for space in undergraduate dormitories and will be assigned if space is available. Undergraduate dormitory contracts entail room, board, and an allowance for personal laundry at the regular undergraduate residence charge.

University-operated rooms for men range in price from $5.00 to $10.00 a week. Similar housing for women includes a weekly allowance for personal laundry in addition to room, and the price range is from $8.50 to $10.50 a week. Unless specifically arranged in advance, contracts cover the full college year.

Off-campus rooms range in price from $5.00 to $10.00 a week, the average being from $6.00 to $7.00. It is usually impossible to arrange for room, board, and laundry at the same place off-campus. There are, however, several restaurants and cafeterias on or near the campus which service the off-campus and university-housed student alike. The present estimated cost of board averages from $2.00 to $2.50 a day.

Upon assurance of admission to the University, graduate students should apply to the Office of Residential Halls, Administration Building, for specific information on both university and off-campus housing.

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. Applications should be made to the office of the Dean of Men and Dean of Women.

LOAN FUND FOR WOMEN GRADUATE STUDENTS . . . There are available loan funds 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 office of the Dean of Women.

FELLOWSHIPS, SCHOLARSHIPS, PRIZES

HONORARY FELLOWSHIPS . . . See page 9.

AWARD AND TENURE . . . Appointments to fellowships and scholarships are made on April 1 of each year. Forms for making application may be obtained 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.[12]

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 must devote his whole time to his studies, except that he may be called upon to assist in instruction up to a maximum of six clock-hours a week and for such assistance may receive extra compensation from the University. He may not accept any other appointment.[13]

The stipends of fellowships and scholarships are payable at the office of the Treasurer of the University in eight or twelve equal installments, at the option of the holder thereof, with the first payment due October 15 and the other payments due on the fifteenth of each succeeding month.

FELLOWSHIPS AND SCHOLARSHIPS . . . The following fellowships and scholarships, except those marked with an asterisk, provide exemption from tuition but not from other fees.

[12]For information concerning appointments to assistantships the applicant should write to the department concerned.

[13]Holders of tuition scholarships may be granted exemption from this rule.

General

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, upon application, be exempted from the rule requiring scholarship holders to accept no other appointment.

Allen Seymour Olmstead Fellowships

Two Allen Seymour Olmstead Fellowships, stipends $1,000 each, are open to graduate students in any field of study in which major work for the Ph.D. degree is offered.

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 1950–1951 the stipend has been fixed at $200.

Cornell Sigma Xi Fellowship

The Cornell Sigma Xi Fellowship, established by the Cornell chapter of the Society of Sigma Xi, is open to graduate students in the following fields of study: mathematics, physics, chemistry, astronomy, sciences of the earth, biology in its various branches including psychology, medicine in its various branches, anthropology, and engineering in its various branches. This fellowship carries a stipend of $500.

Agriculture

Two *Henry Strong Denison Fellowships in Agriculture.* Stipend, $1000 each. 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.

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, $600.

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.

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. Awarded in alternate years.

The Graduate Scholarship in Botany, Geology, or Physical Geography. Stipend, $200. Awarded in alternate years.

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, $1200 if appointee is single, $1800 if married.

The Carl G. Schluederberg Fellowship. Stipend, $200.

The John E. Teeple Fellowship. Stipend, $400.

Classics

Two *Fellowships in Greek and Latin.* Stipend, $600 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

The President White Fellowship in Political and Social Science.[14] Stipend, $600. Awarded in alternate years in Government and Economics.

A Fellowship in Political Economy. Stipend, $700.

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.

[14]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.

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 Fellowships in Hydraulics, listed below.

*The John McMullen Graduate Scholarships**

THE JOHN MCMULLEN GRADUATE SCHOLARSHIPS are open to candidates for advanced degrees in Aeronautical, 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 $1200 each. The scholarships have not been assigned to any particular School of the College but will be awarded as conditions dictate. 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 for the year 1950–1951 is $500. Applications should be sent to the Graduate School.

ENGLISH

The Martin Sampson Teaching Fellowship. Stipend, $1050. See page 52.

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

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

GEOLOGY

The Goldwin Smith Fellowship in Botany, Geology, or Physical Geography. Stipend, $400. Awarded in alternate years.

The Graduate Scholarship in Botany, Geology, or Physical Geography. Stipend, $200. Awarded in alternate years.

The Eleanor Tatum Long Graduate Scholarship in structural geology is open to graduate students who are majoring in this branch of geology. The stipend is approximately $1200 a year.

*Charles Bean DeLong Graduate Research Fund**

A fund of $6000, 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. An award from this fund does not exempt recipient from payment of tuition and fees.

GERMAN

The University Fellowship in German Studies. Stipend, $400.

GOVERNMENT

The President White Fellowship in Political and Social Science. 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.[15] Stipend, $500. In the discretion of the Faculty this fellowship may be made a traveling fellowship, with a stipend of $800.

The Fellowship in American History. Stipend, $400.

The George C. Boldt Fellowship in History. Stipend, $1,000.

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.

*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.

[15]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. Both scholarships and fellowships carry free tuition in the Graduate School in addition to the stipend.

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.

Psychology

The John Wallace Dallenbach Fellowship in Psychology. Stipend, $800.

The Susan Linn Sage Fellowship in Psychology. Stipend, $400.

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

Romance Studies

The University Fellowship in Romance Studies. 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 accumulation it is sometimes possible to increase the amount available for this scholarship.

*TEMPORARY FELLOWSHIPS** . . . There are regularly available a number of other fellowships, usually offered by industrial concerns to graduate students in Cornell University who are studying in a field of interest to the donor. Since these fellowships are established for a limited period or for a series of years, they are not listed here; but some of the appointees to such fellowships for the year 1948–49 are named on pages 185–186. All such fellowships are awarded by action of the Faculty of the Graduate School. Inquiries about those currently available will be referred by the office of the Graduate School to the department concerned.

THE GRADUATE PRIZE IN PHILOSOPHY . . . Open for competition to all students registered in the Graduate School. See pages 63–64.

FIELDS OF INSTRUCTION

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

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

Architecture and the Fine Arts; Far Eastern Studies; Languages and Literatures; Music; Philosophy; History and the Social Sciences; Animal Sciences; Plant Sciences; Physical Sciences; Agriculture; Education; Engineering; Home Economics; Hotel Administration; Industrial and Labor Relations; Law; Veterinary Medicine; The Medical Sciences as presented in the Medical College, New York City; and *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 the main, courses intended primarily for advanced undergraduate students, but often meeting the needs of graduates, are not listed or described in this catalogue. For all such courses, the student should refer to the *Announcement* of the college in which the course is offered.

PREREGISTRATION FOR COURSES . . . In order to assure proper distribution of facilities, preregistration is required for all courses where staff and facilities are comparatively inflexible. Courses requiring preregistration are so marked in the descriptions. The preregistration periods normally occur about six weeks before the end of the semester preceding, and registered students are informed. New students and those not on campus are advised to write to the department concerned or to the office of the Graduate School as soon as they know that they want a place reserved in courses.

ARCHITECTURE AND THE FINE ARTS

The Division of Architecture and the Fine Arts has jurisdiction over work leading to the degrees of Master of Architecture, Master of Landscape Architecture, Master of Regional Planning, and Master of Fine Arts. These degrees are intended for those primarily interested in the practice of the various fields given below. Students primarily interested in the history and theory rather than the practice of these fields of study may become candidates for the Master of Arts degree.

ARCHITECTURE

Professors S. M. Barnette, H. E. Baxter, L. D. Brown, T. H. Canfield, G. D. Clarke, A. H. Detweiler, F. W. Edmondson, J. A. Hartell, T. W. Mackesey, E. D. Montillon, A. D. Seymour, J. N. Tilton, Jr., F. M. Wells.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Architectural Construction 2, 3, 4

Architectural Design 2, 3, 4

History of Architecture 2, 3, 4

Graduate work is offered in architectural design, in the history of architecture, and in advanced construction. 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 12,000 books, 20,000 mounted photographs, 45,000 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. For specific courses offered see the *Announcement of the College of Architecture.*

REGIONAL AND CITY PLANNING

Professors G. D. Clarke, T. W. Mackesey, F. W. Edmondson, Mr. J. W. Reps, and other members of the University Faculty.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

City Planning 1, 2, 3, 4 Regional Planning 1, 2, 3, 4

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.

700. *HISTORY OF CITY PLANNING.* Fall term. Credit three hours. Professors DETWEILER and MACKESEY.

710. *PRINCIPLES OF REGIONAL AND CITY PLANNING.* Fall term. Credit three hours. Professor MACKESEY.

711. *CITY PLANNING PRACTICE.* Spring term. Credit three hours. Prerequisite, Course 710. Professor MACKESEY.

713. *HOUSING.* Fall term. Credit two hours. Registration limited. Prerequisite, Course 710. Mr. REPS.

717. *ZONING PRINCIPLES AND PRACTICE.* Spring term. Credit two hours. Prerequisite, Course 710. Mr. REPS.

718. *CITY PLANNING DESIGN.* Either term. Credit arranged. Professor EDMONDSON.

719. *CITY AND REGIONAL PLANNING RESEARCH.* Either term. Credit arranged. Professors CLARKE, MACKESEY, and EDMONDSON.

LANDSCAPE ARCHITECTURE

Professors G. D. CLARKE, E. D. MONTILLON, F. W. EDMONDSON, and members of the Faculty in Architecture.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Landscape Architecture 2, 3, 4

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. For specific courses offered see the *Announcement of the College of Architecture.*

PAINTING AND SCULPTURE

Professors N. D. DALY, KENNETH EVETT, J. M. HANSON, J. A. HARTELL, R. P. LANG, J. O. MAHONEY, and K. L. WASHBURN.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Painting 2, 3, 4 Sculpture 2, 3, 4

The degree of Master of Fine Arts will be granted to candidates with a special aptitude for the practice of Painting or Sculpture, who have a basic general education, and who have qualified themselves in the history and theory of art.

Entering students must present at least 30 hours of studio work in these fields, or its equivalent. Two years' residence will normally be required and candidates must supplement work in the practice of art with a related program in the history and theory of art. At the end of his third term of residence each candidate will present an exhibition of work done while in residence and take a comprehensive examination in the history and theory of the art of his special interest. A thesis, consisting of a creative project, will be presented at the end of the fourth term of residence. Instruction in Painting and Sculpture is given by the staff of the College of Architecture. For further information consult the *Announcement* of that College.

Either Painting or Sculpture may also be elected as minor fields of study for the degree of Master of Arts.

The degree of Master of Education, administered by the School of Education under the jurisdiction of the Graduate School, is offered for those students who

wish to prepare themselves for the teaching of art in the secondary schools. Open to qualified graduate students only.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Architecture,* Department of Painting and Sculpture, Courses 322–323, 326–327–328, 353, 356, 375, 370–371.

STUDIO COURSES

The following courses constitute advanced work in the several fields they cover. They offer a study of the various artistic and technical problems inherent in the production of works of art in these fields through projects chosen by the student.

390. *PAINTING AND COMPOSITION.* Either term. Credit as assigned. May be repeated for credit. Open to qualified graduate students only.

396. *SCULPTURE.* Either term. Credit as assigned. May be repeated for credit. Open to qualified graduate students only.

SEMINARS

The following courses are for qualified graduate students only. They may be taken either term and may be repeated for credit.

392. *SEMINAR IN THE THEORY OF PAINTING.* Credit two hours.

397. *SEMINAR IN THE THEORY OF SCULPTURE.* Credit two hours.

398. *SEMINAR IN ART CRITICISM.* Credit two hours.

399. *SEMINAR IN THE TEACHING OF ART.* Credit two hours. Offered with the co-operation of the SCHOOL OF EDUCATION.

DRAMA AND THE THEATRE

Professors H. D. ALBRIGHT, R. C. BALD, A. M. DRUMMOND, J. A. HARTELL, H. A. MYERS, EDWIN NUNGEZER, W. H. STAINTON.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Dramatic Production 2, 3, 4 Playwriting 2, 3, 4
Dramatic Technique 2, 3, 4

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.

For information on programs leading to A.M. and Ph.D. degrees in Dramatic Production, see page 58 of this *Announcement,* under SPEECH AND DRAMA.

THE CORNELL UNIVERSITY THEATRE provides opportunities for public presentation of the work of graduate students in Dramatic Interpretation and Acting and in Playwriting.

HISTORY OF ART AND ARCHAEOLOGY

Professors D. L. FINLAYSON, N. A. PATTILLO, and F. O. WAAGÉ.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Archaeology 1, 2, 3, 4
History of Art 2, 3, 4

Graduate work is offered in the general field of the history of the visual arts (architecture, painting, sculpture, and the minor arts). To elect this as a major subject the candidate must present undergraduate preparation comparable to the major course in Fine Arts, option 2 (Visual Arts Course) in the College of Arts and Sciences at Cornell. Instruction will be offered through advanced undergraduate courses (for which see the *Announcement of the College of Arts and Sciences* under Fine Arts) and through independent study and research under individual direction.

The same conditions will usually apply in the election of work in the general field of Archaeology as a major subject; however, in undergraduate preparation relevant courses in such subjects as cultural anthropology may be substituted for some of those in art history, and for graduate work in Classical Archaeology courses in Latin and Greek may be so substituted.

History of Art and Archaeology are approved as major subjects for the Master of Arts, but not for the Master of Fine Arts, degree; candidates for the Master of Fine Arts degree may, however, elect History of Art as a minor subject.

FAR EASTERN STUDIES

Professors KNIGHT BIGGERSTAFF, H. W. BRIGGS, C. F. HOCKETT, M. E. OPLER, N. A. PATTILLO, E. P. REUBENS, H. E. SHADICK, and LAURISTON SHARP; and MISS GUSSIE E. GASKILL.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Chinese Literature 2, 3, 4 Far Eastern Studies 4

For major or minor work in Chinese History, see HISTORY. Students taking graduate work in Anthropology, Economics, and Government may also concentrate their research on the Far East.

In the Wason Collection Cornell University possesses one of the best European-language libraries on China and the Chinese in the world. The Collection is also strong in books and periodicals dealing with Southeast Asia, Japan and other areas adjacent to China. The Chinese-language materials, amounting to some forty thousand volumes, cover the whole range of Chinese studies, being especially strong in bibliography, literature, Ch'ing history, and the various aspects of contemporary Chinese civilization.

INTRODUCTION TO LITERARY CHINESE. Throughout the year. M W F 11. Professor SHADICK. (Chinese 201–212)

INTERMEDIATE COLLOQUIAL CHINESE. Throughout the year. T Th S 11. Professor HOCKETT. (Chinese 203–214)

[*LINGUISTIC STRUCTURE OF CHINESE.* Professor HOCKETT. (Chinese 232) Not given in 1950–1951.]

CHINESE LITERATURE IN TRANSLATION: PHILOSOPHICAL AND HISTORICAL LITERATURE. Fall term. M W F 10. Professor SHADICK. (Literature 321)

CHINESE LITERATURE IN TRANSLATION: IMAGINATIVE LITERATURE. Spring term. Prerequisite, Far Eastern Studies 201 or 301, or History 161. M W F 10. Professor SHADICK. (Literature 322)

351–352. *READINGS IN CHINESE LITERATURE: CLASSICAL AND MODERN.* Throughout the year. Prerequisite: Chinese 212 and 214. Professor SHADICK.

375–376. *SEMINAR IN CHINESE LITERATURE.* Throughout the year. Professor SHADICK.

HISTORY OF CHINESE CIVILIZATION. Professor BIGGERSTAFF. (History 161–162)

THE MODERNIZATION OF CHINA. Professor BIGGERSTAFF. (History 811–812)

SEMINAR IN MODERN CHINESE HISTORY. Professor BIGGERSTAFF. (History 875–876)

INTRODUCTION TO FAR EASTERN ART. Dr. PATTILLO. (Fine arts 601–602)

NATIVE CULTURES OF THE PACIFIC. Professor SHARP. (Sociology and Anthropology 605)

SEMINAR: CULTURES AND CULTURE CHANGE IN INDIA. Professor OPLER. (Sociology and Anthropology 683)

SEMINAR: CONTEMPORARY CULTURE CHANGE IN SOUTHEAST ASIA. Professor SHARP. (Sociology and Anthropology 685)

ECONOMICS OF THE FAR EAST. Professor REUBENS. (Economics 801–802)

[*FAR EASTERN POLICY OF THE UNITED STATES.* Professor BRIGGS. (Government 417) Not given in 1950–1951.]

951–952. *SEMINAR IN FAR EASTERN STUDIES.* Throughout the year. T 2–4. Far Eastern Studies staff.

The attention of graduate students is also called to the following introductory courses, listed in the *Announcement of the College of Arts and Sciences,* which may be of interest to them: Chinese 101–102 *(Elementary Colloquial Chinese);* Far Eastern Studies 201 *(Introduction to Contemporary China),* 202 *(Introduction to Contemporary Southeast Asia),* and 204 *(Introduction to Contemporary Japan).*

LANGUAGES AND LITERATURES

THE CLASSICS

Professors EDWARD L. BASSETT, HARRY CAPLAN, JAMES HUTTON, GORDON M. KIRKWOOD, FRIEDRICH SOLMSEN, and F. O. WAAGÉ.

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 and Renaissance Latin Literature 1, 2, 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

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 seminar 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 additional to those investigated in the seminar courses are ordinarily treated in courses of lectures. A seminar room in the Library Building is reserved for the exclusive use of graduate students in the Classics.

For fellowships in Greek and Latin, see page 38.

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

For undergraduate courses, which often meet needs of graduate students, see the *Announcement of the College of Arts and Sciences* under Classics.

301–302. *ARISTOPHANES, CLOUDS; SOPHOCLES, OEDIPUS REX; HERODOTUS.* Throughout the year. Credit three hours a term. Prerequisite, Greek 201 or the equivalent. M W F 3. Professor SOLMSEN.

305–306. *LYRIC POETRY; AESCHYLUS, PROMETHEUS VINCTUS; THEOCRITUS; DEMOSTHENES, PHILIPPICS.* Throughout the year. Credit three hours a term. Prerequisite, Greek 301–302. M W F 9. Professor CAPLAN.

[307–308. *PLATO, THE REPUBLIC; PINDAR, SELECTED ODES; THUCYDIDES.* Throughout the year. Credit three hours a term. Not given in 1950–1951.]

309–310. *ADVANCED GREEK COMPOSITION.* Throughout the year. Credit one hour a term. T 2. Assistant Professor KIRKWOOD.

365–366. *SEMINAR. EURIPIDES.* Throughout the year. Credit three hours a term. Library, Classical Seminar Room. W 2–4. Professor SOLMSEN.

[375–376. *SEMINAR. PLATO.* Throughout the year. Not given in 1950–1951.]

See also Ancient History (under HISTORY) and Greek Philosophy (under PHILOSOPHY).

LATIN

For undergraduate courses, which often meet needs of graduate students, see the *Announcement of the College of Arts and Sciences,* under Classics.

315–316. *THE GREATER REPUBLICAN WRITERS: PLAUTUS, CICERO, LUCRETIUS.* Throughout the year. Credit three hours a term. T Th S 9. Professor HUTTON.

[317–318. *LITERATURE OF THE EARLY EMPIRE: TACITUS, ANNALS; JUVENAL; PLINY'S LETTERS; SENECA'S LETTERS.* Throughout the year. Credit three hours a term. Not given in 1950–1951.]

321–322. *LATIN COMPOSITION: ADVANCED COURSE.* Throughout the year. Credit one hour a term. W 2. Professor SOLMSEN.

[381–382. *SEMINAR: CLASSICAL RHETORIC.*]

383–384. *SEMINAR: PLAUTUS.* Throughout the year. Credit three hours a term. Library, Classical Seminar Room. T 2–4. Professor CAPLAN.

GREEK AND LATIN LINGUISTICS

347. *HISTORY OF THE LATIN LANGUAGE.* Spring term. Credit two hours. T Th 12. Assistant Professor BASSETT.

[348. *VULGAR LATIN: PETRONIUS, CENA TRIMALCHIONIS; VULGAR LATIN INSCRIPTIONS.* Credit two hours. Not given in 1950–1951.]

350. *COMPARATIVE GRAMMAR OF GREEK AND LATIN.* Fall term. Credit two hours. T Th 12. Assistant Professor BASSETT.

[389. *GREEK DIALECTS.* Fall term. Credit two hours. Not given in 1950–1951.]

[390. *ITALIC DIALECTS.* Credit two hours. Not given in 1950–1951.]

See also GENERAL LINGUISTICS.

CLASSICAL ARCHAEOLOGY

For undergraduate courses, which often meet needs of graduate students, see the *Announcement of the College of Arts and Sciences,* under Fine Arts.

[315. *NUMISMATICS: ANCIENT COINAGE.* Not given in 1950–1951.]

377. *PAUSANIAS AND THE TOPOGRAPHY OF GREECE WITH SPECIAL REFERENCE TO ATHENS.* First term. Hours to be arranged. Goldwin Smith 37. Professor WAAGÉ.

378. *PROBLEMS IN CLASSICAL ARCHAEOLOGY.* Second term. Hours to be arranged. Goldwin Smith 37. Professor WAAGÉ.

ENGLISH LANGUAGE AND LITERATURE

Professors M. H. ABRAMS, R. C. BALD, DAVID DAICHES, R. H. ELIAS, F. BARRON FREEMAN, W. H. FRENCH, BAXTER HATHAWAY, G. H. HEALEY, C. W. JONES, F. E. MINEKA, H. A. MYERS, EDWIN NUNGEZER, W. M. SALE, H. W. THOMPSON.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Medieval Literature 1, 2, 3, 4
Old and Middle English 1, 2, 3, 4
The English Renaissance to 1660 1, 2, 3, 4

The Restoration and the Eighteenth Century 1, 2, 3, 4
The Nineteenth Century and After 1, 2, 3, 4
American Literature 1, 2, 3, 4
English Poetry 1, 2, 3, 4
Dramatic Literature 1, 2, 3, 4
Prose Fiction 1, 2, 3, 4
Folk-Literature 3, 4
Creative Writing 2, 3 (for A.M.), 4 (for A.M.)

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. Upon arrival at Cornell, they should consult a member of the departmental Committee on Graduate Studies.

In the Cornell University Library are collections for advanced work in every division of English Literature; those in Old and Middle English, in Elizabethan and nineteenth-century literature, and in folklore are especially rich. In addition, the Department has a separate collection, the Hart Memorial Library, with many reference books and ample 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-five 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 of the University.

In general, thirty 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 literatures is especially acceptable. A candidate for the degree of Doctor of Philosophy must have at least a full-year course in Old English. He must also 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 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.

Successful study leading to the doctorate with the major in any one of the subjects listed above requires not only a balanced undergraduate training in the arts and sciences with a concentration in languages and literature, but also mature habits of reading and appreciation. Since entrance credentials cannot establish the presence of these habits, applicants intending to major in one of these subjects are admitted to the Graduate School as noncandidates and are required to pass an oral examination before admission to candidacy for the degree. This examination should be taken within one month of first registration if the student wishes to be admitted to candidacy and to receive residence credit for the term. A reading list useful in preparing for this examination may be obtained from the Department. The examiners may require a composition to test students' ability to write critical prose. For those who pass the examination the usual qualifying examination of the Graduate School (see p. 25) will be waived.

The minimum residence requirement after admission to candidacy for the Ph.D. degree is, except in very unusual circumstances, four semesters. The other two semesters required by the Faculty of the Graduate School may, on recommenda-

tion of the candidate's Special Committee, be made up of study as a noncandidate, as a candidate for the Master's degree, or as a student in another accredited graduate school.

When a student has completed studies in his major and minor subjects, he will be given Final Examination A by his Special Committee. When his thesis has been accepted, he will be given Final Examination B by the same committee.

Rules in the three preceding paragraphs apply to students entering in or after the fall term of 1949.

A graduate student who expects to earn all his residence credit by attendance in summer sessions may be a candidate only for the degree of A.M., Plan B. Final examinations for the degree of A.M., Plan A, and for the degree of Ph.D. may be scheduled only during the fall and spring terms, preferably during the regular examination periods. Theses for the degrees of A.M., Plan A, or Ph.D., or parts thereof, may be submitted for consideration by the student's Special Committee during the fall and spring terms only.

For further information on examinations, see pp. 17, 19, 26–27.

The Martin Wright Sampson Teaching Fellowship, to the value of $1050, with exemption from tuition fees, and one fellowship of $600, also carrying exemption from tuition fees, are awarded annually to graduate students in English. To receive consideration, applicants must ordinarily have completed a year of graduate study. The Department also nominates deserving applicants for tuition scholarships. Furthermore, several 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.

Instruction in English available to candidates for advanced degrees is listed below in three groups: I, Courses open to undergraduates as well as graduate students; II, Courses at a more advanced level open only to graduate students; and III, Intensive and specialized study available to candidates for the doctorate. The candidate for the Master's degree under Plan A is ordinarily expected to have completed successfully at least three two-term courses from Groups I and II, or to have completed 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 six two-term courses, including four from Groups II and III, or to have completed six courses which his Special Committee deems equivalent in scope and quality.

GROUP I. Graduate Students taking the following courses are expected to do extra work in order to obtain graduate credit. For further descriptions see the *Announcement of the College of Arts and Sciences,* Department of English and Division of Literature.

305–306. *OLD ENGLISH PROSE AND POETRY.*

309–310. *ENGLISH NON-DRAMATIC LITERATURE, 1550–1660.*

313–314. *ENGLISH LITERATURE, 1660–1790.*

317–318. *THE ROMANTIC PERIOD.*

321–322. *THE VICTORIAN PERIOD.*

326. *MODERN ENGLISH POETRY.*

329–330. *AMERICAN LITERATURE.*

335. *THE MODERN AMERICAN NOVEL.*

341–342. *ELIZABETHAN AND EARLY STUART DRAMA.*

345. *THE DRAMA OF THE RESTORATION AND THE EIGHTEENTH CENTURY.*

349. *RECENT AMERICAN POETRY.*

355. *AMERICAN FOLK-LITERATURE.*

357. *BALLAD AND FOLKTALE.*

365–366. *CHAUCER AND HIS AGE.*

369–370. *SHAKESPEARE.*

373. *MILTON.*

376. *AMERICAN COLONIAL LITERATURE.*

377. *EMERSON, THOREAU, AND WHITMAN.*

379. *POE, HAWTHORNE, AND MELVILLE.*

380. *MARK TWAIN, HOWELLS, AND JAMES.*

382. *THE ENGLISH LANGUAGE.*

385–386. *NARRATIVE WRITING.*

388. *VERSE WRITING.*

389. *ADVANCED EXPOSITION.*

485–486. *SEMINAR IN WRITING.*

Literature 201–202. *ENGLISH TRANSLATIONS OF GREEK AND LATIN CLASSICS.*

Literature 211–212. *SURVEY OF MEDIEVAL LITERATURE.*

Literature 214. *HUMANISM AND THE RENAISSANCE.*

Literature 301–302. *DRAMA AND THE THEATRE.*

Literature 311–312. *EUROPEAN FICTION*

Literature 321–322. *CHINESE LITERATURE IN TRANSLATION.*

Literature 401–402. *PRINCIPLES OF LITERARY CRITICISM.*

Literature 411. *THE PSYCHOLOGY OF LITERATURE.*

Literature 421. *MODERN LITERARY CRITICISM.*

Speech and Drama 455. *AMERICAN DRAMA AND THEATRE.*

Speech and Drama 461–462. *PLAYWRITING.*

German Literature 151–152. *MASTERS OF GERMAN LITERATURE.*

GROUP II. Courses open to graduate students only. Not all of these can be offered, but persons interested in particular courses should address inquiries to the Department. If enough students apply, hours and a room for a course will be arranged. Candidates for the degree of A.M., Plan B, will receive three hours of credit a term for each course taken.

501. *BIBLIOGRAPHY AND METHOD.* Fall Term. Professor BALD. Recommended for all candidates for the doctorate.

503–504. *MIDDLE ENGLISH LITERATURE.* Fall and spring terms. Professor FRENCH.

507–508. *ELIZABETHAN LITERATURE.* Fall and spring terms. Associate Professor NUNGEZER.

510. *SEVENTEENTH-CENTURY LITERATURE.* Spring term. Professor BALD.

[512. *SHAKESPEARE.* Spring term. Professor BALD. Not given in 1950–1951.]

513–514. *EIGHTEENTH-CENTURY LITERATURE.* Fall and spring terms. Assistant Professor HEALEY.

516. *THE ROMANTIC PERIOD.* Fall term. Associate Professor ABRAMS.

535–536. *VICTORIAN LITERATURE.* Fall and spring terms. Associate Professor MINEKA.

541–542. *AMERICAN LITERATURE.* Fall and spring terms. Professor THOMPSON.

551–552. *DRAMATIC LITERATURE.* Fall and spring terms. Professor MYERS.

555. *ENGLISH POETRY.* Fall term. Professor DAICHES.

546. *PROSE FICTION.* Spring term. Professor SALE.

557–558. *SEMINAR IN WRITING.* Fall and spring terms. Associate Professor HATHAWAY.

GROUP III. Specialized study for Ph.D. candidates. The professors designated will supervise the work of advanced students.

601–602. *OLD AND MIDDLE ENGLISH.* Professor FRENCH.

603–604. *MIDDLE ENGLISH TEXTS.* Professor FRENCH.

605–606. *MEDIEVAL LITERATURE.* Professor JONES.

607–608. *ELIZABETHAN LITERATURE.* Associate Professor NUNGEZER.

609–610. *THE ENGLISH DRAMA TO 1700.* Professor BALD.

611–612. *SEVENTEENTH-CENTURY LITERATURE.* Professor BALD.

613–614. *EIGHTEENTH-CENTURY LITERATURE.* Professor SALE, Associate Professor ABRAMS, Assistant Professor HEALEY.

615–616. *THE ROMANTIC PERIOD.* Associate Professors MINEKA and ABRAMS.

635–636. *VICTORIAN LITERATURE.* Associate Professor MINEKA.

641–642. *AMERICAN LITERATURE.* Professors THOMPSON and MYERS.

645–646. *PROSE FICTION.* Professors SALE and DAICHES.

651–652. *DRAMATIC LITERATURE.* Professor MYERS.

653–654. *CONTEMPORARY LITERATURE.* Professors DAICHES and SALE.

657–658. *FOLK-LITERATURE.* Professor THOMPSON.

GENERAL LINGUISTICS

Professors F. B. AGARD, E. L. BASSETT, J M. COWAN, G. I. DALE, G. H. FAIRBANKS, W. H. FRENCH, R. A. HALL, JR., C. F. HOCKETT, W. G. MOULTON, and C. K. THOMAS.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

General Linguistics 1, 2, 3, 4

The following more specialized linguistic fields, listed elsewhere, are also available: Latin Language, Greek Language (see THE CLASSICS); Old and Middle English (see ENGLISH LANGUAGE and LITERATURE); Germanic Linguistics (see GERMAN STUDIES); French, Spanish, and Romance Linguistics (see ROMANCE STUDIES); and Slavic Linguistics (see RUSSIAN STUDIES). In any of these, emphasis is laid on (1) methodology, and (2) the body of results already attained in the field; but in General Linguistics the primary emphasis is on (1), in the linguistics of a specified language or group of languages the primary emphasis is on (2).

A student majoring in General Linguistics for the Ph.D. must choose at least one of his minors in a field other than those referred to above. Particularly desirable are literature, area studies, anthropology, and mathematics.

The Cornell Linguistics Club, open to all interested, meets monthly throughout the school year and affords an opportunity for the presentation and discussion of current developments of topics of research.

201, 202. See *Announcement of the College of Arts and Sciences.*

203–204. *LINGUISTIC ANALYSIS.* Throughout the year. Credit three hours a term. General Linguistics 201 is a prerequisite or concurrent for 203; 203 is a prerequisite for 204. M W F 9, and a fourth hour to be arranged. Associate Professor HOCKETT.

205. *FIELD METHODS.* Fall term. Credit three hours. Prerequisite, 204. Hours to be arranged; four class hours a week may be required. Associate Professor HOCKETT.

206. *LANGUAGE AND CULTURE.* Spring term. Credit three hours. Prerequisite, Linguistics 204 and Sociology and Anthropology 601, or consent of the instructor. Hours to be arranged. Associate Professor HOCKETT.

211, 212. *ACOUSTICAL PHONETICS.* Throughout the year. Credit three hours a term. Hours to be arranged. Professor COWAN.

290. *SEMINAR.* Each term. Admission by permission of the instructor. Hours and credit to be arranged. Various members of the STAFF.

The following courses, described elsewhere, can be included in a program of work in GENERAL LINGUISTICS with the permission of the student's Special Committee: Latin 347, 348, 350, 390 (see THE CLASSICS); English 305, 306, 601, 602 (see ENGLISH LANGUAGE and LITERATURE); German 232, 241, 242, 281, 282, 290 (see GERMAN STUDIES); Speech and Drama 333, 334, 336 (see SPEECH and DRAMA); French 232, 241, 242, 290, Italian 290, Spanish 232, 241, 242, 290, Romance Linguistics 281, 282, 290 (see ROMANCE STUDIES); Russian 232, 241, 290 (see RUSSIAN STUDIES).

GERMAN STUDIES

Professors E. KAHLER, V. LANGE, W. G. MOULTON, W. F. OECHLER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

German Literature 1, 2, 3, 4 Germanic Linguistics 1, 2, 3, 4

In the advanced courses in this field the work is twofold, literary and linguistic. The history of German literature from the earliest period to the present day is treated in 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 Baroque period, the age of Goethe, the drama of the nineteenth century, and contemporary literature. The courses offered in linguistics include the study of Gothic and of Old and Middle High German. They also afford an introduction to the historical and descriptive methods of language study. The seminar in German literature aims to impart the principles and methods of investigation.

Work in German studies is greatly facilitated by an exceptional library equipment, whose nucleus is the Zarncke library, one of the largest collections of rare books for the study of German literature and philology ever brought to America.

Candidates with a Ph.D. major in German literature must select Germanic linguistics as one of their minors; candidates with a Ph.D. major in Germanic linguistics must select German literature as one of their minors. Candidates for advanced degrees in German Studies are expected to have an adequate knowledge of French and Latin. Inquiries concerning advanced work in German Studies and fellowships available should be addressed to the chairman, Professor Victor Lange.

For undergraduate courses which may meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* under German.

232. *LINGUISTIC STRUCTURE OF GERMAN.* Spring term of 1951 and alternate years. Credit three hours. Prerequisites, proficiency in German and Linguistics 201. Professor MOULTON. T Th S 10.

[241. *HISTORY OF THE GERMAN LANGUAGE.* Fall term 1951 and alternate years. Credit three hours. Prerequisite, proficiency in German. Professor MOULTON. T Th S 10. Not given in 1950–1951.]

[242. *MIDDLE HIGH GERMAN.* Spring term 1952 and alternate years. Credit three hours. Prerequisite, German 241 or German 281, 282. Professor MOULTON. T Th S 10. Not given in 1950–1951.]

281, 282. *GOTHIC AND COMPARATIVE GERMANIC LINGUISTICS.* Throughout the year, 1950–1951 and alternate years. Credit three hours. Professor MOULTON. T Th S 9.

290. *SEMINAR IN GERMANIC LINGUISTICS.* Offered every term. Credit three hours. Prerequisite, German 241 or German 281, 282, or concurrent registration in one of these. Professor MOULTON. Hours to be arranged.

300. *SOCIAL AND INTELLECTUAL EVOLUTION OF MODERN GERMANY.* Fall term. Credit three hours. Visiting Professor KAHLER. M W F 12.

308. *MIDDLE HIGH GERMAN LITERATURE.* Fall term. Credit three hours. Assistant Professor OECHLER. M W F 10, or at hours to be arranged.

[310. *GERMAN REFORMATION AND BAROQUE.* Fall term 1951 and alternate years. Credit three hours. Assistant Professor OECHLER. M W F 10. Not given in 1950–1951.]

316. *GERMAN PROSE FICTION FROM GOETHE TO THOMAS MANN.* Fall term. Credit three hours. Professor LANGE. M W F 9.

325. *THE GERMAN DRAMA OF THE NINETEENTH CENTURY.* Spring term. Credit three hours. Assistant Professor OECHLER. M W F 10.

[332. *MODERN GERMAN LITERATURE 1870–1940.* Fall term. Credit three hours. Visiting Professor KAHLER. M W F 2. Not given in 1950–1951.]

[345. *LESSING AND THE PERIOD OF ENLIGHTENMENT.* Spring term. Credit three hours. Assistant Professor OECHLER. T Th S 11. Not given in 1950–1951.]

350. *SCHILLER.* Fall term 1950 and alternate years. Credit three hours. Visiting Professor KAHLER. M W F 2.

[365, 366. *GOETHE.* Throughout the year, 1951–1952 and alternate years. Credit three hours a term. Professor LANGE. M W F 9. Not given in 1950–1951.]

420. *GERMAN ROMANTICISM.* Spring term. Credit three hours. Professor ————————. M W F 12.

470. *PROSEMINAR IN GERMAN LITERATURE: INTRODUCTION TO METHODS.* Spring term, 1951 and alternate years. Credit two hours. Professor LANGE. One meeting a week at a time to be arranged. Required of all graduate students in German studies.

475, 476. *SEMINAR IN GERMAN LITERATURE.* Throughout the year. Credit three hours a term. Fall term: *Die deutsche Novelle.* Visiting Professor KAHLER. Spring term: *Stifter.* Professor LANGE. One meeting a week at a time to be arranged.

ROMANCE STUDIES

Professors F. B. AGARD, MORRIS BISHOP, G. I. DALE, R. A. HALL, JR., and B. L. RIDEOUT.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

French Linguistics 1, 2, 3, 4
French Literature 1, 2, 3, 4
Italian 1, 2, 3, 4
Romance Linguistics 1, 3, 4
Spanish Linguistics 1, 2, 3, 4
Spanish Literature 1, 2, 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 unrivaled Dante and Petrarch collections, the gift of the late Willard Fiske, who likewise presented 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 Graduate Committee on Romance Studies consists of the professors listed above, with Professor MORRIS BISHOP as chairman. Inquiries pertaining to advanced study in this field should be addressed to the chairman.

A working knowledge of Latin is especially desirable for all candidates for advanced degrees in this field. 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. A graduate student in Romance studies 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.

FRENCH

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Arts and Sciences,* courses 232, 233, 241, 242, 301, 302, 311, 322, 361, 362.

290. *SEMINAR IN FRENCH LINGUISTICS.* Offered in accordance with student needs. Credit three hours a term. Hours to be arranged. Associate Professor HALL.

375, 376. *MODERN FRENCH SEMINAR.* Throughout the year. Credit two hours a term. Professor BISHOP.

ITALIAN

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Arts and Sciences,* courses 401, 402, 407, 408.

290. *SEMINAR IN ITALIAN LINGUISTICS.* Offered in accordance with student needs. Credit three hours a term. Hours to be arranged. Associate Professor HALL.

SPANISH

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Arts and Sciences,* courses 232, 241, 242, 501, 502, 503, 504, 511, 512, 521, 522, 524.

290. *SEMINAR IN IBERO-ROMANCE LINGUISTICS.* Offered in accordance with student needs. Credit three hours a term. Hours to be arranged. Associate Professor AGARD.

[575, 576. *OLD SPANISH.* Not given in 1950–1951.]

[581, 582. *CALDERON AND ALARCON.* Not given in 1950–1951.]

585, 586. *THE PICARESQUE NOVEL.* Throughout the year. Credit two hours a term. Th 2:15. Professor DALE.

[591, 592. *SEMINAR IN SPANISH-AMERICAN LITERATURE.* Not given in 1950–1951.]

ROMANCE LINGUISTICS

281, 282. *THE COMPARATIVE STUDY OF THE ROMANCE LANGUAGES.* Throughout the year. Credit three hours a term. Prerequisite, Linguistics 201–

202, taken either previously or concurrently. Hours to be arranged. Associate Professor HALL.

290. *SEMINAR IN ROMANCE LINGUISTICS.* Offered in accordance with student needs. Credit three hours a term. Hours to be arranged. Associate Professor HALL.

RUSSIAN STUDIES

Professors G. H. FAIRBANKS, VLADIMIR NABOKOV.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Russian Literature 1, 2, 3, 4

Slavic Linguistics 1, 2, 3, 4

232. *THE LINGUISTIC STRUCTURE OF RUSSIAN.* Spring term. Credit three semester hours. Prerequisite, proficiency in Russian and Linguistics 201. M W F 2. Assistant Professor FAIRBANKS.

241. *HISTORY OF THE RUSSIAN LANGUAGE.* Fall term. Credit three semester hours. Prerequisite, proficiency in Russian. M W F 2. Assistant Professor FAIRBANKS.

290. *SEMINAR IN SLAVIC LINGUISTICS.* Offered in accordance with stutent needs. Credit three semester hours a term. Hours to be arranged. Assistant Professor FAIRBANKS.

301, 302. *SURVEY OF RUSSIAN LITERATURE.* Throughout the year. Credit three semester hours a term. M W F 12. Associate Professor NABOKOV.

311, 312. *RENAISSANCE OF RUSSIAN POETRY.* Throughout the year. Credit three semester hours a term. Prerequisite, Russian 302 or consent of the instructor. Hours to be arranged. Associate Professor NABOKOV.

SPEECH AND DRAMA

Professors A. M. DRUMMOND, H. A. WICHELNS, HARRY CAPLAN, W. H. STAINTON, C. K. THOMAS, H. D. ALBRIGHT, and C. C. ARNOLD.

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 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 for study 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 (see page 45 of this *Announcement*).

Opportunities for theatre practice of which students will be expected to avail themselves are afforded by various branches of THE CORNELL UNIVERSITY THEATRE.

For undergraduate courses which often meet needs of the graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Speech and Drama, courses 101, 102, 111, 131, 141, 175, 209. Preregistration is required for these courses.

205. *DISCUSSION.* Either term. Credit three hours. Assistant Professor ARNOLD. Fall term: M W F 10. Spring term: M W F 10, 11. Preregistration required.

213, 214. *ARGUMENT.* Fall and spring terms. Credit three hours a term. Professor WICHELNS. T 11, Th 11–1. Preregistration required.

221. *FORMS OF PUBLIC ADDRESS.* Fall term. Credit three hours. Assistant Professor ARNOLD. M W F 11.

[227. *ORATORY AS A LITERARY FORM.* Credit three hours. Professor WICHELNS. Not offered in 1950–1951.]

241. *PUBLIC OPINION AND THE METHOD OF ARGUMENT.* Spring term. Credit three hours. Professor WICHELNS. M W F 12.

[275, 276. *HISTORY OF PUBLIC ADDRESS.* Fall and spring terms. Credit three hours a term. Professor WICHELNS. Not offered in 1950–1951.]

[281, 282. *BRITISH RHETORIC AND ORATORY.* Fall and spring terms. Credit three hours a term. Assistant Professor ARNOLD. Not offered in 1950–1951.]

[283, 284. *AMERICAN RHETORIC AND ORATORY.* Fall and spring terms. Credit three hours a term. Assistant Professor ARNOLD. Not offered in 1950–1951.]

287, 288. *THEORIES OF PUBLIC ADDRESS.* Fall and spring terms. Credit three hours a term. Assistant Professor ARNOLD. Th 2–4:30.

291, 292. *RHETORICAL CRITICISM.* Fall and spring terms. Credit three hours a term. Professor WICHELNS. T 2–4:30.

[295, 296. *PHILOSOPHY OF RHETORIC.* Fall and spring terms. Credit three hours a term. Professor WICHELNS. Not offered in 1950–1951.]

[*SEMINAR IN CLASSICAL RHETORIC.* Professor CAPLAN.]

333. *ENGLISH PHONETICS.* Fall term. Credit three hours. Professor THOMAS. M W F 12.

334. *PRINCIPLES OF PHONETICS.* Spring term. Credit three hours. Professor THOMAS. M W F 12.

[336. *REGIONAL AND HISTORICAL PHONETICS.* Spring term. Credit three hours. Professor THOMAS. Not offered in 1950–1951.]

[341, 342. *STRUCTURE AND FUNCTIONING OF THE SPEECH MECHANISM.* Fall and spring terms. Credit three hours a term. Not offered in 1950–1951.]

351, 352. *PRINCIPLES OF SPEECH CORRECTION.* Fall and spring terms. Credit three hours a term. Mr. GRAHAM. T Th S 9.

353, 354. *PRINCIPLES OF SPEECH CORRECTION.* Fall and spring terms. Credit three hours a term. Prerequisite course 352. Professor THOMAS. Hours to be arranged.

381, 382. *SPEECH TRAINING.* Throughout the year. Credit two hours a term. Professor THOMAS. Hours to be arranged.

401. *DRAMATIC PRODUCTION: DIRECTION.* Fall term. Credit three hours. Associate Professor STAINTON. M W F 11. Prerequisite for further work in Dramatic Production.

405. *ADVANCED DRAMATIC PRODUCTION: DIRECTION.* Fall term. Credit three hours. Associate Professor STAINTON. T 2–4 and hours to be arranged.

421. *ADVANCED DRAMATIC INTERPRETATION.* Spring term. Credit three hours. Associate Professor ALBRIGHT. W 2–4:30. Preregistration required.

431. *DRAMATIC PRODUCTION: STAGECRAFT.* Spring term. Credit three hours. Associate Professor STAINTON. M W 11. Laboratory, T 2–4 or as arranged.

437. *DRAMATIC PRODUCTION: STAGE LIGHTING.* Spring term. Credit three hours. Associate Professor STAINTON. T Th 12. Laboratory, Th 2–4:30.

439, 440. *THEATRE PRACTICE.* Fall and spring terms; may be entered either term. Associate Professor STAINTON and Associate Professor ALBRIGHT. Hours and credits as arranged.

451. *HISTORY OF THE THEATRE.* Spring term. Credit three hours. Professor DRUMMOND. M W F 10.

455. *AMERICAN DRAMA AND THEATRE.* Fall term. Credit three hours. Professor DRUMMOND. M W F 10.

463, 464. *PLAYWRITING.* Fall and spring terms. Credit three hours a term. Professor DRUMMOND. F 2–4:30.

475. *THEORIES OF DRAMATIC PRODUCTION.* Fall term. Credit three hours. Professor DRUMMOND. W 2–4:30.

476. *SEMINAR IN DRAMA AND THE THEATRE.* Spring term. Credit three hours. Professor DRUMMOND. W 2–4:30, or hours to be arranged.

481. *DRAMATIC ART.* Fall term. Credit three hours. Associate Professor ALBRIGHT. W 2–4:30.

485. *MODERN THEORIES OF STAGE PRESENTATION.* Spring term. Credit three hours. Associate Professor STAINTON. W 2–4:30.

DRAMATIC LITERATURE. See English 341–342, 369–370.

DRAMATIC STRUCTURE. See English 651–652.

DRAMA AND THE THEATRE. See Literature 301–302.

MUSIC

Professors WILLIAM W. AUSTIN, WILLIAM A. CAMPBELL, DONALD J. GROUT, ROBERT L.HULL, HUNTER JOHNSON, JOHN KIRKPATRICK, ROBERT PALMER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

History of Music 2, 3, 4	Musicology 1, 2, 3, 4
Musical Composition 2, 3, 4	Theory of Music 2, 3, 4

Students interested in applied music and the musical organizations are invited to consult with the chairman of the Department. Graduate credit is not given for applied music.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Music, courses 101, 103 and 201. For courses 101 and 103, preregistration is required.

MUSIC THEORY

203, 204. *THEORY III. COUNTERPOINT.* Throughout the year. Credit three hours a term. Prerequisite, Music 201–202, or the equivalent. M W F 12. Associate Professor PALMER.

207, 208. *ORCHESTRATION AND CONDUCTING.* Throughout the year. Credit three hours a term. Prerequisites, Music 101–102 and 103–104, or the equivalents. M W F 2. Messrs. CAMPBELL and JOHNSON.

209, 210. *THEORY IV. COMPOSITION IN TWENTIETH-CENTURY STYLE.* Throughout the year. Credit two hours a term. Hours to be arranged. Prerequisite, Music 203–204. (Music 203–204 may be taken concurrently with Music 209–210.) Mr. JOHNSON.

021–022. *INFORMAL STUDY.* Credit hours to be arranged. Associate Professor PALMER.

023–024. *INFORMAL STUDY.* Credit hours to be arranged. Associate Professor HULL.

MUSIC HISTORY

301, 302. *HISTORY OF MUSIC.* Throughout the year. Credit three hours a term. Prerequisites, Music 101–102 and Music 201–202 (the latter may be taken concurrently with Music 301, 302). M W F 9. Professor GROUT.

305, 306. *MUSIC OF THE BAROQUE PERIOD.* Throughout the year. Credit three hours a term. Prerequisite, Music 301–302. T Th S 8. Assistant Professor AUSTIN.

[311. *CONTEMPORARY MUSIC.* Fall term. Credit three hours. Prerequisites, Music 301–302 and Music 203–204. (The latter may be taken concurrently with Music 311.) M W F 11. Associate Professor PALMER. Not given in 1950–1951.]

[312. *CONTEMPORARY MUSIC.* Spring term. Credit three hours. Prerequisite, Music 311. M W F 11. Associate Professor PALMER. Not given in 1950–1951.]

319, 320. *COLLEGIUM MUSICUM.* Throughout the year. Credit one hour a term. Prerequisite, consent of the instructor. T 2–3:40. Associate Professor HULL, assisted by members of the Department.

031, 032. *INFORMAL STUDY.* Credit hours to be arranged. Assistant Professor AUSTIN.

033, 034. *INFORMAL STUDY.* Credit hours to be arranged. Professor GROUT

041, 042. *INFORMAL STUDY.* Credit hours to be arranged. Associate Professor KIRKPATRICK.

ADVANCED SEMINARS

275, 276. *SEMINAR IN COMPOSITION.* Throughout the year. Credit two hours a term. Open to seniors by permission. Hours to be arranged. Associate Professor PALMER.

ANALYTIC TECHNIQUE. Throughout the year. Credit three hours a term. Prerequisite, Music 203–204, or the equivalent. M W 1–3. Associate Professor PALMER.

375, 376. *INTRODUCTION TO RESEARCH.* Throughout the year. Credit two hours a term. Prerequisites, a reading knowledge of French and German and an elementary knowledge of music theory and general music history. M 10–12. Professor GROUT.

377, 378. *SEMINAR IN MUSICOLOGY.* Throughout the year. Credit two hours a term. W 10–12. Professor GROUT.

SUSAN LINN SAGE SCHOOL OF PHILOSOPHY

Professors MAX BLACK, STUART M. BROWN, JR., E. A. BURTT, NORMAN MALCOLM, ARTHUR E. MURPHY, HAROLD R. SMART, and GREGORY VLASTOS; *Dr.* Willis Doney.

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 quarterly 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* is 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. Candidates for the doctorate are required, and other graduate students are encouraged, to choose one minor in a subject other than philosophy.

The Graduate Prize in Philosophy. The Graduate Prize in Philosophy has an annual value of about $25 and is open for competition to all students registered in the Graduate School of Cornell University. The prize is 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 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 typewritten 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.

For fellowships in Philosophy see page 41.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

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

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Philosophy, courses 301–302, 312, 313, 321, 322, 323, 324, 325–26, 327.

424. *PHILOSOPHY OF SCIENCE.* Spring term. Professor BLACK. M W F 3.

[425. *ETHICAL THEORY.* Fall term. Associate Professor BROWN. Not given in 1950–1951.]

427. *RECENT PHILOSOPHY (1890–1940).* Fall term. Professor MURPHY. M W F 12. Topic for 1950–1951: Peirce, Royce, and Collingwood.

431. *SEVENTEENTH-CENTURY RATIONALISM.* Fall term. Credit three hours. Prerequisite, Philosophy 102, or Philosophy 302, or consent of the instructor. Dr. DONEY. T Th S 11. Topic for 1950–1951: Descartes, Malebranche, and Leibniz, and their contemporaries.

434. *NINETEENTH-CENTURY PHILOSOPHY.* Spring term. Credit three hours. Prerequisite, Philosophy 301–302, or consent of the instructor. Associate Professor SMART. T Th S 12.

481. *AESTHETICS: ADVANCED COURSE.* Fall term. Credit three hours. Associate Professor SMART. T Th S 11.

485. *PHILOSOPHY OF RELIGION: ADVANCED COURSE.* Spring term. Professor BURTT. Th 2–4, or hours to be arranged. Topic for 1950–1951: Conceptions of God, and Arguments for His Reality.

SYMBOLIC LOGIC. See MATHEMATICS, page 109.

[575–576. *PLATO AND ARISTOTLE.* Fall and spring terms. Professor VLASTOS. Not given in 1950–1951.]

[579–580. *MODERN PHILOSOPHERS.* Fall and spring terms. Professors BURTT and MURPHY. Not given in 1950–1951.]

581–582. *SEMANTICS AND LOGIC.* Fall and spring terms. Professor BLACK. T 2–4. Topic for 1950–1951: The Theories of Frege and Russell.

584. *SEMINAR IN POLITICAL PHILOSOPHY.* Spring term. Professor VLASTOS. M 3–5. Topic for 1950–1951: The Ethical Status of Political Community.

585–586. *ADVANCED ETHICS AND VALUE THEORY.* Fall and spring terms. First term prerequisite to the second. Fall term: The Moral Sense. Associate Professor BROWN. Th 3–5. Spring term: Definitions of Good. Professor MURPHY. W 3–5.

587–588. *METAPHYSICS.* Fall term only, 1950–1951. Professor BURTT. W 3–5, or hours to be arranged. Topic: Presuppositions, Their Epistemological and Metaphysical Status.

[590. *SEMINAR IN GREEK PHILOSOPHY.* Fall term. Professor VLASTOS. Not given in 1950–1951.]

[592. *SEMINAR IN MODERN PHILOSOPHY.* Spring term. Not given in 1950–1951.]

594. *SEMINAR IN PHILOSOPHICAL ANALYSIS.* Spring term. Assistant Professor MALCOLM. Th 3–5. Topic for 1950–1951: Memory.

[595. *SEMINAR IN SEMANTICS AND LOGIC.* Fall term. Professor BLACK. Not given in 1950–1951.]

039. *INFORMAL STUDY.* Professors BLACK, BURTT, MURPHY, VLASTOS.

049. *INFORMAL STUDY.* Assistant Professors BROWN and MALCOLM, Associate Professor SMART, Dr. DONEY.

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 special 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.

SOCIAL SCIENCE RESEARCH CENTER

The Center is an organization designed to encourage and facilitate research in all major fields of the social sciences. Its services and facilities are available for social science research by individual faculty members and graduate students in all schools and colleges of the University, as well as for use by organized staff groups. In addition to aids in the planning and development of studies and in voluntary co-operation of research efforts, the Center supplies technical, statistical, and clerical services by appropriate arrangement with the director and staff of specific projects. The two main objectives of the organization are to encourage basic research advances by means of technical and financial aids and to provide practical research training.

Projects currently sponsored or assisted by the Center deal with problems of interest to each social science discipline. A major theme of the present research program is the study of the impact of technology and economic change upon modern societies, both in the United States and in several foreign areas.

A number of opportunities for training through participation in studies sponsored by the Center are available to graduate students who qualify for research assistantships or special employment arrangements. Normally each Center study provides one or more opportunities of this kind. Arrangements for such research experience are made through the student's Special Committee in consultation with the directors of specific studies.

ECONOMICS

Professors G. P. ADAMS, JR., MORRIS A. COPELAND, M. G. DE CHAZEAU, J. G. B. HUTCHINS, A. E. KAHN, M. S. KENDRICK, R. E. MONTGOMERY, J. E. MORTON, P. M. O'LEARY, H. L. REED, E. P. REUBENS.

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
Industrial Organization, Control, and Finance 1, 2, 3, 4
International Economics 1, 2, 3, 4
Labor Economics 1, 2, 3, 4
Monetary Economics and Fiscal Policy 1, 2, 3, 4
Public Finance 1, 2, 3, 4
Economic Statistics 1, 2, 3, 4
Trade Fluctuations and the Determination of Output and Income 1, 2, 3, 4

1. All candidates for the Ph.D. in Economics will be required to demonstrate competence in at least three of the above fields of study in addition to their major and minor subjects. One of these subsidiary subjects must be Economic Theory and Its History unless that is elected as a major or minor subject.

2. All candidates for advanced degrees who elect a minor in Economics will be held for work in Economic Theory.

3. Candidates for advanced degrees in Economics may elect one minor subject from some field outside Economics, or may, with the approval of their special committees, substitute subsidiary fields outside Economics for one or two of those listed above.

4. Applications for fellowships and scholarships in Economics should be filed with the Dean of the Graduate School prior to March 1. Applications for teaching fellowships, however, should be made directly to the Chairman of the Department of Economics.

5. Courses and seminars. Courses in the School of Business and Public Administration, in addition to those listed below, may be taken with the approval of the Dean of the School. For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Economics. Preregistration is required for all of these.

275. *MONETARY AND BUSINESS CYCLE THEORY.* Throughout the year. Credit three hours a term. Professor REED. Hours to be arranged. Preregistration required.

BASIC ECONOMIC STATISTICS. (I.L.R. 103) Fall term. Credit three hours. Professor MORTON. Hours to be arranged. Preregistration required.

SEMINAR IN ECONOMIC STATISTICS. (I.L.R. 113) Spring term. Credit three hours. Professor MORTON. Hours to be arranged. Preregistration required.

375. *PUBLIC CONTROL OF BUSINESS.* Throughout the year. Credit three hours a term. Professor DE CHAZEAU. Hours to be arranged. Preregistration required.

475. *LABOR ECONOMICS.* Throughout the year. Credit three hours a term. Professor MONTGOMERY. Hours to be arranged. Preregistration required.

575. *PUBLIC FINANCE.* Spring term. Credit three hours. Professor KENDRICK. Hours to be arranged. Preregistration required.

675. *ECONOMIC HISTORY.* Thoughout the year. Credit three hours a term. Professor HUTCHINS. Hours to be arranged. Preregistration required.

775. *INTERNATIONAL ECONOMICS.* Throughout the year. Credit three hours a term. Assistant Professor KAHN. Hours to be arranged. Preregistration required.

975. *ECONOMIC THEORY.* Throughout the year. Credit three hours a term. Professor COPELAND. Hours to be arranged. Preregistration required.

980. *HISTORY OF ECONOMIC THOUGHT.* Throughout the year. Credit three hours a term. Associate Professor ADAMS. Hours to be arranged. Preregistration required.

GOVERNMENT

Professors HERBERT W. BRIGGS, ROBERT E. CUSHMAN, MARIO EINAUDI, ELIAS HUZAR, and CLINTON L. ROSSITER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

American Government and 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

Public Administration 1, 2, 3, 4

Students undertaking graduate work in Government should possess a familiarity with the elements of political science and American and European political institutions, as well as some knowledge of international relations and American and European history. It is recommended that candidates for the Ph.D. with a major in Government should take at least one minor outside the Department.

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 co-operate in directing the researches of students in their several fields and to serve as members of the Special Committees of such students.

AMERICAN GOVERNMENT AND INSTITUTIONS

213. *CONGRESS: ORGANIZATION AND METHODS OF WORK.* Fall term. Credit three hours. M W F 2. Associate Professor HUZAR.

216. *THE AMERICAN PRESIDENCY.* Spring term. Credit three hours. Prerequisite, Government 101. M W F 11. Associate Profesor ROSSITER.

218. *AMERICAN POLITICAL PARTIES.* Spring term. Credit three hours. Prerequisite, Government 101. M W F 8. Associate Professor ROSSITER.

231, 232. *PUBLIC ADMINISTRATION.* Throughout the year. Credit three hours a term. M W F 10. Associate Professor HUZAR.

235. *AMERICAN POLITICAL AND CONSTITUTIONAL THEORY.* Fall term. Credit three hours. Prerequisite, Government 101, or History 151–152. M W F 8. Associate Professor ROSSITER.

241. *CONSTITUTIONAL LAW: THE AMERICAN FEDERAL SYSTEM.* Fall term. Credit three hours. Prerequisite, Government 101, or the consent of the instructor. T Th S 11. Professor CUSHMAN.

242. *CONSTITUTIONAL LAW: FUNDAMENTAL RIGHTS AND IMMUNITIES.* Spring term. Credit three hours. Prerequisite, Government 101, or the consent of the instructor. T Th S 11. Professor CUSHMAN.

275–276. *SEMINAR IN CONSTITUTIONAL PROBLEMS.* Throughout the year. Credit two hours a term. Hours to be arranged. Professor CUSHMAN.

286. *SEMINAR IN PUBLIC ADMINISTRATION.* Spring term. Credit two hours. Hours to be arranged. Associate Professor HUZAR.

295–296. *SEMINAR IN AMERICAN POLITICAL THEORY AND INSTITUTIONS.* Throughout the year. Credit three hours a term. Open to graduate students and qualified seniors. Hours to be arranged. Associate Professor ROSSITER.

COMPARATIVE GOVERNMENT AND POLITICAL THEORY

[311. *CONSTITUTIONAL GOVERNMENT OF EUROPE.* Fall term. Credit three hours. T Th S 9. Professor EINAUDI. Not offered in 1950–1951.]

331. *PUBLIC CONTROL OF ECONOMIC LIFE.* Fall term. Credit three hours. T Th S 9. Professor EINAUDI.

321. *DEVELOPMENT OF MODERN POLITICAL THOUGHT.* Fall term. Credit three hours. T Th S 10. Professor EINAUDI.

322. *CONTEMPORARY POLITICAL THOUGHT.* Spring term. Credit three hours. T Th S 10. Professor EINAUDI.

375–376. *SEMINAR IN POLITICAL THEORY.* Throughout the year. Credit three hours a term. Hours to be arranged. Preregistration required. Professor EINAUDI.

[385–386. *SEMINAR IN COMPARATIVE CONSTITUTIONAL LAW.* Throughout the year. Credit three hours a term. Hours to be arranged. Preregistration required. Professor EINAUDI. Not offered in 1950–1951.]

INTERNATIONAL RELATIONS

411. *INTERNATIONAL POLITICS.* Fall term. Credit three hours. M W F 9. Professor BRIGGS.

414. *INTERNATIONAL ORGANIZATION.* Spring term. Credit three hours. M W F 9. Professor BRIGGS.

[417. *THE FAR EASTERN POLICY OF THE UNITED STATES.* Fall term. Credit three hours. M W F 9. Professor BRIGGS. Not offered in 1950–1951.]

441, 442. *INTERNATIONAL LAW.* Throughout the year. Credit three hours a term. M W F 12. Professor BRIGGS.

475–476. *SEMINAR IN INTERNATIONAL LAW AND INTERNATIONAL ORGANIZATION.* Throughout the year. Credit two hours a term. Hours to be arranged. Professor BRIGGS.

HISTORY

Professors KNIGHT BIGGERSTAFF, C. W. DE KIEWIET, E. W. FOX, P. W. GATES, H. E. GUERLAC, M. L. LAISTNER, F. G. MARCHAM, C. P. NETTELS, CARL STEPHENSON, and MARC SZEFTEL.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

American History 1, 2, 3, 4	History of Science 1, 2, 3, 4
Ancient History 1, 2, 3, 4	Medieval History 1, 2, 3, 4
Chinese History 1, 2, 3, 4	Modern European History 1, 2, 3, 4
English History 1, 2, 3, 4	Slavic History 1, 2, 3, 4

For graduate work in history a student should have a general knowledge of history, government, and other social studies. He should be able to speak and write good English; to read French, German, and any other foreign language required for work in his special field. For major work in Ancient History the student needs a reading knowledge of both Greek and Latin; for major work in Medieval History a reading knowledge of Latin; for major work in Chinese History a reading knowledge of Chinese; for major work in Slavic History a reading knowledge of Russian. Such linguistic training should preferably be obtained by the student during his undergraduate years, but deficiencies can be made up after admission to the Graduate School.

The University Library contains a number of special collections that are notably strong. Among these are the President White Library of European History

with its emphasis upon the French Revolution and science and warfare, the Eisenlohr collection on the history of Egypt, the Anthon collection on the Graeco-Roman world, the Fiske Collections on Dante, Petrarch, and Iceland, the Goldwin Smith collection on English history, and the Wason collection on China and the Chinese. The Collection of Regional History has brought together rich manuscript and newspaper materials for the study of American economic and social history. Mention should also be made of the libraries of the College of Agriculture and the Law School which include much additional material relating to American and English History.

There are several assistantships in History which are generally awarded to advanced graduate students. Competition for the Moses Coit Tyler prize for an outstanding original study in American history and literature is open to graduate students.

For undergraduate courses at the beginning level which may be useful to graduate students see *Announcement of the College of Arts and Sciences,* Department of History, courses 101–2, 103–4, 105–6, 107–8, 147–8, 151–2.

AMERICAN HISTORY

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

711. *AMERICAN COLONIAL HISTORY TO 1763.* Fall term. M W F 1. Professor NETTELS.

712. *THE AGE OF WASHINGTON. 1763–1800.* Spring term. M W F 1. Professor NETTELS.

[717. *AMERICAN BIOGRAPHY.* Fall term. M W F 1. Professors NETTELS. Not offered in 1950–1951.]

721–22. *AMERICAN HISTORY: HISTORY OF THE WEST.* Fall and spring term. M W F 12. Professor GATES.

[725–726. *RECENT AMERICAN HISTORY.* Throughout the year. M W F 12. Professor GATES. Not offered in 1950–1951.]

[728. *ECONOMIC HISTORY OF THE UNITED STATES.* Spring term. M W F 12. Professor GATES. Not offered in 1950–1951.]

775–776. *SEMINAR IN AMERICAN HISTORY.* One or two terms during the year. Hours to be arranged. Professor NETTELS.

781–782. *SEMINAR IN AMERICAN HISTORY.* Throughout the year. Hours to be arranged. Professor GATES.

ANCIENT HISTORY

Professor M. L. W. LAISTNER.

[211. *GREEK HISTORY, 500–323 B. C.* Fall term. M W F 11. Not offered in 1950–1951.]

212. *THE HELLENISTIC AGE.* Fall term. M W F 11.

213. *THE ROMAN REPUBLIC, 133–30 B.C.* Spring term. M W F 11.

[214. *THE ROMAN EMPIRE, 30 B.C.–180 A.D.* Spring term. M W F 11. Not offered in 1950–1951.]

275–6. *SEMINAR IN GREEK AND ROMAN HISTORIOGRAPHY.* Throughout the year. T 2–4.

[277–8. *SEMINAR IN ROMAN HISTORICAL INSCRIPTIONS.* Not offered in 1950–1951.]

CHINESE HISTORY

Professor KNIGHT BIGGERSTAFF.

161. *HISTORY OF CHINESE CIVILIZATION: TO 1842.* Fall term. M W F 12. Credit three hours.

162. *HISTORY OF CHINESE CIVILIZATION: SINCE 1842.* Spring term. M W F 12. Credit three hours.

811. *MODERNIZATION OF CHINA: 1842–1911.* Fall term. M 2–4. Credit two hours. Prerequisite, History 162 or consent of the instructor.

812. *MODERNIZATION OF CHINA: SINCE 1911.* Spring term. M 2–4. Credit two hours. Prerequisite, History 162 or consent of the instructor.

875–6. *SEMINAR IN MODERN CHINESE HISTORY.* Throughout the year. Hours to be arranged.

See related courses under FAR EASTERN STUDIES, page 47.

ENGLISH HISTORY

Professor F. G. MARCHAM.

[512. *ENGLISH CONSTITUTIONAL HISTORY SINCE 1485.* Spring term. T Th S 11. Not offered in 1950–1951.]

515. *HISTORY OF ENGLAND UNDER THE TUDORS.* Fall term. T Th S 11.

516. *HISTORY OF ENGLAND UNDER THE STUARTS.* Spring term. T Th S 11.

[517. *HISTORY OF ENGLAND IN THE NINETEENTH CENTURY.* Fall term. T Th S 11. Not offered in 1950–1951.]

[518. *HISTORY OF ENGLAND IN THE TWENTIETH CENTURY.* Fall term. T Th S 11. Not offered in 1950–1951.]

575–576. *SEMINAR IN TUDOR AND STUART HISTORY.* Fall and spring terms.

MEDIEVAL HISTORY

Professor CARL STEPHENSON.

[511. *ENGLISH CONSTITUTIONAL HISTORY TO 1485.* Fall term. M W F 2. Not offered in 1950–1951.]

309–310. *MEDIEVAL SOCIETY, LEARNING, AND EDUCATION.* Throughout the year. Hours to be arranged. Credit three hours a term.

375–6. *SEMINAR IN MEDIEVAL HISTORY.* Fall and spring terms. A reading knowledge of Latin is desirable. Hours to be arranged.

MODERN EUROPEAN HISTORY

Professors C. W. DE KIEWIET and E. W. FOX.

[411–412. *FRANCE IN THE SEVENTEENTH AND EIGHTEENTH CENTURIES.* Fall and spring terms. Professor DE KIEWIET. Not offered in 1950–1951.]

[421. *THE EUROPEAN REVOLUTION, 1789–1848.* Fall term. W F 2:00–3:30. Professor Fox. Not offered in 1950–1951.]

423. *MODERNIZATION OF EUROPE.* Fall term. M F 2:00–3:30. Professor Fox.

[424. *EVOLUTION OF THE FOURTH FRENCH REPUBLIC.* Spring term. W F 2:00–3:30. Professor Fox. Not offered in 1950–1951.]

[426. *ORIGINS OF THE THIRD REICH.* Spring term. W F 2:00–3:30. Professor Fox. Not offered in 1950–1951.]

427. *EUROPE IN THE TWENTIETH CENTURY.* Spring term. W F 2:00–3:30. Professor Fox.

481–2. *SEMINAR IN MODERN EUROPEAN HISTORY.* Hours to be arranged. Professor Fox.

[475–6. *SEMINAR IN MODERN EUROPEAN HISTORY.* Hours to be arranged. Professor DE KIEWIET. Not offered in 1950–1951.]

SLAVIC HISTORY

Professor MARC SZEFTEL.

[451. *HISTORY OF POLAND AND CZECHOSLOVAKIA.* Fall term. T Th 2–3:30. Not offered in 1950–1951.]

[452. *HISTORY OF YUGOSLAVIA AND BULGARIA.* Spring term. T Th 2–3:30. Not offered in 1950–1951.]

455–6. *INTELLECTUAL HISTORY OF MODERN RUSSIA.* Fall and spring terms. Credit three hours a term. Prerequisite, History 147–148, or consent of the instructor. T Th 2–3:30.

[457. *RUSSIAN HISTORIOGRAPHY.* Fall term. Credit three hours. Prerequisite, History 147–148, or consent of the instructor. T Th 2–3:30. Not offered in 1950–1951.]

[458. *KIEV RUSSIA AND MUSCOVY.* Spring term. Credit three hours. Prerequisite, History 147–148, or consent of the instructor. T Th 2–3:30. Not offered in 1950–1951.]

495–496. *SEMINAR IN RUSSIAN STUDIES.* Fall and spring terms. Credit and hours to be arranged. Prerequisite, consent of MR. SZEFTEL and other members of the Committee on Russian Studies.

HISTORY OF SCIENCE

Professor H. E. GUERLAC.

[911. *ORIGINS OF MODERN SCIENCE: PHYSICAL THOUGHT.* Fall term. Not offered in 1950–1951.]

913. *ORIGINS OF MODERN SCIENCE: BIOLOGICAL THOUGHT.* Fall term. T Th 2–4. Alternates with History 911.

916. *THE CENTURY OF THE ENLIGHTENMENT.* Spring term. M W F 9.

975–976. *SEMINAR IN THE HISTORY OF SCIENCE.* Throughout the year. Hours to be arranged.

SOCIOLOGY, RURAL SOCIOLOGY, AND ANTHROPOLOGY

Professors JOHN ADAIR, W. A. ANDERSON, M. L. BARRON, R. C. CLARK, L. S. COTTRELL, JR., J. P. DEAN, M. E. DUTHIE, LOUIS GUTTMAN, A. R. HOLMBERG, O. F. LARSON, A. H. LEIGHTON, J. W. MCCONNELL, M. E. OPLER, R. A. POLSON, W. W. REEDER, LAURISTON SHARP, LEO SIMMONS, A. SUCHMAN, H. E. THOMAS, W. F. WHYTE, R. M. WILLIAMS, JR.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Sociology 1, 2, 3, 4
Rural Sociology 1, 2, 3, 4
Cultural Anthropology 1, 2, 3, 4
Statistics 2, 3, 4

For graduate work in sociology or anthropology a student should have a general background in human biology, the social studies, and the humanities. He should also have some knowledge of the basic concepts and applications of social statistics, although deficiencies in this respect can be made up in the course of his work as a graduate student. For graduate work in rural sociology the student should have had, in addition, considerable personal experience with rural life and institutions.

It is recommended that candidates for advanced degrees in sociology, rural sociology, or anthropology should take at least one minor outside these fields.

There are several assistantships which are normally awarded to advanced graduate students. Applications should be made directly to the Department of Sociology and Anthropology or the Department of Rural Sociology.

These departments sponsor various social research programs and field projects in which graduate students may participate directly for purposes of training or research. One such large-scale current project is a community study in intergroup relations, involving an analysis of the factors affecting intergroup attitudes and behavior in a near-by industrial city, a community offering the graduate student a field laboratory for many different kinds of community research. Another is a combined program of instruction and research on the modernization of non-industrialized areas. In connection with this applied anthropology program, continuing field research projects have been initiated in the American Southwest, South America, India, and Southeast Asia to study the effects of the introduction of modern technology in underdeveloped regions. A wide range of studies is also being conducted as a research program under the Agricultural Experiment Station of Cornell University. Currently graduate students are working on experiment station projects in social participation of farm families, values in rural living, rural leadership, rural health, and two experiments in community development. These and other research programs are carried on under the auspices of the Cornell Social Science Research Center, which is described elsewhere in this *Announcement*. One of the functions of the Research Center is to train graduate students in research methods by permitting them to work on established, active research projects.

The requirements for the Ph.D. degree in the approved major and minor fields in sociology, rural sociology, and anthropology are listed below. The major requirements for the A.M. or M.S. degrees correspond generally to the minor requirements for the Ph.D. degree. (For Social Psychology, see PSYCHOLOGY.)

GENERAL SOCIOLOGY. When offered as a major: (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 subfields in sociology, such as cultural anthropology, social psychology, the family, educational sociology, rural sociology, urban sociology, social pathology, criminology, population, statistics.

When offered as a minor: a general knowledge of part (1) of the above requirement and a satisfactory knowledge of one or two subfields.

CULTURAL ANTHROPOLOGY. When offered as a major: (1) a thorough knowledge of the history of anthropology and of anthropological theory and method; (2) familiarity with the major culture areas of the world; (3) a detailed knowledge of the ethnology of at least one such area; (4) a grasp of the principles of linguistics, of physical anthropology, and familiarity with the most important findings of archaeology.

When offered as a minor: parts (1) and (2) of the above requirement.

RURAL SOCIOLOGY. When offered as a major: (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 three subfields in sociology, such as cultural anthropology, social psychology, the family, educational sociology, rural sociology, urban sociology, social pathology, criminology, population, statistics.

When offered as a minor: a general knowledge of parts (1) and (3) of the above requirement, and a satisfactory knowledge of one other subfield under part (4).

STATISTICS. When offered as a minor for the Ph.D. degree: (1) completion of an approved sequence of courses including Sociology 285–286; (2) completion of a research project which demonstrates that the candidate is able to select methods appropriate to the problems and to employ advanced statistical methods.

GENERAL SOCIOLOGY

The following courses are offered in the Department of Sociology and Anthropology unless otherwise noted.

201. *INTRODUCTION TO RESEARCH METHODS.* Fall term. Credit three hours. Assistant Professor SUCHMAN. M W F 10.

202. *ANALYSIS AND INTERPRETATION OF SOCIAL DATA.* Spring term. Credit three hours. Prerequisite, Statistics I or the equivalent. Assistant Professor SUCHMAN. M W F 10.

[275–276. *SEMINAR: RESEARCH METHODS IN SOCIOLOGY AND ANTHROPOLOGY.* Throughout the year. Credit two hours a term. Open to upperclass majors and graduate students in Sociology and Anthropology. Assistant Professor HOLMBERG and STAFF. W 4–6. Given in alternate years. Not given in 1950–1951.]

277. *SEMINAR: CURRENT RESEARCH PROJECTS.* Spring term. Credit two hours. Prerequisite, consent of instructor. Assistant Professor SUCHMAN and STAFF. W 4–6.

285–286. *SEMINAR: ADVANCED STATISTICAL METHODS.* Throughout the year. Credit two hours a term. Prerequisite, consent of instructor. Associate Professor GUTTMAN. Hours to be arranged.

301. *SOCIAL PSYCHOLOGY: INTER-PERSONAL BEHAVIOR.* Fall term. Credit three hours. Prerequisite, one course in Sociology and Anthropology and one course in Psychology. Mr. FOOTE. M W F 9.

302. *SOCIAL PSYCHOLOGY: GROUP DYNAMICS.* Spring term. Credit three hours. Prerequisite, one course in Sociology and Anthropology and one course in Psychology. Mr. FOOTE. M W F 9.

310. *THE FAMILY.* Spring term. Credit three hours. Mr. STREIB. M W F 8.

311. *PUBLIC OPINION.* Fall term. Credit three hours. Assistant Professor SUCHMAN. M W F 11.

[312. *MASS COMMUNICATION MEDIA.* Spring term. Credit three hours. Assistant Professor SUCHMAN. Given in alternate years. Not given in 1950–1951.]

314. *COLLECTIVE BEHAVIOR AND SOCIAL MOVEMENTS.* Spring term. Credit three hours. Mr. STREIB. T T S 11.

[320. *POLITICAL SOCIOLOGY.* Fall term. Credit three hours. Not given in 1950–1951.]

HUMAN RELATIONS IN INDUSTRY. (See Industrial and Labor Relations 44.)

PRINCIPLES OF HUMAN RELATIONS. (See Industrial and Labor Relations 67.)

375. *SEMINAR: SOCIAL PSYCHOLOGY.* Spring term. Credit two hours. Professor COTTRELL. W 2–4.

376. *SEMINAR: PRESSURE GROUPS AND PROPAGANDA.* Fall term. Credit two hours. Assistant Professor SUCHMAN. Th 2–4.

385. *SEMINAR: GROUP RELATIONS.* Spring term. Credit two hours. Professor WILLIAMS. T 2–4.

431. *STRUCTURE AND FUNCTIONING OF AMERICAN SOCIETY. I.* Fall term. Credit three hours. Prerequisite, Sociology and Anthropology 101 or equivalent. Professor WILLIAMS. T Th S 9.

432. *STRUCTURE AND FUNCTIONING OF AMERICAN SOCIETY. II.* Spring term. Credit three hours. Prerequisite, Sociology and Anthropology 101 or equivalent. Professor WILLIAMS. T Th S 9.

433. *AMERICAN ECONOMIC CLASSES.* Fall term. Credit three hours. Open to upperclassmen and graduate students. Mr. FOOTE. T Th S 8.

[477–478. *SEMINAR: THE URBAN COMMUNITY.* Throughout the year. Credit two hours a term. Prerequisite, consent of instructor. Assistant Professor DEAN. M 2–4. Not given in 1950–1951.]

[485. *SEMINAR: FOREIGN INTERPRETATIONS OF AMERICAN SOCIETY.* Fall term. Credit two hours. Prerequisite, consent of instructor. Assistant Professor BARRON. T 2–4. Not given in 1950–1951.]

510. *POPULATION PROBLEMS.* Fall term. Credit three hours. Assistant Professor BARRON. M W F 10.

520. *PROBLEMS IN MINORITY GROUP RELATIONS.* Spring term. Credit three hours. Prerequisite, Sociology and Anthropology 101 or the equivalent. Assistant Professor BARRON. T T S 10.

[530. *DELINQUENCY AND CRIME.* Fall term. Credit three hours. Assistant Professor BARRON. Given in alternate years. Not given in 1950–1951.]

550. *SOCIAL PLANNING.* Spring term. Credit three hours. Open to upperclassmen and graduate students. Mr. FOOTE. T T S 8.

[576. *SEMINAR: SOCIAL CHANGE AND SOCIAL PLANNING.* Spring term. Credit two hours. Not given in 1950–1951.]

585. *SEMINAR: PROBLEMS OF OLD AGE.* Fall term. Credit two hours. Prerequisite, consent of instructor. Assistant Professor BARRON. M 2–4.

SOCIOLOGICAL THEORY. (See Rural Sociology 207.)

SYSTEMATIC SOCIOLOGY. (See Rural Sociology 208.)

[875. *THEORY OF CULTURE AND SOCIAL ORGANIZATION.* Fall term. Credit three hours. Open to seniors and graduate students with the consent of the instructor. Professor WILLIAMS. T Th S 11. Given in alternate years. Not given in 1950–1951.]

020. *INFORMAL STUDY.* Throughout the year. Credit and hours to be arranged. Open to upperclass majors and graduate students in Sociology and Anthropology. Members of the DEPARTMENT STAFF.

CULTURAL ANTHROPOLOGY

The following courses are offered in the Department of Sociology and Anthropology unless otherwise noted.

603. *NATIVE CULTURES OF THE NEW WORLD: NORTH AMERICA.* Fall term. Credit three hours. Dr. ADAIR. M W F 2.

604. *NATIVE CULTURES OF THE NEW WORLD: MIDDLE AND SOUTH*

AMERICA. Spring term. Credit three hours. Assistant Professor HOLMBERG. M W F 2.

605. *NATIVE CULTURES OF THE PACIFIC*. Spring term. Credit two hours. Prerequisite, consent of instructor. Professor SHARP. Th 4–6.

PHYSICAL ANTHROPOLOGY AND HUMAN EVOLUTION. (See Zoology 222.)

611. *CULTURAL ANTHROPOLOGY*. Fall term. Credit three hours. Open to upperclassmen and graduate students. Professor SHARP. M W F 12.

612. *CULTURE AND PERSONALITY*. Spring term. Credit three hours. Open to upperclassmen and graduate students. Professor OPLER. M W F 12.

INTRODUCTION TO THE SCIENTIFIC STUDY OF LANGUAGE. (See Linguistics 201–202.)

620. *COMPARATIVE SOCIAL AND POLITICAL ORGANIZATION*. Spring term. Credit three hours. Professor SHARP. M W F 11.

622. *COMPARATIVE RELIGIOUS SYSTEMS OF NON-WESTERN PEOPLES*. Fall term. Credit three hours. Professor OPLER. M W F 11.

[624. *COMPARATIVE ECONOMIC SYSTEMS OF NON-WESTERN PEOPLES*. Spring term. Credit three hours. Assistant Professor HOLMBERG. Given in alternate years. Not given in 1950–1951.]

PRIMITIVE ART: THE ART OF EARLY SOCIETIES. (See Fine Arts 204.)

[626. *THE ARTS OF NON-LITERATE MAN*. Spring term. Credit three hours. Dr. ADAIR. Not given in 1950–1951.]

675. *SEMINAR: ANTHROPOLOGICAL THEORY*. Spring term. Credit two hours. Professor OPLER. Th 2–4.

677. *SEMINAR: RESEARCH IN CULTURE AND CULTURE CHANGE*. Fall term. Credit two hours. Prerequisite, consent of instructor. Professor LEIGHTON. T 10–12.

681. *SEMINAR: CONTEMPORARY CULTURE CHANGE IN MIDDLE AND SOUTH AMERICA*. Spring term. Credit two hours. Assistant Professor HOLMBERG. F 4–6.

683. *SEMINAR: CULTURES AND CULTURE CHANGE IN INDIA*. Fall term. Credit two hours. Professor OPLER. T 4–6.

685. *SEMINAR: CONTEMPORARY CULTURE CHANGE IN SOUTHEAST ASIA*. Fall term. Credit two hours. Professor SHARP. Th 4–6.

687. *SEMINAR: REGIONAL ANTHROPOLOGY*. Throughout the year. Credit to be arranged. Far East: Professors LEIGHTON, OPLER, and SHARP; Middle East: Professors OPLER and SHARP; North America: Dr. ADAIR, Professors LEIGHTON and OPLER; Middle and South America: Assistant Professor HOLMBERG; Oceania: Professor SHARP; Africa: Assistant Professor HOLMBERG and Professor SHARP.

689. *SEMINAR: SPECIAL PROBLEMS IN ANTHROPOLOGY*. Throughout the year. Credit to be arranged. STAFF.

690–691. *SEMINAR: CASE STUDIES IN APPLIED ANTHROPOLOGY*. Both terms or either term. Credit two hours. Prerequisite, consent of instructor. Professor SHARP and STAFF. M 7:30–9:30.

692. *SEMINAR: FIELD LABORATORY IN APPLIED ANTHROPOLOGY*. Term and credit to be arranged. Prerequisite, consent of instructors. Professor LEIGHTON and Dr. ADAIR.

RURAL SOCIOLOGY

For undergraduate courses which often meet needs of graduate students, see the

Announcement of the College of Agriculture, Department of Rural Sociology, courses 1, 12, 123, 124, 126, 128, 129, 130, 131. For course 123, preregistration is required.

The following courses are offered in the Department of Rural Sociology unless otherwise noted.

105. *ORGANIZATION METHODS.* Fall term. Credit three hours. Prerequisite course 1, 12, or permission of instructor. Assistant Professor REEDER. T Th S 11–12:30. Warren 340. Fee for materials, $1.00.

111. *RURAL COMMUNITY ORGANIZATION.* Spring term. Credit three hours. Prerequisite, course 1, 12, or permission of the instructor. Assistant Professor REEDER. T Th S 11–12:30. Warren 340. Fee for materials, $1.00.

132. *RURAL LEADERSHIP.* Spring term. Credit two hours. Prerequisite, permission of the instructor. Professor LARSON. Th 2–4. Warren 302.

[134. *RURAL SOCIAL PROBLEMS AND PUBLIC POLICY.* Fall term. Credit two hours. Open to seniors and graduate students. Prerequisite, permission of the instructor. Professor LARSON. T 2–4. Warren 302. Not given in 1950–1951.]

[135. *FARMERS' ORGANIZATIONS IN THE UNITED STATES.* Spring term. Credit three hours. Open to juniors, seniors, and graduate students. Professor ANDERSON and members of the STAFF. Not given in 1950–1951.]

207. *SOCIOLOGICAL THEORY.* Throughout the year. Credit three hours a term. Alternates with course 208. Open to seniors and graduate students. Prerequisite, permission of instructor. Professor ANDERSON. M W F 10.

[208. *SYSTEMATIC SOCIOLOGY.* Throughout the year. Credit three hours a term. Given in alternate years. Not offered in 1950–1951.]

211. *THE RURAL COMMUNITY.* Fall term. Credit two hours. Prerequisite, permission of instructor. Assistant Professor REEDER. W 2–4. Warren 302.

212. *RURAL SOCIOLOGY.* Throughout the year. Fall term. Credit three hours. T T S 8. Spring term. Credit two hours. T 2–4. Prerequisite, permission of the instructor or graduate standing. Professor LARSON. Warren 302.

217. *SEMINAR: THE HISTORY OF RESEARCH IN RURAL SOCIOLOGY.* Spring term. Credit three hours. Prerequisite, permission of the instructor. Professor ANDERSON. M W F 10. Warren 302.

218. *SEMINAR: APPLICATION OF SOCIOLOGY TO PROBLEMS OF RURAL SOCIETY.* Spring term. Credit two hours. Prerequisite, permission of a department staff member. M 2–4. Professor POLSON and members of the STAFF.

[219. *SEMINAR: COMMUNITY ORGANIZATION.* Spring term. Credit two hours. Given in alternate years. Not offered in 1950–1951.]

220. *SEMINAR: COMPARATIVE RURAL SOCIAL LIFE.* Fall term. Credit two hours. Open to seniors, special students, and graduate students. Professor ANDERSON. M 4:10–5:50. Warren 302.

[221. *SEMINAR: RURAL SOCIAL PARTICIPATION.* Fall term. Credit three hours. Prerequisite, permission of the instructor. Professor ANDERSON. Not given in 1950–1951.]

[240. *SEMINAR: PROBLEMS IN TEACHING SOCIOLOGY.* Spring term. Credit two hours. Prerequisite, permission of instructor. Assistant Professor REEDER and STAFF. W 2–4. Warren 302. Not given in 1950–1951.]

250. *INFORMAL STUDY IN RURAL SOCIOLOGY.* Throughout the year.

Credit one to three hours each term as arranged. Prerequisite, permission of department staff member concerned. STAFF.

251. *RESEARCH IN RURAL SOCIOLOGY.* Throughout the year. Hours and credit to be arranged. STAFF.

STATISTICS

Courses in statistics are given in various divisions of the University. Information on the following courses will be found in the listings of the appropriate department or school.

STATISTICS I (Industrial and Labor Relations). Either term. Credit three hours.

STATISTICS II (Industrial and Labor Relations). Spring term. Credit three hours. Prerequisite, Statistics I.

ELEMENTARY MATHEMATICAL STATISTICS (Department of Mathematics). Throughout the year. Credit three hours a term.

ADVANCED MATHEMATICAL STATISTICS (Department of Mathematics). Throughout the year. Credit three hours a term. Prerequisite, elementary mathematical statistics.

ELEMENTARY PROBABILITY (Department of Mathematics). Throughout the year. Credit three hours a term.

ADVANCED PROBABILITY (Department of Mathematics). Throughout the year. Credit three hours a term.

DESIGN OF SAMPLE SURVEYS (Industrial and Labor Relations). Fall term. Credit three hours. Prerequisite, one term of statistics.

STATISTICAL TABULATION AND COMPUTING (Industrial and Labor Relations). Spring term. Credit three hours.

SEMINAR IN ADVANCED STATISTICAL METHODS (Department of Sociology and Anthropology). Throughout the year. Credit two hours a term.

SEMINAR ON SOCIAL AND ECONOMIC STATISTICS (Industrial and Labor Relations). Spring term. Credit three hours.

Special attention is called to the following courses in other departments:

Agricultural Economics 102, 126, 135, 181, 207, 236.
Architecture 700, 710, 711, 713, 719.
Child Development and Family Relationships 305, 360, 370, 373, 415, 460.
Classics 401.
Education 607, 618, 675, 680, R E 211
Far Eastern Studies 951–952
Government 218, 231–232, 235, 241–242, 275–276, 321, 322, 375–376, 414
History 721–722, 726, 811, 812
Linguistics 203–204, 215
Mathematics 721, 722, 723
Philosophy 301–302, 313, 321, 324, 325–326, 424, 485, 581–582, 585–586
Plant Breeding 1, 101
Psychology 250, 303, 309, 401, 580

ANIMAL SCIENCES

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 certain fields there are a limited number of temporary fellowships for special work as well as the University fellowships listed on pages 37–41 of this *Announcement.*

ANIMAL BREEDING AND PHYSIOLOGY

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Animal Breeding 1, 2, 3, 4

Animal Genetics 1, 2, 3, 4

Before entering graduate study in the field of Animal Breeding the student should have had courses in zoology, general biology, comparative anatomy, physiology, and chemistry, and elementary courses in genetics and animal breeding. Some practical experience in animal husbandry, poultry husbandry, or plant breeding is desirable.

In the course of their graduate study, students will be expected to take certain courses in animal physiology, biochemistry, embryology, cytology, genetics, biometry, and histology. One or more of these may be selected as a minor subject.

Graduate studies in animal breeding may be taken in several departments of the University, and the student should consult the course offerings under each of these departments.

Graduate work in genetics and breeding of large animals, including physiology of reproduction, is offered in the Department of Animal Husbandry. This work is supervised by Professors ASDELL, BRATTON, HANSEL, and HENDERSON.

Graduate study in animal genetics is offered in the Department of Poultry Husbandry, where work in that field is supervised by Professors HUTT, COLE, BRUCKNER, and HALL.

Courses in genetics and biological statistics are given in the Department of Plant Breeding by Professors SRB, SMITH, ATWOOD, CUSHING, FEDERER, and LIVERMORE.

ANIMAL NUTRITION

Dairy Building: *Professors* L. L. BARNES, G. F. HEUSER, F. W. HILL, J. K. LOOSLI, L. A. MAYNARD, C. M. MCCAY, F. B. MORRISON, L. C. NORRIS, M. L. SCOTT, and S. E. SMITH.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Animal Nutrition 1, 2, 3, 4

(See also Food and Nutrition under HOME ECONOMICS, pp. 160–162)

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 ANIMAL NUTRITION.* Fall term. Credit 3 hours. Prerequisites, a course in physiology and in organic chemistry or biochemistry. Professor LOOSLI. Lectures, M W F 10.

A.H. 111. *LABORATORY IN ANIMAL NUTRITION.* Fall term. Credit 3 hours. Prerequisite, Quantitative Analysis. Professor MCCAY. M W F 2–4. Stocking 160. Preregistration required.

A.H. 115. *ADVANCED LIVESTOCK FEEDING AND APPLIED ANIMAL NUTRITION.* Spring term. See ANIMAL HUSBANDRY.

P.H. 210. *EXPERIMENTAL METHODS IN POULTRY NUTRITION.* Spring term. Credit two hours. Registration by permission. Professor NORRIS. Discussion and laboratory period, hours to be arranged.

A.H. 210. *SPECIAL TOPICS IN ANIMAL NUTRITION.* Spring term. Credit one hour. Registration by permission. Professors LOOSLI, MAYNARD, and MCCAY. T 8.

A.H. 215. *HISTORY OF NUTRITION.* Fall term. Credit one hour. Professor MCCAY. Th 4:15.

219. *SEMINAR IN ANIMAL NUTRITION.* Fall term. Credit one hour. Registration by permission. Professors MAYNARD, MCCAY, NORRIS, and LOOSLI. Weekly conferences, M 4:30. Savage 130.

BIOCHEMISTRY

Savage Hall: *Professors* SUMNER, WILLIAMS, NEAL, NELSON, RAMSTAD, DANIEL, MAYNARD, ELLIS, and SOMERS.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Biochemistry 1, 2, 4

See also Food Science and Technology for graduate research in biochemistry as applied to food problems, pp. 181–182.

101. *GENERAL BIOCHEMISTRY.* Lecture. Fall term. Credit four hours. Prerequisites, Chemistry 215 or the equivalent; and 303 and 305, or the equivalent. Lectures, M W F S 11. Savage Hall 100. Professor WILLIAMS.

102. *GENERAL BIOCHEMISTRY.* Laboratory. Fall term. Credit two hours. Prerequisite or parallel, Biochemistry 101. Laboratory, M W or T Th 2–4.20. Savage Hall 230. Professor WILLIAMS and assistants.

130. *PRINCIPLES OF FOOD PRESERVATION.* Spring term. Credit two hours. Prerequisite, Organic Chemistry. Lectures, T Th 10. Savage Hall 145. Associate Professor RAMSTAD.

140. *SELECTED TOPICS IN FOOD BIOCHEMISTRY.* Spring term. Credit two hours. Prerequisite, Biochemistry 101. Lectures, M W 10. Savage Hall 145. Associate Professor RAMSTAD.

201. *BIOCHEMISTRY OF LIPIDS AND CARBOHYDRATES.* Spring term. Credit two hours. Prerequisite, Physical Chemistry 405 and 406, and Biochemistry 101 and 102, or the equivalent. Lectures, M W 9. Savage Hall 100. Professor SUMNER and Associate Professor NELSON.

202. *BIOCHEMISTRY OF PROTEINS AND ENZYMES.* Spring term. Credit two hours. Prerequisite, Physical Chemistry 405 and 406, and Biochemistry 101 and 102, or the equivalent. Lectures, T Th 9. Savage Hall 100. Professor SUMNER.

203. *ADVANCED BIOCHEMISTRY. Laboratory.* Spring term. Credit three hours. Prerequisite, to accompany or follow Biochemistry 201 and 202. M W 2–5. Savage Hall 230. Registration by permission only. Professor SUMNER and Assistant Professor NELSON.

[210. *PLANT BIOCHEMISTRY.* Spring term. Credit two hours. Prerequisite, Biochemistry 101 and 102 or the equivalent. Associate Professor NEAL. Not given in 1950–1951.]

215. *BIOCHEMISTRY SEMINAR.* Fall term. Credit one hour. Registration by permission. M 4:15. Savage Hall 130. Professor SUMNER.

220. *SPECIAL TOPICS IN NUTRITION.* Spring term. Credit one hour. T 8. Savage Hall 145. Prerequisite, a course in Biochemistry and a course in Nutrition. Registration by permission. Professor MAYNARD.

225. *FOOD BIOCHEMISTRY SEMINAR.* Fall term. Credit one hour. Registration by permission. T 4:30. Savage 145. Associate Professor RAMSTAD.

CONSERVATION

Fernow Hall; *Professors* A. A. ALLEN, J. C. AYRES, D. C. CHANDLER, W. R. EADIE, C. H. GUISE, W. J. HAMILTON, JR., O. H. HEWITT, P. P. KELLOGG, R. R. MORROW, E. L. PALMER, A. M. PHILLIPS, E. C. RANEY, G. A. SWANSON, and D. A. WEBSTER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Fishery Biology 1, 2, 3, 4
Forest Conservation 2, 4
Herpetology 1, 2, 3, 4
Ichthyology 1, 2, 3, 4
Mammalogy 1, 2, 3, 4
Oceanography 1, 2, 3, 4
Ornithology 1, 2, 3, 4
Vertebrate Taxonomy and Ecology 3, 4
Wildlife Management 1, 2, 3, 4

To undertake graduate study the student should be well prepared in general and vertebrate zoology and should have or must acquire a foundation in the specialized field of study which he intends to pursue. A strong background in the other natural and physical sciences is highly desirable, and a working knowledge of statistical methods is important in all fields. Staff members are available to direct graduate study during the regular University summer session, and selected summer courses are offered.

Attention is also directed to the fields of study and courses offered in the Departments of Botany, Zoology, Entomology, and Limnology. Graduate study in Conservation Education is directed by Dr. Palmer in the School of Education under Nature Study and Science Education.

For undergraduate courses which often meet needs of graduate students, see announcements of the *College of Agriculture,* Department of Conservation, courses 1, 2, 3, 4, 8, 9; Department of Entomology and Limnology, courses 12 and 16; Department of Botany, courses 55 and 56; and the *Announcement of the College of Arts and Sciences,* Department of Zoology, courses 101–102, 103–104, 211–212. Preregistration is required for all.

FISHERY BIOLOGY

Fernow Hall; *Associate Professors* D. A. WEBSTER and A. M. PHILLIPS.

173. *FISHERY BIOLOGY.* Fall term. Credit three hours. Prerequisite, consent of instructor. Associate Professor WEBSTER. Lectures, M W F 12. Fernow 122.

174. *FISH CULTURE.* Spring term. Credit two hours. Prerequisite, consent of instructor. Associate Professor PHILLIPS. Lecture, M 12, laboratory, M 2–4:30.

175. *FISHERY BIOLOGY LABORATORY.* Spring term. Credit two hours. Prerequisite, Conservation 173. Limited to graduate majors and minors and qualified seniors. Associate Professor WEBSTER. Hours to be arranged. Fernow 102.

179. *SEMINAR IN FISHERY BIOLOGY.* Fall and spring terms. Without credit. Registration by permission of instructor. Time and place to be arranged. Associate Professors WEBSTER and PHILLIPS.

FORESTRY

Fernow Hall; *Professors* C. H. GUISE and R. R. MORROW.

Graduate students, candidates for the degrees Master of Science or Doctor of Philosophy, may elect to do work of nonprofessional character in forest conservation.

OCEANOGRAPHY

Fernow Hall: *Professor* J. C. AYERS.

Students planning to work in this field should be well grounded in biology and chemistry. Major or minor work for the Ph.D. degree and major work for the Master's degree require marine experience. Arrangements can be made to provide this experience for properly qualified students.

180. *OCEANOGRAPHY.* Fall term. Credit three hours. Prerequisites, general zoology, botany, chemistry, and physics or equivalents. Assistant Professor AYERS. Lectures, T Th 10; laboratory, Th 12. 122 Fernow.

181. *MARINE ECOLOGY.* Spring term. Credit three hours. Prerequisites, general zoology, chemistry, and physics, plus either invertebrate zoology or limnology. Assistant Professor AYERS. Lectures, M W F 9. 122 Fernow.

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 and laboratory, T Th 2–5. Fernow 210. Preregistration required.

131. *TECHNIQUES IN ORNITHOLOGY.* Fall term. Credit three hours. Prerequisite, courses 8 and 9, Botany 1, and Entomology 12, or consent of instructor. Associate Professor KELLOGG. Lecture and laboratory, M W 2–5. Fernow 210.

133. *BIRD SPECIATION AND MUSEUM METHODS IN ORNITHOLOGY.* Fall term. Credit three hours. Limited to graduate students. Professor ALLEN and Mr. PARKES. Lecture and laboratory, S 8–1. Fernow 308. Preregistration required. Prerequisite, courses 8, 9, 126, and 131, or permission to register.

136. *ORNITHOLOGY SEMINAR.* Throughout the year. M 7:30–9. p.m. Fernow 122. Required of all graduate students in Ornithology.

VERTEBRATE TAXONOMY AND ECOLOGY

Fernow Hall: *Professors* W. J. HAMILTON, JR., W. R. EADIE, and E. C. RANEY.

22. *ICHTHYOLOGY.* Spring term. Credit three hours. Prerequisite, Conservation 8 or consent of instructor. Associate Professor RANEY. Lectures, T Th 8. Fernow 122. Laboratory, F 2–4:30. Fernow 14. Preregistration required.

[23. *HERPETOLOGY.* Spring term. Credit three hours. Professor HAMILTON and Associate Professor RANEY. Not given in 1950–1951.]

25. *MAMMALOGY.* Fall term. Credit three hours. Prerequisite, Conservation 8 or consent of instructor. Professor HAMILTON. Lectures, T Th 8. Fernow 122. Laboratory, F 2–4:30. Fernow 14. Preregistration required.

67. *SEMINAR IN SYSTEMATIC VERTEBRATE ZOOLOGY.* Fall term without credit. Professor HAMILTON, Associate Professor RANEY, and Associate Professor EADIE. W 12 m. Fernow 122. Limited to graduate students and upperclass zoology majors. Registration by permission of instructor.

112. *LITERATURE OF ECONOMIC ZOOLOGY, CONSERVATION, AND ECOLOGY.* Spring term. Credit one hour. Professor HAMILTON, and Associate Professors EADIE and RANEY. W 9 a.m. Fernow 122. Limited to upperclass students and graduates.

122. *ADVANCED ICHTHYOLOGY.* Fall term. Credit one or two hours. Prerequisites, Conservation 8, 22, Elementary Statistics, permission of instructor. Limited to graduate students. Associate Professor RANEY. Hours to be arranged. Fernow 14.

WILDLIFE MANAGEMENT

Fernow Hall: *Professor* SWANSON, *Associate Professor* EADIE, and *Assistant Professor* HEWITT.

102. *PRINCIPLES OF WILDLIFE MANAGEMENT.* Fall term. Credit three hours. Prerequisite, consent of instructor. Assistant Professor HEWITT. Lectures, M W F 10 and two field trips to be arranged. Fernow 122.

103. *WILDLIFE MANAGEMENT METHODS.* Spring term. Credit three hours. Prerequisite, consent of instructor. Assistant Professor HEWITT. Lecture, F 11, laboratory, S 8–1. Several all-day field trips. Fernow 212.

110. *ECONOMIC ZOOLOGY.* Fall term. Credit one hour. Prerequisite, consent of instructor. Associate Professor EADIE. F 8. Fernow 122.

111. *SEMINAR IN WILDLIFE MANAGEMENT.* Fall and spring terms. Without credit. Time and place to be arranged.

CONSERVATION, ALL BRANCHES

400–407. *RESEARCH PROBLEMS.* Either term. Credit and hours to be arranged. Problems may be undertaken in any of the fields of study in the department, but adequate preparation in the specialized field and consent of the instructor are prerequisites. Fernow Hall.

400. *FISHERY BIOLOGY.* Associate Professors WEBSTER and PHILLIPS.

401. *HERPETOLOGY.* Professor HAMILTON and Associate Professor RANEY.

402. *ICHTHYOLOGY.* Associate Professor RANEY.

403. *MAMMALOGY.* Professor HAMILTON.

404. *ORNITHOLOGY.* Professor ALLEN, Associate Professor KELLOGG.

405. *WILDLIFE MANAGEMENT.* Professor SWANSON, Associate Professor EADIE, Assistant Professor HEWITT.

406. *FORESTRY.* Professor GUISE, Assistant Professor MORROW.

407. *OCEANOGRAPHY.* Assistant Professor AYERS.

410. *CONSERVATION SEMINAR.* Fall and spring terms. Without credit. STAFF. Time and place to be arranged.

ENTOMOLOGY AND LIMNOLOGY

Comstock Hall: *Professors* W. E. BLAUVELT, J. C. BRADLEY, J. L. BRANN, F. H. BUTT, D. C. CHANDLER, W. L. COGGSHALL, J. E. DEWEY, HENRY DIETRICH, E. J. DYCE, W. T. M. FORBES, G. G. GYRISCO, J. D. HOOD, H. C. HUCKETT, A. A. LAPLANT, R. W. LEIBY, J. G. MATTHYSSE, L. B. NORTON, C. E. PALM, V. S. L. PATE, R. L. PATTON, W. A. RAWLINS, H. H. SCHWARDT, B. V. TRAVIS, L. D. UHLER, and T. C. WATKINS.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Apiculture 1, 2, 3, 4
Insect Ecology 1, 2, 3, 4
Economic Entomology 1, 2, 3, 4
Insect Embryology 1, 2, 3, 4
Insect Morphology and Histology 1, 2, 3, 4
Insect Taxonomy 1, 2, 3, 4
Insect Physiology 1, 2, 3, 4
Insect Toxicology 1, 2, 3, 4
Insecticide Chemistry 1, 2, 3, 4
Medical Entomology 1, 2, 3, 4
Parasitology 1, 2, 3, 4
Limnology 1, 2, 3, 4
Entomology 4

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 the subject which he intends to pursue; he should also 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.

For undergraduate courses which often meet the needs of graduate students

see *Announcement of the College of Agriculture,* Department of Entomology and Limnology, courses 12, 31, 32, 41, 61.

[16. *INSECT ECOLOGY.* Fall term. Credit three hours. Prerequisites, a course in general biology or zoology, and Entomology 12. Professor PALM. Lectures, T Th 9. Comstock 145. Laboratory and field work, Th 2–4:30. Not given in 1950–1951.]

30. *TAXONOMY OF INSECTS.* Spring term. Credit three hours. Prerequisite, Entomology 12. Assistant Professor PATE. Lecture, T 10. Laboratory, M W 2–4:30. Comstock 300. Preregistration desirable.

[51. *PARASITOLOGY.* Spring term. Credit three hours. Given in alternate years. Prerequisite, Biology 1, or Zoology 102 or 104. Professor TRAVIS. Lecture, Th 10. Comstock 245. Laboratory, Th or F 2–4:30, and S 8–10:30 or 10:30–1. Not given in 1950–1951.]

52. *MEDICAL ENTOMOLOGY.* Spring term. Credit three hours. Given in alternate years. Prerequisite, Entomology 12. Professor TRAVIS. Lecture, Th 10. Comstock 245. Laboratory, Th or F 2–4:30, and S 8–10:30 or 10:30–1. Comstock 200. Preregistration required.

118. *THE TECHNICS OF BIOLOGICAL LITERATURE.* Fall term. Credit two or three hours. Professor BRADLEY. Lectures, W F 11, and library work by assignment. Comstock 300.

122. *INSECT MORPHOLOGY, ANATOMY, AND HISTOLOGY.* Throughout the year. Credit three hours a term. Prerequisite, Entomology 12. Associate Professor BUTT. Lecture, T 11. Comstock 145. Laboratory, M W 2–4:30. Comstock 270. Preregistration required.

[123. *INSECT EMBRYOLOGY AND POSTEMBRYONIC DEVELOPMENT.* Spring term. Credit two hours. Prerequisites, Entomology 12 and 122. Associate Professor BUTT. Lecture and laboratory: hours by appointment. Comstock 270. Not given in 1950–1951.]

124. *INSECT HISTOLOGY. TECHNIQUE.* Fall or spring term. Credit two hours. Prerequisites, Entomology 12 and 122. Associate Professor BUTT. Two laboratory periods a week by appointment. Comstock 270. Preregistration required.

131. *THE PHYLOGENY AND CLASSIFICATION OF INSECTS.* Fall term. Credit four hours. Prerequisites, Entomology 30 and 31, and 122 should precede or accompany. Professor BRADLEY and Assistant Professor PATE. Lectures, W F 10. Laboratory, T Th 2–4:30. Comstock 300. Preregistration desirable.

[133. *TAXONOMY OF THE HOLOMETABOLA: DIPTERA AND COLEOPTERA.* Spring term. Credit three hours. Given in alternate years. A continuation of Entomology 131. Professor BRADLEY and Assistant Professor PATE. Not given in 1950–1951.]

134. *TAXONOMY OF THE HOLOMETABOLA: LEPIDOPTERA AND HYMENOPTERA.* Spring term. Credit three hours. Given in alternate years. Prerequisite, Entomology 30 and 122; may be preceded by 131. Associate Professor FORBES, Professor BRADLEY, and Assistant Professor PATE. Lecture, F 10. Laboratory, T Th 2–4:30. Comstock 300. Preregistration desirable.

171. *LIMNOLOGY.* Spring term. Prerequisites, nine hours of biological science and a course in general physics and general chemistry. Associate Professor CHANDLER. Lecture, Th 11. Comstock 145. Laboratory and field trips, F 2–4:30 and S morning by arrangement. Preregistration required.

172. *ADVANCED LIMNOLOGY.* Fall term. Prerequisites, Entomology 171 and permission to register. Associate Professor CHANDLER. Lecture, Th 11. Comstock 145. Laboratory and field trips, F 2–4:30 and S morning by arrangement. Preregistration required.

[185. *INSECT PHYSIOLOGY.* Fall term. Credit five hours. Given in alternate years. Prerequisites, Entomology 122, Chemistry 106, and Physics 104. Associate Professor PATTON. Lectures, M W F 9. Comstock 145. Laboratory, M W 2–4:30. Comstock 265. Not given in 1950–1951.]

195. *CHEMISTRY AND TOXICOLOGY OF INSECTICIDES.* Fall term. Credit five hours. Given in alternate years. Prerequisites, general chemistry and organic chemistry. Associate Professors DEWEY and NORTON. Lectures, M W F 9. Laboratory, M W 2–4:30, or by arrangement. Preregistration desirable.

241. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY.* Fall term. Credit three hours. Given in alternate years. Prerequisite, Entomology 41. Professor SCHWARDT. Lectures, M W F 11. Comstock 145.

242. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY.* Spring term. Credit three hours. Given in alternate years. Prerequisite, Entomology 41. Assistant Professor GYRISCO and Associate Professors BRANN and DEWEY. Lectures, M W F 9. Comstock 145.

[243. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY.* Fall term. Credit three hours. Given in alternate years. Prerequisite, Entomology 41. Professors BLAUVELT and RAWLINS. Not given in 1950–1951.]

[244. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY.* Spring term. Credit three hours. Given in alternate years. Associate Professors MATTHYSSE and WATKINS. Not given in 1950–1951.]

261. *ADVANCED BEEKEEPING.* Throughout the year. Credit three hours a term. Given in alternate years. Prerequisites, Entomology 12 and 61 and previous beekeeping experience. Professor DYCE and Assistant Professor COGGSHALL. Lectures and laboratory, T Th 2–4:30. Comstock 17. Preregistration required.

[262. *SPECIAL TOPICS IN BEEKEEPING.* Throughout the year. Credit three hours a term. Given in alternate years. Registration by permission only. Professor DYCE and Assistant Professor COGGSHALL. Not given in 1950–1951.]

RESEARCH

300–309. *RESEARCH.* Throughout the year. Prerequisite, permission to register from the professor under whom the work is taken. Comstock Hall.

300. *INSECT ECOLOGY.* Professor PALM.

301. *INSECT MORPHOLOGY, HISTOLOGY, AND EMBRYOLOGY.* Associate Professor BUTT.

302. *INSECT TAXONOMY. All orders:* Professor BRADLEY or Assistant Professor PATE. *Lepidoptera:* Associate Professor FORBES. *Thysanoptera:* Professor HOOD.

303. *ECONOMIC ENTOMOLOGY.* Professors BLAUVELT, LEIBY, PALM, RAWLINS, and SCHWARDT; Associate Professors BRANN, DEWEY, MATTHYSSE, and WATKINS; and Assistant Professors GYRISCO and LAPLANTE. At Geneva: Professor CHAPMAN and others: see page 182 for further details.

304. *MEDICAL ENTOMOLOGY AND PARASITOLOGY.* Professor TRAVIS.

305. *APICULTURE.* Professor DYCE and Assistant Professor COGGSHALL.

306. *LIMNOLOGY.* Associate Professor CHANDLER.

307. *INSECT PHYSIOLOGY.* Associate Professor PATTON.

308. *INSECT TOXICOLOGY.* Associate Professor DEWEY.

309. *INSECTICIDAL CHEMISTRY.* Associate Professor 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. For further information see page 182.

SEMINAR

JUGATAE. Fall and spring terms. M 4:30–5:30. Comstock 245.

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.

GENERAL BIOLOGY

Roberts Hall; *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.

5. *LABORATORY METHODS IN BIOLOGY.* Fall term. Credit two or three hours. Prerequisite, Biology 1, Zoology 1, or Botany 1 and permission to register. Lecture and laboratory, T or F 10–12:30, and one or more periods by appointment. Roberts 302. Assistant Professor UHLER.

7. *GENERAL BIOLOGY.* Throughout the year. Prerequisite, at least twelve hours in animal or plant sciences. Professor HOOD. One conference period a week and a minimum of twelve hours in animal or plant sciences to be arranged. For students whose major field is outside animal or plant sciences.

9. *BIOLOGICAL BASIS OF SOCIAL PROBLEMS.* Spring term. Credit three hours. Lectures T 9, Th 2. Roberts 392. Lecture demonstration, Th 8–10. Roberts 301. Assistant Professor UHLER. For students in the College of Home Economics who intend to enter the field of nursery-school teaching, though open to other interested students as well.

310. *RESEARCH PROBLEMS.* Credit and hours to be arranged.

PSYCHOLOGY

Morrill Hall: *Professors* U. BRONFENBRENNER, R. H. DALTON, F. S. FREEMAN, J. J. GIBSON, H. S. LIDDELL, R. B. MACLEOD, F. L. MARCUSE, T. A. RYAN, P. C. SMITH, A. L. WINSOR; *Doctors* J. V. HARALSON, J. E. HOCHBERG.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Abnormal Psychology 3, 4
Comparative Psychology 1, 2, 3, 4
Differential Psychology and Psychological Tests 1, 2, 3, 4
Experimental Psychology 1, 2, 3, 4
General Psychology 2, 4
History of Psychology and Systematic Psychology 1, 2, 3, 4
Industrial Psychology 1, 2, 3, 4
Personality and Social Psychology 1, 2, 3, 4
Psychobiology 1, 2, 3, 4

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.

At the Cornell Behavior Farm, a farm of 100 acres near Ithaca, laboratories are equipped for investigations in neuroendocrinology, the conditioned reflex, the experimental neurosis, and other fields of behavior research.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Psychology, courses 207, 216, 221, 224, 321, 324, 331, 332, 336, 351, 352.

For other related courses, see the *Announcement of the College of Arts and Sciences,* Department of Sociology and Anthropology; the *Announcement of the College of Home Economics,* Department of Child Development and Family Relationships; the *Announcement of the School of Education;* and the *Announcement of the School of Industrial and Labor Relations.*

The following advanced undergraduate courses are open to graduate students.

375. *STATISTICAL METHODS IN PSYCHOLOGY.* Fall term. Credit three hours. Prerequisites, Psychology 101 and Statistics ILR 40. Mr. RYAN.

401. *PSYCHOSOMATIC PROBLEMS.* Fall term. Credit three hours. Prerequisite, consent of the instructor. Mr. MARCUSE.

405. *PSYCHOPATHOLOGY.* Fall term. Credit three hours. Prerequisite, nine hours of psychology. Mr. LIDDELL.

410. *INDIVIDUAL DIFFERENCES.* Spring term. Credit three hours. Prerequisite, Psychology 351. Mr. FREEMAN.

411. *PROCEDURES IN CLINICAL CHILD GUIDANCE.* Fall term. Credit three hours. Prerequisite, Psychology 351. Mr. FREEMAN.

421. *COMPARATIVE PSYCHOLOGY.* Fall term. Credit three hours. Prerequisites, Psychology 101 and 112, and consent of the instructor.

423. *PSYCHOPHYSIOLOGY.* Fall term. Credit three hours. Prerequisites, Psychology 101 and 112. Mr. HARALSON.

426. *CONDITIONING AND BEHAVIOR.* Spring term. Credit three hours. Prerequisites, Psychology 208, 212, or consent of instructor. Mr. LIDDELL.

[432. *PSYCHOLOGY OF LANGUAGE AND THINKING.* Spring term. Credit three hours. Prerequisites, Psychology 101 and 112. Mr. MACLEOD. Not given in 1950–1951.]

455. *ADVANCED INDUSTRIAL PSYCHOLOGY.* Fall term. Credit two hours. Prerequisites, Psychology 331 and 332. Mrs. SMITH.

456. *RESEARCH METHODS IN INDUSTRIAL PSYCHOLOGY.* Spring term. Credit three hours. Prerequisites, Psychology 331 and 332 and consent of instructor. Mrs. SMITH.

476. *TECHNIQUE OF EXPERIMENTATION.* Fall term. Credit three hours. Prerequisite, consent of instructor. Mr. HOCHBERG.

485. *CONTEMPORARY PSYCHOLOGICAL THEORY.* Fall term. Credit three hours. Prerequisites, Psychology 101, 112, and three additional hours of psychology.

499. *MINOR RESEARCH PROBLEMS.* Either term. Credit three hours. Prerequisite, consent of instructor. The STAFF.

GRADUATE SEMINARS

Approximately five seminars are offered each term, the selection to be determined by the needs of the students.

511. *PERCEPTION.* Either term. Credit three hours.

513. *LEARNING.* Either term. Credit three hours.

515. *MOTIVATION.* Either term. Credit three hours.

517. *THINKING.* Either term. Credit three hours.

521. *PSYCHOBIOLOGY.* Either term. Credit three hours.

523. *PSYCHOPHYSIOLOGY.* Either term. Credit three hours.

531. *HISTORY OF PSYCHOLOGY.* Either term. Credit three hours.

541. *STATISTICAL METHODS.* Either term. Credit three hours.

543. *CLINICAL METHODS.* Either term. Credit three hours.

545. *METHODS OF SOCIAL ANALYSIS.* Either term. Credit three hours.

547. *METHODS OF CHILD STUDY.* Either term. Credit three hours.

562. *HUMAN DEVELOPMENT AND BEHAVIOR.* Spring term. Credit three hours.

571. *SOCIAL PSYCHOLOGY.* Either term. Credit three hours.

573. *PERSONALITY, NORMAL AND ABNORMAL.* Either term. Credit three hours.

581. *INDUSTRIAL PSYCHOLOGY.* Either term. Credit three hours.

591. *EDUCATIONAL PSYCHOLOGY.* Either term. Credit three hours.

600. *THE TEACHING OF PSYCHOLOGY.* Spring term. Credit three hours.

ZOOLOGY

Professors H. B. ADELMANN, L. C. COLE, P. W. GILBERT, D. R. GRIFFIN, S. L. LEONARD, J. W. PAPEZ, W. A. WIMSATT, and B. P. YOUNG.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Comparative Anatomy 1, 2, 3, 4
Comparative and General Physiology 1, 2, 3, 4
Ecology 1, 2, 3, 4
Endocrinology 1, 2, 3, 4
Histology and Embryology 1, 2, 3, 4
Invertebrate Zoology 1, 2, 3, 4
Neurology 1, 2, 3, 4
Zoology 1, 2, 4

To undertake graduate study the student not only should be prepared in the fundamentals of Zoology but should also 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 and the Department of Conservation.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Zoology. *Preregistration is required in all courses.*

COMPARATIVE ANATOMY

Stimson Hall: *Professor* P. W. GILBERT.

The department is well equipped with suitable collections and apparatus to offer graduate work in comparative vertebrate anatomy. Particular emphasis is placed on the functional interpretation of structure, the aim being to correlate the activities and structural adaptations of the living animal. Students majoring in this field will find it advantageous to have taken courses in comparative anatomy, histology, embryology, physiology, and vertebrate ecology.

COMPARATIVE AND GENERAL PHYSIOLOGY

Stimson Hall: *Professor* D. R. GRIFFIN.

Facilities are available for advanced work in Comparative Physiology and General Physiology. There are especially favorable opportunities for research in comparative sensory physiology. Before undertaking advanced work in physiological zoology a student should ordinarily have taken elementary zoology, comparative anatomy, histology, embryology, physics, inorganic and organic chemistry, and at least one laboratory course in physiology. In addition, calculus, physical chemistry, and biochemistry are almost indispensable.

451. *COMPARATIVE PHYSIOLOGY.* Fall term. Credit three hours. Prerequisites, one year of Biology or Zoology and college courses in Chemistry and Physics. Organic Chemistry and Comparative Anatomy are also desirable. Associate Professor GRIFFIN. Lectures, W F 9; Laboratory, T W Th or F 1:40–4:30. Preregistration required.

452. *GENERAL AND CELLULAR PHYSIOLOGY.* Spring term. Credit three hours. Prerequisites, Zoology 451, Organic Chemistry, and permission of the instructor. Histology and Calculus are also desirable. Associate Professor GRIFFIN. Seminars, M 2–4 or F 2–4; laboratory, T W or Th 1:40–4:30. Preregistration is required, and graduate students should consult the instructor before registering.

ECOLOGY

Stimson Hall: *Professor* L. C. COLE.

Advanced work in ecology is an individual matter, but the student majoring in this field should have, or plan to obtain, a broad biological background including an acquaintance with genetics and the principles of systematics. Some training in statistical analysis is almost indispensable. A general background in the physical sciences, particularly geography, geology, chemistry, and meteorology is desirable.

401–402. *ECOLOGY AND PHYSIOLOGY OF THE INVERTEBRATES.* Throughout the year. Credit three hours a term. Prerequisites, one year of general biology or introductory zoology plus organic chemistry and college mathematics. Assistant Professor COLE. Lectures, M W 11; laboratory, W 2–4:30. Preregistration required.

404. *GENERAL ANIMAL ECOLOGY.* Spring term. Credit three hours. Prerequisites, Zoology 101–102 or 103–104, or their equivalent. Assistant Professor COLE. Lectures, W F 10. A total of 8 laboratory and field periods S 8–1. Preregistration required.

ENDOCRINOLOGY

Stimson Hall; *Professor* S. L. LEONARD.

476. *EXPERIMENTAL ENDOCRINOLOGY.* Spring term. Credit two or three hours. Prerequisite, Zoology 101–102 or 103–104 or equivalent, and Chemistry. Associate Professor LEONARD. Open to graduate students only. Lectures, M F 11; laboratory, M 2–4:30 or F 2–4:30 for a limited number of students. Preregistration required.

HISTOLOGY AND EMBRYOLOGY

Stimson Hall; *Professors* H. B. ADELMANN and W. A. WIMSATT.

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 should precede advanced work in this subject.

302. *THE ORGANS: HISTOLOGY AND DEVELOPMENT.* Spring term. Credit four hours. Prerequisite, course 301 or its equivalent. Associate Professor WIMSATT and assistants. Lectures, W F 9; laboratory, W F 2–4:30. Preregistration required.

304. *VERTEBRATE EMBRYOLOGY.* Spring term. Credit five hours. Prerequisite, Biology 1 or Zoology 101–102, or 103–104. Professor ADELMANN and assistants. Lectures, T Th S 11; laboratory, Section I, T Th 8–11; Section II, T Th 2–4:30. Preregistration required.

308–309. *SEMINAR.* First and second terms. One hour each week. Time to be arranged.

[315. 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. Not given in 1950–1951.]

INVERTEBRATE ZOOLOGY

Stimson Hall; *Professor* B. P. YOUNG.

515–516. *INVERTEBRATE ZOOLOGY.* Throughout the year. Credit three hours a term. Prerequisite, Introductory or General Zoology, or equivalent. Open to undergraduate majors and graduate students in the various fields of biology. Associate Professor YOUNG. One lecture a week during laboratory periods; laboratory, F 2–5, and S 9–12. Preregistration required.

NEUROLOGY

Stimson Hall; *Professor* J. W. PAPEZ.

224. *COMPARATIVE NEUROLOGY.* Spring term. Credit three hours. Prerequisite, nine hours of Animal Biology. Professor PAPEZ. Hours to be arranged. Lectures, T Th 12; laboratory, M or W 2–4:30. Preregistration required.

226. *CEREBRAL MECHANISMS.* Spring term. Credit three hours. Prerequisite, course 224. Professor PAPEZ. Hours to be arranged. Given if desired by a sufficient number of students. Preregistration required.

PLANT SCIENCES

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.

BACTERIOLOGY

Stocking Hall: *Professors* J. M. SHERMAN, GEORGES KNAYSI, M. R. ZELLE, H. B. NAYLOR, C. N. STARK, H. W. SEELEY, JR., and E. A. DELWICHE.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Bacteriology 1, 2, 3, 4

(See also Pathogenic Bacteriology 1, 2, 3, 4; p. 176.)

Before taking up graduate work in bacteriology, it is desirable that the student have had 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. Professors SHERMAN, SEELEY, and assistants. Lectures, M W F 11. Laboratory practice, M W F 1:40–4. Dairy Industry Building 218 and 301. Preregistration required.

103. *ADVANCED BACTERIOLOGY.* Spring term. Credit six hours. Prerequisite, course 1, quantitative analysis, and organic chemistry. Professor SHERMAN, Professor SEELEY, and assistants. Lectures, recitations, and laboratory practice, M W F 1:40–5. Dairy Industry Building 119 and 301. Preregistration required.

105. *HIGHER BACTERIA AND RELATED MICROORGANISMS.* Fall term. Credit four hours. Prerequisite, course 1. Professor KNAYSI and assistant. Lectures, recitations, and laboratory practice. T Th 1:40–5. Dairy Industry Building 119 and 323. Preregistration required.

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.

210. *PHYSIOLOGY OF BACTERIA.* Fall term. Credit two hours. Prerequisites, course 1 and at least one additional course in bacteriology. Professor DELWICHE. Lectures, T Th 8. Dairy Building 120.

213. *MORPHOLOGY AND CYTOLOGY OF BACTERIA.* Fall term. Credit three hours. Professor KNAYSI. Lectures, T Th S 9. Dairy Building 119.

215. *CHEMISTRY OF BACTERIAL PROCESSES.* Spring term. Credit two hours. Lectures, T Th 8. Dairy Industry Building 119. Professor DELWICHE.

221. *SEMINAR.* Throughout the year. Without credit. Required of graduate students specializing in the Department. Professor SHERMAN. Hours to be arranged. Dairy Building.

RESEARCH AT THE NEW YORK STATE EXPERIMENT STATION

See FOOD SCIENCE and TECHNOLOGY for graduate work in bacteriology, particularly as applied to food problems.

BOTANY

Professors LEWIS KNUDSON, W. C. MUENSCHER, L. C. PETRY, L. F. RANDOLPH, D. G. CLARK, R. T. CLAUSEN, H. P. BANKS, and C. H. UHL; 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
Paleobotany 1, 2, 3, 4
Plant Physiology 1, 2, 3, 4
Plant Taxonomy 1, 2, 3, 4
Plant Morphology (including Anatomy) 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 facilities for research. The herbarium contains both local and foreign material for taxonomic study.

The rich flora around Ithaca and its accessibility make the location especially advantageous for many phases of botany, as materials may be easily obtained. Green houses are also available for the growing of experimental material.

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, 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, including plant physiology, should correspond with the appropriate member of the staff before coming to Ithaca.

PLANT PHYSIOLOGY

31. *INTRODUCTORY PLANT PHYSIOLOGY.* Fall or spring term. Credit four hours. Lectures, T Th 10. Plant Science 141. Laboratory, T Th 2–4:30; W F 2–4:30; M 2–4:30; S 8–10:30. Preregistration required.

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 ——. Lectures, M W F 10. Plant Science 143.

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, CLARK, and ——. Laboratory, M 1:40–4, S 8–12:30. Plant Science 241. Preregistration required.

233. *SEMINAR IN PLANT PHYSIOLOGY.* Fall and spring terms. Required of graduate students in Plant Physiology. Professors KNUDSON, CLARK, and ——. Conference, F 11. Plant Science.

RESEARCH IN PLANT PHYSIOLOGY. Professors KNUDSON, CLARK, and ——.

PLANT ANATOMY

123. *PLANT ANATOMY.* Fall term. Credit four hours. Prerequisite, course 1 or the equivalent and permission to register. Associate Professor BANKS. Lectures, T Th 9. Laboratory, T 10–12:30; Th 10–11:30; S 9–11:30 or M 2–4:30; W 2–3:30; F 2–4:30. Plant Science 228. Preregistration required.

RESEARCH IN PLANT ANATOMY. Associate Professor BANKS.

CYTOLOGY

124. *GENERAL CYTOLOGY.* Fall term. Credit four hours. Prerequisite, Botany 1 or Zoology 1 or equivalent. Assistant Professor UHL. 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. Preregistration required.

224. *CYTOGENETICS.* Spring term. Credit three hours. Prerequisites, Botany 124, Plant Breeding 101, or equivalent. Lectures, M W 9. Plant Science 143. Laboratory, M or W 10–12:30. Plant Science 219. Professor RANDOLPH.

RESEARCH IN CYTOLOGY. Professor RANDOLPH and Assistant Professor UHL.

MORPHOLOGY

(COMPARATIVE MORPHOLOGY OF FUNGI. Given in the DEPARTMENT OF PLANT PATHOLOGY.)

[126. *MORPHOLOGY OF VASCULAR PLANTS.* Spring term. Credit three hours a term. Prerequisites, course 1 or its equivalent, and permission to register. Associate Professor BANKS. Lectures, M W 11. Laboratory, M W 2–4:30. Plant Science 228. Given in alternate years. Not given in 1950–1951.]

127. *MORPHOLOGY OF VASCULAR PLANTS.* Spring term. Credit three hours a term. Prerequisites, course 1 or its equivalent and permission to register. Associate Professor BANKS. Lectures, M W 11. Laboratory, M W 2–4:30. Plant Science 228.

RESEARCH IN MORPHOLOGY. Professor PETRY and Associate Professor BANKS.

TAXONOMY

117. *TAXONOMY OF VASCULAR PLANTS.* Fall term. Credit four hours. Prerequisite, course 1 or its equivalent. Professor CLAUSEN. Lectures, T Th 9. Plant Science 143. Laboratory, T Th 2–4:30. Plant Science 211. Preregistration required.

118. *TAXONOMY OF VASCULAR PLANTS, ADVANCED COURSE.* Spring term. Credit four hours. Prerequisite, course 117 and either course 124 or Plant Breeding 101. Lectures, T Th 9. Plant Science 143. Laboratory, T Th 2–4:30. Plant Science 211. Professor CLAUSEN. Preregistration required.

RESEARCH IN TAXONOMY. Professors MUENSCHER and CLAUSEN.

PALEOBOTANY

RESEARCH IN PALEOBOTANY. Professor PETRY and Associate Professor BANKS.

ECONOMIC BOTANY

55. *WEEDS AND POISONOUS PLANTS.* Fall term. Credit three hours. Prerequisite course 1 or its equivalent. Lecture, F 8. Laboratory, W F 2–4:30. Plant Science 353. Professor MUENSCHER. Preregistration required.

56. *SEED ANALYSIS.* Spring term. Credit one hour. Prerequisite course 1 or its equivalent. Lectures and laboratory, F 2–4:30. Plant Science 353. Professor MUENSCHER. Preregistration required.

115. *AQUATIC PLANTS.* Spring term. Credit three hours. Prerequisite, course 1 or its equivalent. Lecture, M 9. Laboratory, M W 2–4:30. Plant Science 353. Professor MUENSCHER. Preregistration required.

RESEARCH IN ECONOMIC BOTANY. Professor MUENSCHER.

OTHER COURSES

161. *HISTORY OF BOTANY.* Fall and spring terms. No credit. Hours to be arranged. Plant Science 404.

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, PETRY, MUENSCHER, RANDOLPH, and CLARK, Associate Professors BANKS and CLAUSEN, and Assistant Professor UHL. 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

Opportunity for graduate research work at Geneva, N. Y. is available in the following fields of botany: cytological investigation on cultivated plants, taxonomic investigation on fruits and vegetables, and investigations on seeds. For further information see page 183.

PLANT BREEDING

Professors S. S. ATWOOD, R. L. CUSHING, W. T. FEDERER, N. F. JENSEN, A. A. JOHNSON, J. R. LIVERMORE, H. M. MUNGER, R. P. MURPHY, H. H. SMITH, A. M. SRB, R. G. WIGGANS, T. L. YORK; at Geneva, *Professors* JOHN EINSET, R. C. LAMB, G. L. SLATE, RICHARD WELLINGTON.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Genetics 1, 2, 3,* 4
Plant Breeding 1, 2, 3,* 4
Statistical Methods of Analysis 1, 2, 3, 4

Students who are interested in crop improvement through breeding will register in *plant breeding.* Problems for research may involve studies of breeding technics, the application of genetic principles to breeding, and the correlation of knowledge from other fields in attacks on problems such as yield, quality, adaptability, and

*Not approved as minor subject when major is in Genetics or Plant Breeding.

disease and insect resistance. The Department now has active research projects with cereal, forage, and vegetable crops, and certain materials from these are available for graduate student problems. Those students interested in theoretical phases will register in *genetics,* and their research problems will generally deal with genic and chromosomal analyses, mutations, and gene action. Almost any suitable material can be utilized, but corn, tobacco, Drosophila, and certain microorganisms are currently available. For those students to whom problems of experimental technic and mathematical analysis of biological data hold the greater appeal, registration will be in *statistical methods of analysis.*

It is advisable that the student entering upon graduate work be well grounded in the fundamentals of the natural sciences. The student should have had elementary courses in inorganic and organic chemistry, college algebra, botany or zoology or biology, and plant, animal, or human physiology. Students intending to specialize in biological statistics will find it to their advantage to have additional training in mathematics. Broad training and experience in the field of agriculture is essential for those planning to major in the field of plant breeding.

Students majoring in plant breeding or genetics will 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.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Plant Breeding, courses 1, 101, 102, 150.

201. *BIOCHEMICAL GENETICS.* Spring term. Credit two hours. Prerequisites, course 101 and a course in organic chemistry, or permission to register. Associate Professor SRB. Lectures, M W 8. Plant Science 141.

203. *METHODS OF PLANT BREEDING.* Fall term. Credit three hours. Prerequisites, course 101, Botany 1, and a course in at least one of the following: field crops, vegetable crops, floriculture, or pomology. Professor MUNGER. Lectures, T Th 9. Plant Science 141. Laboratory, T 2–4:30. Plant Science 146.

204. *EXPERIMENTAL EVOLUTION.* Spring term. Credit two hours. Prerequisites, course 101 and Botany 124. Professor SMITH. Lectures, T Th 10. Plant Science 141. One discussion period, to be arranged.

211. *STATISTICAL METHODS OF ANALYSIS.* Fall term. Credit three hours. Associate Professor LIVERMORE. T 11. Plant Science 143; Th 2–4. Plant Science 233.

212. *EXPERIMENTAL METHODS.* Spring term. Credit two hours. Prerequisite, course 211 or equivalent. Professor ATWOOD. F 2–4. Plant Science 141.

213. *ADVANCED STATISTICAL METHODS I.* Fall term. Credit four hours. Prerequisite, course 211 or equivalent. Professor FEDERER. M W F 8. Plant Science 141. Laboratory to be arranged.

214. *ADVANCED STATISTICAL METHODS II.* Spring term. Credit four hours. Prerequisite, course 213 or equivalent. Professor FEDERER. T Th S 8. Plant Science 141. Laboratory to be arranged.

222. *SEMINAR.* Fall and spring terms. Required of all graduate students taking either a major or a minor in this Department. Members of departmental STAFF. F 4:30. Plant Science 404.

PLANT PATHOLOGY

Professors L. M. MASSEY, DONALD REDDICK, H. M. FITZPATRICK, W. H. BURKHOLDER, C. CHUPP, F. M. BLODGETT, A. B. BURRELL, D. S. WELCH, A. G. NEWHALL, G. C.

KENT, A. W. DIMOCK, L. J. TYLER, W. D. MILLS, A. F. ROSS, K. H. FERNOW, K. G. PARKER, H. S. CUNNINGHAM, L. C. PETERSON, W. F. MAI, B. LEAR, A. A. FOSTER, R. E. WILKINSON, C. E. WILLIAMSON, and C. W. BOOTHROYD; at Geneva, *Professors* O. A. REINKING, J. M. HAMILTON, D. H. PALMITER, W. T. SCHROEDER, A. J. BRAUN, R. E. FOSTER, and H. C. YOUNG, JR.

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 exsiccati. 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. They should also have some practice in teaching, for which opportunity will be provided. 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 the 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 cannot 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 subdivisions 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.* See *Announcement of the College of Agriculture.*

200. *GENERAL PLANT PATHOLOGY.* Fall term. Credit four hours. 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 KENT, WELCH, and L. J. TAYLOR. Lecture, T 11. Plant Science 336. Practice, three 3-hour periods weekly—two on T, W, Th, or F 2–4 and one at the students' convenience. Preregistration required.

2. *PRINCIPLES OF PLANT DISEASE CONTROL.* Fall or spring term; preference to graduates in fall and to undergraduates in spring. Credit three

hours. Prerequisite, Course 1 or 200 or the equivalent. Professor L. J. TYLER. Lecture hour to be arranged. Plant Science 336. Laboratory, T Th 2–4:30. Plant Science 342. Preregistration required.

201. *ADVANCED PLANT PATHOLOGY.* A two-term course, fall and spring terms. Prerequisites, course 200, 2, 121 or 221, and permission to register. Professor Ross and Professor MASSEY. Lecture, T 9. Plant Science 336. Practice, T Th 10–12:30. Plant Science 304. Preregistration required.

111. *DISEASES OF TREES AND SHRUBS.* Spring term. Credit three hours. Prerequisite, course 1 or 200. Professor WELCH. Lecture, W F 10. Plant Science 336. Practice, F 2–4:30. Plant Science 362.

[121. *COMPARATIVE MORPHOLOGY OF FUNGI.* Fall 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 2–4:30. Plant Science 329. Given in alternate years. Not given in 1950–1951.]

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 2–4:30 and one equivalent additional period to be arranged. Plant Science 329. Given in alternate years.

[222. *ADVANCED MYCOLOGY.* Spring term. Credit five hours. Prerequisite, course 221. Professor FITZPATRICK. Practice hours and weekly conferences to be arranged. Plant Science 329. Given in alternate years. Not given in 1950–1951.]

231. *HISTORY OF PLANT PATHOLOGY.* A two-term course, fall and spring terms. Requires a reading knowledge of French and German. Professor ——. Designed especially for graduate students specializing in Plant Pathology.

241. *RESEARCH. Professors* MASSEY, REDDICK, CHUPP, BURKHOLDER, BLODGETT, WELCH, FERNOW, NEWHALL, MILLS, BURRELL, KENT, PARKER, DIMOCK, TYLER, CUNNINGHAM, ROSS, PETERSON, MAI, LEAR, FOSTER, WILKINSON, WILLIAMSON, and BOOTHROYD.

242. *SEMINAR.* Members of the STAFF and GRADUATE STUDENTS. Weekly.

243. *LITERATURE REVIEW.* Members of the STAFF and GRADUATE STUDENTS. Biweekly.

PHYSICAL SCIENCES

ASTRONOMY

Professors R. W. SHAW and M. E. STAHR.

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 Introductory Astronomy, six hours of Interpretational Astronomy, and six hours of electives in the field of Astronomy.

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.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Astronomy, courses 101 and 102 (preregistration required).

INTERPRETATIONAL ASTRONOMY

[221. *ORIGIN OF THE SOLAR SYSTEM.* Fall term. Credit three hours. Prerequisite, the Calculus. Associate Professor SHAW. M W F 11. Not given in 1950–1951.]

[226. *THEORY OF ORBITS.* Spring term. Credit three hours. Prerequisite, the Calculus. Assistant Professor STAHR. M W F 12. Not given in 1950–1951.]

231. *STELLAR STRUCTURE.* Fall term. Credit three hours. Prerequisite, the Calculus. STAFF. M W F 11.

[238. *ASTROCHEMISTRY.* Spring term. Credit three hours. Prerequisite, the Calculus. Associate Professor SHAW. M W F 11. Not given in 1950–1951.]

241. *THE GALAXY.* Fall term. Credit three hours. Prerequisite, the Calculus. Assistant Professor STAHR. M W F 12.

244. *EXTERNAL GALAXIES.* Spring term. Credit three hours. Prerequisite, the Calculus. Assistant Professor STAHR. M W F 12.

[275. *ASTROPHYSICS.* Fall and spring terms. Credit three hours a term. Prerequisites, Differential Equations and Astronomy 231 or 238. Associate Professor SHAW. Not given in 1950–1951.]

[285. *ADVANCED GALACTIC STRUCTURE.* Spring term. Credit three hours. Prerequisites, Differential Equations and Astronomy 241 and 244. Assistant Professor STAHR. Not given in 1950–1951.]

295. *ADVANCED STUDY AND RESEARCH.* Either term. Credit variable. STAFF.

OBSERVATIONAL ASTRONOMY

[461. *ASTRONOMICAL SPECTROSCOPY.* Fall term. Credit three hours. Prerequisite, consent of instructor. Associate Professor SHAW. Not given in 1950–1951.]

464. *ASTROMETRY.* Spring term. Credit three hours. Prerequisite, consent of the instructor. Assistant Professor STAHR. Hours to be arranged.

[468. *PRACTICAL ASTRONOMY.* Spring term. Credit three hours. Prerequisite, consent of instructor. Associate Professor SHAW. Not given in 1950–1951.]

[475. *ADVANCED ASTROPHYSICAL LABORATORY.* Either term. Credit one to three hours. Prerequisites, Astronomy 461, 464, or 468 and the consent of the instructor. STAFF. Not given in 1950–1951.]

CHEMISTRY

Professors PETER DEBYE, S. H. BAUER, A. T. BLOMQUIST, T. R. BRIGGS, C. K. CAIN, P. J. FLORY, J. L. HOARD, J. R. JOHNSON, A. W. LAUBENGAYER, F. A. LONG, D. R. MILLER, W. T. MILLER, M. L. NICHOLS, J. PAPISH, E. R. VAN ARTSDALEN, L. A. WOOD; *Doctors* D. F. DETAR, E. E. MUSCHLITZ, H. POSVIC, R. A. REINHARDT, H. A. SCHERAGA, and M. J. SIENKO.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Inorganic Chemistry 1, 2, 3, 4	Organic Chemistry 1, 2, 3, 4
Analytic 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 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 105 and 106; Qualitative Analysis 201 or 212; Quantitative Analysis 215, or 220 and 222; Introductory Organic Chemistry 307 and 308 and 311; Introductory Physical Chemistry 403 and 404 or 407 and 408, and 411; 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 Quantitative Analysis 220 and 222, Introductory Organic Chemistry Laboratory 312, and Introductory Physical Chemistry Laboratory 412. 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.

Proficiency Tests will be required of all entering candidates for advanced degrees (M.S. or Ph.D.) in Chemistry. These tests, which will be given a few days before registration for the fall term, will cover the divisions of Inorganic, Analytical, Organic, and Physical Chemistry. Each test will be from two to two and one-half hours in length and will cover material normally presented in elementary courses in the subjects listed above.

Results of these tests will be used to aid the student's Special Committee in the selection of his program of courses. While the results will not be considered in the usual sense of "passing" or "failing," low marks in one or more of the tests may require a preponderance of elementary courses during a term and a reduced residence credit for that term.

Qualifying Examinations required of all candidates for the Ph.D. degree will follow the general procedure outlined on page 25 of this *Announcement.*

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 *Announcement of the College of Arts and Sciences* and the *Announcement of the College 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 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. Ordinarily research assistantships are awarded only to students who have completed one or more years of residence. Teaching assistantships are open to entering graduate students.

All courses listed below are to be given in the Baker Laboratory of Chemistry.

INORGANIC CHEMISTRY

For undergraduate courses in Inorganic Chemistry which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Chemistry, courses 105, 106, 111, 112, and 115. Preregistration is required in all these courses.

575 and 576. *ADVANCED INORGANIC CHEMISTRY.* Throughout the year. Credit three hours a term. Prerequisite or parallel courses, Chemistry 403 and 404, or 407 and 408, or consent of the instructor. Professor LAUBENGAYER. M W F 11. Baker 107.

580. *ADVANCED INORGANIC LABORATORY.* Either term. Credit two to six hours. Prerequisites, Chemistry 307, 308, 311, and 312 and consent of the instructor. Chemistry 580 is designed to accompany Chemistry 575 and 576 but may be taken separately. Professor LAUBENGAYER, Assistant Professor VAN ARTSDALEN, and Dr. SIENKO. Day and hours to be arranged. Baker 178.

585 and 586. *SELECTED TOPICS IN ADVANCED INORGANIC CHEMISTRY.* Throughout the year. Credit two hours a term. Students may register for either term separately. Prerequisite, Chemistry 403 and 404, or 407 and 408 and consent of the instructor. Instructors and topics to be announced. T Th 11. Baker 107.

ANALYTICAL CHEMISTRY

For undergraduate courses in Analytical Chemistry which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Chemistry, courses 201, 212, 215, 220, and 222. Preregistration is required in all these courses.

240. *SPECIAL METHODS OF QUANTITATIVE ANALYSIS.* Either term. Credit three hours. Prerequisite, Chemistry 220 and 222, or the consent of the instructor. Professor NICHOLS and assistants. Lecture, T 11, Baker 207. Laboratory, M T or Th F 2–4:30, or W 2–4:30 and Th 10–12:30. Baker 282 and 294. Preregistration required.

265. *ADVANCED QUANTITATIVE LABORATORY.* Spring term. Credit two to four hours. Prerequisite, Chemistry 240 or consent of the instructor. Professor NICHOLS and Dr. SCHERAGA. Hours to be arranged. Baker 294. Preregistration required.

[275. *QUANTITATIVE MICROANALYSIS.* Fall term. Credit three or more hours. Prerequisite, consent of the instructor. Enrollment is limited. Professor NICHOLS and assistant. Laboratory, W F 9–5. Baker 358. Preregistration required. Not given in 1950–1951.]

280. *EMISSION SPECTROSCOPY IN CHEMICAL ANALYSIS.* Either term. Credit three hours. Prerequisite, consent of the instructor. Professor PAPISH and assistant. Conference, one hour, to be arranged. Laboratory, hours to be arranged. Baker 396. Preregistration required.

285. *SPECTROCHEMICAL ANALYSIS.* Either term. Credit two or more hours. Prerequisite, Chemistry 280. Professor PAPISH and assistant. Laboratory, hours to be arranged. Baker 396. Preregistration required.

290. *ADVANCED QUANTITATIVE ANALYSIS.* Spring term. Credit two hours. Prerequisite, Chemistry 403 or 407. Professor NICHOLS. Lectures, W F 9, Baker 207. Given in alternate years.

ORGANIC CHEMISTRY

For undergraduate courses in Organic Chemistry which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Chemistry, courses 303, 305, 307, 308, 311 and 312. Preregistration is required in all these courses.

320. *IDENTIFICATION OF ORGANIC COMPOUNDS.* Either term. Credit four hours. Prerequisites, Chemistry 307, 308, 311, and 312, at grades of 75 or better. Professor MILLER and assistants. Lectures, T Th 8. Baker 377. Laboratory, T Th 2–4:30, or F 2–4:30 and S 10–12:30. Baker 378. Preregistration required.

330. *ADVANCED ORGANIC LABORATORY.* Either term. Credit two to four hours. Prerequisite, Chemistry 312 and 320, and the consent of the instructor.

Professors JOHNSON and MILLER, Associate Professor BLOMQUIST, Assistant Professor CAIN, and Doctor DETAR. Hours to be arranged. Baker 352.

365 and 366. *ADVANCED ORGANIC CHEMISTRY.* Throughout the year. Credit three hours a term. Prerequisite, Chemistry 307 and 308, 311 and 312 and 320, or the consent of the instructor. Students may register for either term separately. Professor JOHNSON, Associate Professor BLOMQUIST, and Doctor DETAR. Lectures, M W F 12. Baker 177.

[375 and 376. *SELECTED TOPICS IN ORGANIC CHEMISTRY.* Throughout the year. Credit two hours a term. Prerequisite, Chemistry 365 and 366. Associate Professor BLOMQUIST. Lectures, T Th 9. Baker 377. Given in alternate years. Not given in 1950–1951.]

380. *ORGANIC CHEMISTRY OF HIGH POLYMERS.* Fall term. Credit two hours. Prerequisite, Chemistry 365 and 366, or consent of the instructor. Professor MILLER. Lectures, M W 11. Baker 377. Given in alternate years.

[385. *PHYSICAL ASPECTS OF ORGANIC CHEMISTRY.* Fall term. Credit two hours. Prerequisite, Chemistry 320 or 365 and 366, and the consent of the instructor. Professor MILLER. Lectures, M W 11. Baker 377. Given in alternate years. Not given in 1950–1951.]

395 and 396. *CHEMISTRY OF NATURAL PRODUCTS.* Throughout the year. Credit two hours a term. Prerequisite, Chemistry 320 or 365 and 366. Students may register for either term separately. Assistant Professor CAIN. Lectures, T Th 9. Baker 377. Given in alternate years.

PHYSICAL CHEMISTRY

For undergraduate courses in Physical Chemistry which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Chemistry, courses 403, 404, 407, 408, 411, and 412. Preregistration is required in all these courses.

431 and 432. *APPLIED ELECTROCHEMISTRY.* Throughout the year. Credit two hours a term. Prerequisite, Chemistry 403 and 404 or Chemistry 407 and 408. Professor BRIGGS. Lectures, T Th 9. Baker 7. Given in alternate years. By electing Chemistry 465 (two or more hours), the student may obtain laboratory practice in many of the subjects which are presented in the lectures.

[440. *COLLOID CHEMISTRY.* Spring term. Credit three hours. Prerequisite, Chemistry 403 and 404, or 407 and 408. Professor BRIGGS. Lectures, M W F 11. Baker 7. Given in alternate years. Not given in 1950–1951.]

445. *APPLICATION OF THE PHASE RULE.* Fall term. Credit three hours. Prerequisite, Chemistry 403 and 404 or Chemistry 407 and 408. Professor BRIGGS. Lectures, M W F 11. Baker 7.

[450. *SOLID STATE.* Spring term. Credit three hours. Prerequisite, Chemistry 403 and 404 or Chemistry 407 and 408. Professor HOARD. Lectures, T Th S 10. Baker 7. Given in alternate years. Not given in 1950–1951.]

455. *KINETICS OF CHEMICAL REACTIONS.* Spring term. Credit three hours. Prerequisite, Chemistry 403 and 404 or Chemistry 407 and 408 and consent of the instructor. Professor LONG. Lectures, M W F 11. Baker 177.

460. *CHEMICAL PHYSICS.* Spring term. Credit two hours. Open to seniors and graduate students majoring in chemistry and physics. Professor DEBYE. Lectures, S 11–1. Baker 377. Conference, one hour a week, to be arranged.

[461. *RADIOCHEMISTRY.* Fall term. Credit three hours. Prerequisite, Chemistry 403 and 404, or 407 and 408. Assistant Professor MILLER. Lectures, M W F 12. Baker 18. Given in alternate years. Not given in 1950–1951.]

465. *ADVANCED LABORATORY PRACTICE IN PHYSICAL CHEMISTRY.* Either term. Credit variable, but not to exceed six hours a term. Prerequisite, determined in each case by the professor in charge. Professors BRIGGS, FLORY, HOARD, and LONG, Associate Professor BAUER, and Dr. MUSCHLITZ. Hour and place to be arranged.

471 and 472. *THERMODYNAMICS.* Throughout the year. Credit three hours a term. Prerequisite, Chemistry 403 and 404 or 407 and 408. Professor FLORY. Lectures, M W F 9. Baker 107.

[480. *STATISTICAL MECHANICS.* Fall term. Credit three hours. Prerequisite, Chemistry 491 or equivalent is desirable but not required. Professor FLORY. Lectures, T Th S 10. Baker 7. Given in alternate years. Not given in 1950–1951.]

482. *PHYSICAL CHEMISTRY OF HIGH POLYMERS.* Spring term. Credit two hours. Prerequisite, Chemistry 380, 471 and 472, or consent of the instructor. Professor FLORY. Lectures M W 11. Baker 377. Given in alternate years.

491. *INTRODUCTION TO QUANTUM MECHANICS.* Fall term. Credit two hours. Prerequisite, consent of the instructor. Professor DEBYE. Lectures, S 11–1. Baker 377. Conference, one hour a week, to be arranged. Given in alternate years.

[492. *QUANTUM CHEMISTRY.* Spring term. Credit three hours. Prerequisite, Chemistry 491 or its equivalent. Associate Professor BAUER. Lectures, M W F 9. Baker 377. Given in alternate years. Not given in 1950–1951.]

[495. *MOLECULAR SPECTRA.* Fall term. Credit three hours. Prerequisite, consent of the instructor. Associate Professor BAUER. Lectures, M W F 9. Baker 18. Given in alternate years. Not given in 1950–1951.]

GEOLOGY AND GEOGRAPHY

Professors W. S. COLE, C. M. NEVIN, J. W. WELLS, A. L. ANDERSON, J. D. BURFOOT, JR., and W. T. HOLSER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Mineralogy 1, 2, 3, 4
Mineralogy and Petrology 1, 2, 3, 4
Economic Geology 1, 2, 3, 4
Paleontology 1, 2, 3, 4
Paleontology and Stratigraphy 4
Petrology 1, 2, 3, 4
Geomorphology 1, 2, 3, 4
Glacial Geology 1, 2, 3, 4
Structural Geology 1, 2, 3, 4
Stratigraphy 1, 2, 3, 4
Sedimentation 1, 2, 3, 4
Geology 4
Geography 1, 2, 3, 4

Under the general title of geology and geography are included structural geology, physical, regional, and economic geography, geomorphology, glaciology, mineralogy, crystallography, petrology, paleontology and stratigraphic geology, and economic geology.

The University Library has a very large collection of maps, reference books, periodicals, and geological society transactions, as well as files of North American, European, and other geological survey reports. The Department possesses a collection of more than 65,000 authors' separates. Complete facilities for all kinds of laboratory investigation are available.

Graduate work in Geology may include investigation, under approved direction, in the field away from Ithaca.

For undergraduate courses which often meet the needs of graduate students see the *Announcement of the College of Arts and Sciences,* Department of Geology.

STRUCTURAL GEOLOGY, SEDIMENTATION, AND PETROLEUM GEOLOGY

Professor NEVIN.

Graduate research in any of these subjects should preferably be based on field work.

301. *STRUCTURAL GEOLOGY.* Fall term. Credit three hours. Prerequisite, Geology 101–102 or equivalent. Two lectures, one laboratory. M W 11, M 2–4:30. McGraw 150.

303. *SEDIMENTATION.* Spring term. Credit three hours. Prerequisite, Geology 101–102 or equivalent. Two lectures, one laboratory. M W 11, M 2–4:30. McGraw 150.

321. *PETROLEUM GEOLOGY.* Spring term. Credit three hours. Prerequisite, Geology 101–102 or equivalent. Two lectures, one laboratory. T Th 9, Th 2–4:30. McGraw 150.

391–392. *SEMINAR IN STRUCTURAL GEOLOGY AND SEDIMENTATION.* Throughout the year. Credit variable. For advanced students. M 4:45. McGraw 150.

395–396. *ADVANCED OR SPECIAL WORK IN STRUCTURAL GEOLOGY, SEDIMENTATION, AND PETROLEUM GEOLOGY.* Throughout the year. Credit variable. McGraw 150.

901. *GEOLOGIC MAPPING.* Given at the summer field camp. Credit six hours. (Special circular, on request, from the Department.)

GEOMORPHOLOGY AND GEOGRAPHY

Assistant Professor ——.

The plateau area in which Cornell University is situated contains outstanding landforms which were developed in a normal cycle of erosion and subsequently modified by continental glaciers. Excellent opportunities for research are afforded by the immediate region and by the facilities available in the laboratories and libraries of the Department and University. Moreover, ample resources are available in the University for geographic investigation under the direction of the staff of the Department.

401. *GEOMORPHOLOGY.* Fall term. Credit three hours. Prerequisite, Geology 101–102. Two lectures, one laboratory. T Th 9, T 2–4:30. McGraw 265.

[403. *GLACIATION AND THE PLEISTOCENE EPOCH.* Spring term. Credit three hours. Prerequisite, Geology 101–102. Two lectures, one laboratory. T Th 10, T 2–4:30. McGraw 265. Given in 1951–1952 and alternate years.]

495–496. *ADVANCED OR SPECIAL WORK IN GEOMORPHOLOGY AND GEOGRAPHY.* Throughout the year. Credit variable. Prerequisite, an adequate background of course work in geology. Hours to be arranged. McGraw 265.

MINERALOGY AND PETROLOGY

Associate Professor BURFOOT and *Assistant Professor* HOLSER.

The laboratory equipment for microscopical work is modern and complete and includes universal stages, one of which is being adapted to the double variation procedure. Other equipment for determinative mineralogy includes a carbon-arc spectroscope and adequate equipment for silicate analysis. Laboratory facilities for X-ray diffraction studies are at present provided in the Department of Chemistry. Mineralogical research is facilitated at high temperatures by an electric furnace with controlled and recorded temperatures and under high pressure hydrothermal conditions by the use of steel bombs.

The study collections in mineralogy and petrology are widely representative of

species and types of occurrance from localities throughout the world and are constantly being expanded. A collection of more than 6000 thin sections enables microscopical study of representative specimens from the petrological collections. The mineralogical collections include the Benjamin Silliman, Jr., Collection, which was acquired before the opening of the University in 1868.

The program of advanced study and research will be adapted to the needs of the individual student. Research projects will, when possible, include correlative field and laboratory work. The research program emphasizes the solution of fundamental problems of mineralogy and petrology by the application of physicochemical principles.

207–208. *MINERALOGY.* Throughout the year. Credit three hours a term. Prerequisite, Chemistry 105–106. Fall term prerequisite to spring term. Assistant Professor HOLSER. Lectures, Fall term M W 10, Spring term T Th 9. McGraw 165. Laboratory, F 2–4:30. McGraw B65. Preregistration required.

209. *LITHOLOGY.* Spring term. Credit two hours. Prerequisite, Geology 101–102 and 207–208. Associate Professor BURFOOT. T Th 2–4:30. McGraw 145. Preregistration required.

[501. *OPTICAL MINERALOGY.* Fall term. Credit three hours. Prerequisite, Geology 207–208. Assistant Professor HOLSER. Lectures, W 9, McGraw 145. Laboratories, F 8–10:30 and S 9–11:30, McGraw 345. Preregistration required. Given in 1951–1952 and alternate years.]

[502. *PETROGRAPHY.* Spring term. Credit three hours. Prerequisite, Geology 501; prerequisite or parallel, Geology 209. Associate Professor BURFOOT. Lecture, W 9, McGraw 145. Laboratories, F 8–10:30 and S 9–11:30, McGraw 345. Preregistration required. Given in 1951–1952 and alternate years.]

[521. *SEDIMENTARY PETROGRAPHY.* Fall term. Credit three hours. Prerequisite, Geology 501. Associate Professor BURFOOT. Lectures, M W 11, McGraw 145. Laboratory, F 10:30–1:00, McGraw 345 and B65. Preregistration required. Given in 1951–1952 and alternate years.]

575. *IGNEOUS PETROGENY.* Fall term. Credit three hours. Prerequisite, Geology 502. Associate Professor BURFOOT. Lectures, M W 9, McGraw 145. Laboratory, F 10:30–1, McGraw 345. Preregistration required. Given in 1950–1951 and alternate years.

577. *METAMORPHIC GEOLOGY.* Spring term. Credit three hours. Prerequisite, Geology 502 and 301; recommended, Geology 702. Associate Professor BURFOOT. Lectures, M W 9, McGraw 145. Laboratory, F 8–10:30, McGraw 145 and 345. Preregistration required. Given in 1950–1951 and alternate years.

581. *STRUCTURAL MINERALOGY.* Fall term. Credit three hours. Prerequisite, Geology 207–208. Assistant Professor HOLSER. Lectures, M W 11. Laboratory, S 10:30–1. McGraw 145. Given in 1950–1951 and alternate years.

583. *CHEMICAL MINERALOGY.* Spring term. Credit three hours. Prerequisite, Geology 270–208; recommended, Geology 501 and 581 and Chemistry 407–408. Assistant Professor HOLSER. Lectures, M W 11. Laboratory, F 10:30–1. McGraw 145. Given in 1950–1951 and alternate years.

591–592. *SEMINAR IN MINERALOGY AND PETROLOGY.* Throughout the year. Credit one hour a term. Prerequisite, permission of instructor. Acting Assistant Professor HOLSER and Associate Professor BURFOOT. W 4:45. McGraw 145.

595–596. *ADVANCED OR SPECIAL WORK IN MINERALOGY AND PETROLOGY.* Throughout the year. Credit variable. Prerequisites, variable. Associate Professor BURFOOT and Acting Assistant Professor HOLSER. Days and hours to be arranged. McGraw 145, 345, B–65.

PALEONTOLOGY AND STRATIGRAPHIC GEOLOGY

Professors COLE and WELLS.

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, and Central and South America, as well as in different parts of the United States and Europe. There are also the Newcomb collection (10,000 species of recent shells) and a wealth of conchological literature in the geological and general libraries.

201. *HISTORIC GEOLOGY.* Fall term. Credit three hours. Prerequisite, Geology 101–102. Professor WELLS. Lectures, M W 9. Laboratory, W 2–4:30. McGraw 450.

601–602. *INVERTEBRATE PALEONTOLOGY.* A two-term course; fall and spring terms. Credit three hours a term. Prerequisite, Geology 101–102 and, if possible, Invertebrate Zoology. Professors COLE and WELLS. Lectures, T Th 10. McGraw 450. Laboratory, Fall term, Th 2–4:30; Spring term, W 2–4:30. McGraw 450.

605–606. *STRATIGRAPHY.* Throughout the year. Credit three hours a term. Prerequisites, Geology 101–102 and first term of 601–602. T Th 9, W 10. Professors COLE and WELLS.

675. *MICROPALEONTOLOGY.* Spring term. Credit two hours. Prerequisite, permission of the instructor. Student should have Geology 101–102, 605, and 601–602. Professor COLE. W 9 and hours to be arranged. McGraw 450.

681. *GEOLOGY OF NEW YORK STATE.* Spring term. Credit two hours. Prerequisites, Geology 101–102, 605, 601–602, or permission of instructor. Professor WELLS. Lectures in winter months, all-day field trips in spring months. T Th 12 and days to be arranged. McGraw 450.

695–696. *ADVANCED OR SPECIAL WORK IN PALEONTOLOGY AND STRATIGRAPHY.* Throughout the year. Credit variable. Prerequisites, Geology 605 and 601–602. Professors COLE and WELLS. Day and hours to be arranged. McGraw 450.

912. *GEOLOGIC INTERPRETATION OF AERIAL PHOTOGRAPHY.* Spring term. Credit three hours. Prerequisite, Geology 301. Intended for majors in geology. Lecture, M 9, two laboratories by arrangement. Professor WELLS.

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.

701–702. *GENERAL ECONOMIC GEOLOGY.* A two-term course. Credit three hours a term. Prerequisite, Geology 101–102 or 113 and 207 or permission of the instructor. Lectures, T Th 11. Laboratory, F 2–4:30. McGraw 150.

712. *METALLURGICAL RAW MATERIALS.* Fall term. Credit three hours. For second-year students in Metallurgical Engineering. Lectures, M W F 10, McGraw 150.

721. *MICROSCOPIC STUDY OF ORE MINERALS.* Fall term. Credit two hours. Prerequisite, Geology 207–208. F 8–10:30. S 8–10:30. McGraw 250. Given in alternate years; given in 1950–1951.

732. *MINING GEOLOGY.* Spring term. Credit three hours. Prerequisites, Geology 701–702. Given in alternate years; given in 1950–1951. M W F 1. McGraw 150.

[775–776. *MINERAL DEPOSITS.* A two-term course. Credit three hours a term. Prerequisites, Geology 701–702. Lectures, M W F 1. McGraw 150. Given in 1951–1952 and alternate years.]

791–792. *ECONOMIC GEOLOGY SEMINAR.* Throughout the year. Credit one hour a term. T 4:45. McGraw 150.

795–796. *ADVANCED OR SPECIAL WORK IN ECONOMIC GEOLOGY.* Throughout the year. Credit variable. Prerequisite, dependent on the nature of the work.

MATHEMATICS

Professors W. A. Hurwitz, R. P. Agnew, J. B. Rosser, Mark Kac, R. J. Walker, Gustav Elfving, W. H. J. Fuchs, Harry Pollard, K. L. Chung, G. A. Hunt, Paul Olum, Bertram Yood; *Doctors* Christine Williams, M. D. Donsker.

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 principal 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 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.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Arts and Sciences,* Department of Mathematics, courses 201, 241, 301, 401, 402, 431, 549, 605, 607, 608, 611, 612, 711, 712, 721, 722.

ALGEBRA

347. *ALGEBRAIC NUMBERS.* Spring term. Prerequisite, consent of the teacher. Dr. WILLIAMS. Hours to be arranged.

371, 371. *MODERN ALGEBRA.* Throughout the year. Prerequisite, Mathematics 173. Professor YOOD. T Th S 9.

381. *FOUNDATIONS OF MATHEMATICS.* Fall term. Prerequisite, at least three semester hours of mathematics beyond the calculus. Professor ROSSER. M W F 9.

382. *SYMBOLIC LOGIC.* Spring term. Prerequisite, a knowledge of Mathematics 381. Professor ROSSER. M W F 9.

GEOMETRY

415, 416. *ALGEBRAIC TOPOLOGY.* Throughout the year. Prerequisite, consent of the teacher. Professor OLUM. M W F 9.

ANALYSIS

501, 502. *ADVANCED CALCULUS.* Throughout the year. Prerequisite, Mathematics 173. Dr. WILLIAMS. M W F 11.

511, 512. *REAL FUNCTIONS.* Throughout the year. Prerequisite, Mathematics 502. Professor HURWITZ. M W F 10.

[531, 532. *COMPLEX VARIABLES.* Throughout the year. Prerequisite, Mathematics 502 or 612. M W F 10. Given in alternate years. Not given in 1950–1951.]

533, 534. *TOPICS IN COMPLEX VARIABLES.* Throughout the year. Prerequisite, Mathematics 532. Professor FUCHS. M W F 10.

APPLIED MATHEMATICS

615. *LAPLACE TRANSFORMS.* Fall term. Prerequisite, Mathematics 201 or 608. Professor AGNEW. Hours to be arranged. Primarily for engineers.

621, 622. *MATHEMATICAL METHODS IN PHYSICS.* Throughout the year. Prerequisite, Mathematics 201 and at least two years of general physics. Professor ROSSER. M T W Th F 12.

641, 642. *PARTIAL DIFFERENTIAL EQUATIONS.* Throughout the year. Prerequisite, Mathematics 612. Professor POLLARD. M W F 9.

681, 682. *DIFFERENTIAL EQUATIONS OF MATHEMATICAL PHYSICS.* Throughout the year. Prerequisite, Mathematics 502. Professor KAC. M W F 11.

715, 716. *ADVANCED MATHEMATICAL STATISTICS.* Throughout the year. Prerequisite, Mathematics 173 and 712. Professor ELFVING. T Th S 11.

METEOROLOGY

Assistant Professor WIDGER.

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, both of themselves and 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. *Basic Meteorology.* See *Announcement of the College of Agriculture.*

2. *CLIMATOLOGY.* Fall term. Credit two hours. Prerequisite, Course 1. M W 9. Plant Science 114. Preregistration is required.

221. *RESEARCH.* Fall or spring term. Credit one or more hours. Prerequisite, permission of the instructor.

212. *SPECIAL TOPICS.* Fall or spring term. Credit one or more hours. Prerequisite, permission of the instructor.

PHYSICS

Professors L. P. SMITH, (C. P. BAKER, Nuclear Studies, on leave), L. L. BARNES, H. A. BETHE, G. COCCONI, D. R. CORSON, (T. R. CUYKENDALL, Engineering Physics, on leave Fall Term), J. W. DEWIRE, R. P. FEYNMAN, G. E. GRANTHAM, K. I. GREISEN, P. L. HARTMAN, J. A. KRUMHANSL, B. D. MCDANIEL, P. MORRISON, C. C. MURDOCK, H. F. NEWHALL, L. G. PARRATT, (H. S. SACK, Engineering Physics), (B. SIEGEL, Engineering Physics), R. L. SPROULL, D. H. TOMBOULIAN, W. M. WOODWARD, and R. R. WILSON; *Doctors* C. W. GARTLEIN, J. S. LEVINGER, J. S. SABY, and E. E. SALPETER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Physics 1, 2, 3, 4
Experimental Physics 1, 2, 3, 4
Theoretical Physics 1, 2, 3, 4
Biophysics 3, 4

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 Physics as a minor, and Theoretical Physics only if accompanied by Experimental Physics as a minor.

Members of the staff are especially interested in directing graduate research in the following fields:

EXPERIMENTAL PHYSICS. Nuclear Physics; cosmic rays; atomic spectra; X-rays; X-ray and electron diffraction; physical electronics, and physics of solids.

THEORETICAL PHYSICS. Quantum mechanics, particularly the theory of nuclei; fundamental particles, and radiation.

Members of the staff who are in residence in Ithaca during the summer often stand ready to consult with investigators.

A colloquium in general physics and a seminar in theoretical physics meet regularly, and seminars in special fields meet as arranged.

A booklet entitled *Graduate Work in Physics at Cornell* can be obtained by writing to the Chairman, Department of Physics, Rockefeller Hall. The booklet contains additional information about graduate work and research in physics for the entering graduate student.

215. *PHYSICAL OPTICS.* Fall term. Credit three or five hours. Prerequisites, Physics 206, or equivalent, and Calculus. Lectures, M W F 9. Laboratory, Th F 1:40–4:30, also T W 1:40–4:30 if a second section is warranted. Associate Professor HARTMAN.

225. *ELECTRICITY AND MAGNETISM.* Either term. Credit three hours. Prerequisite, Physics 117 or 206. Lectures, T Th S 9, and an optional problem period to be arranged. Professor MURDOCK.

236. *ELECTRICITY AND MAGNETISM.* Spring term. Credit three hours. Prerequisites, Physics 225 and Differential Equations. Lectures, M W F 11. Assistant Professor KRUMHANSL.

242. *ANALYTICAL MECHANICS.* Spring term. Credit three hours. Prerequisites, Physics 205 or 208, and Mathematics 201, or their equivalents. T Th S 9. Associate Professor SPROULL.

243. *ATOMIC AND MOLECULAR PHYSICS.* Fall term. Credit three hours. Prerequisite, Physics 225 or consent of the instructor. M W F 10. Assistant Professor DEWIRE.

254. *ELECTRONIC PROPERTIES OF SOLIDS AND LIQUIDS.* Spring term. Credit three hours. Prerequisite, Physics 243. Lectures, T Th S 9. Professor SACK.

258. *MECHANICS OF CONTINUA.* Spring term. Credit three hours. Prerequisite, Partial Differential Equations, or consent of instructor. T Th S 10. Assistant Professor KRUMHANSL.

020. *INFORMAL STUDY IN PHYSICS.* Either term. Reading or laboratory work in any branch of Physics under the direction of a member of the staff. Hours to be arranged.

380. *ADVANCED LABORATORY.* Either term. Credit three hours. Prerequisite, Physics 210 or its equivalent. Laboratory, T W or Th F 1:40–4:30. Rockefeller 306. Professors PARRATT and CUYKENDALL, Associate Professors CORSON, HARTMAN, MCDANIEL, and Assistant Professors COCCONI and WOODWARD.

383. *X-RAY EXPERIMENTS.* Fall term. Credit two or three hours. Prerequisite, Physics 380 or consent of instructor. Professor PARRATT.

391. *ELECTRONICS AND IONICS.* Fall term. Credit three hours. Prerequisite, one term of Physics 380. Two laboratory periods and one seminar. Associate Professor SPROULL.

393. *NUCLEAR PHYSICS LABORATORY.* Fall term. Credit two hours. Prerequisite, consent of instructor. Assistant Professor DEWIRE.

396. *COSMIC RAY EXPERIMENTS.* Spring term. Credit two hours. Prerequisite, consent of instructor. Associate Professor COCCONI. Two afternoons each week. T W Th F 1:30–4:30.

475. *THEORETICAL MECHANICS.* Fall term. Credit three hours. Prerequisite, Physics 242 or equivalent. T Th S 11. Associate Professor MORRISON.

476. *ELECTRODYNAMICS.* Spring term. Credit three hours. Prerequisite, Physics 225 or equivalent. T Th S 11. Professor BETHE.

477. *STATISTICAL MECHANICS AND KINETIC THEORY.* Fall term. Credit two hours. Prerequisites, Physics 475, and (or in parallel) Physics 485. T Th 9. Professor BETHE.

480. *THEORETICAL PHYSICS READING COURSE.* Fall term. Repeated in the spring term. Credit two hours. Hours to be arranged. Dr. SALPETER.

485. *INTRODUCTORY QUANTUM MECHANICS.* Fall term. Credit there hours. Prerequisites, Physics 475 and 476. T Th S 12. Associate Professor FEYNMAN.

486. *APPLICATIONS OF QUANTUM MECHANICS.* Spring term. Credit three hours. Prerequisite, Physics 485. T Th S 12. Associate Professor MORRISON.

491. *ADVANCED QUANTUM MECHANICS.* Fall term. Credit three hours. Prerequisite, Physics 486. Given upon sufficient demand. Hours to be arranged. Associate Professor FEYNMAN.

582. *X-RAY CRYSTALLOGRAPHY.* Spring term. Credit three hours. Prerequisite, Physics 225 or consent of the instructor. M W F 10. Professor MURDOCK.

588. *X-RAYS.* Spring term. Credit three hours. Prerequisite, Physics 243 or equivalent. M W F 11. Professor PARRATT.

[681. *ADVANCED ELECTRON PHYSICS.* Fall term. Credit three hours. Not offered in 1950–1951.]

683. *THE THEORY AND PROPERTIES OF SOLIDS.* Fall term. Credit three hours. Prerequisite, Physics 485 or its equivalent. T Th S 11. Professor SMITH.

[692. *ADVANCED ELECTRONICS LABORATORY.* Spring term. Credit three hours. Not offered in 1950–1951.]

781. *NUCLEAR PHYSICS.* Fall term. Credit two hours. Prerequisites, Physics 243 and (or in parallel) Physics 485. M 9, F 9–11. Professor WILSON.

782. *THEORY OF NUCLEI.* Spring term. Credit two hours. Not offered in 1950–1951.]

784. *COSMIC RAYS.* Spring term. Credit two hours. Prerequisite, a course in introductory Theoretical Physics. Lectures, T Th 9. Assistant Professor COCCONI.

786. *THEORY OF HIGH ENERGY PHENOMENA.* Spring term. Credit two hours. Prerequisites, Physics 486, or the equivalent. M W 9. Associate Professor FEYNMAN.

080. *INFORMAL STUDY IN PHYSICS.* Either term. Special reading or problem work done under the direction of a member of the staff. Hours to be arranged.

090. *SPECIAL LABORATORY WORK.* Either term. Laboratory work in any branch of physics under the direction of a member of the staff. Hours to be arranged.

AGRICULTURE

AGRICULTURAL ECONOMICS

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, S. W. Warren, L. C. Cunningham, G W. Hedlund, T. N. Hurd, Herrell DeGraff, L. B. Darrah, E. A. Lutz, Max Brunk, C. A. Bratton, L. E. Slater, H. E. Conklin, E. N. Searls, Carlton Wright, Mary B. Wood, (Mrs.) Lorraine Houlihan, and C. D. Kearl.

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
Farm Finance 1, 2, 3, 4
Land Economics and Agricultural Geography 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.

121. *FINANCIAL STATEMENTS.* Fall term. Credit three hours. Dr. John W. Fitzgerald. Lectures, M W 11. Warren 225. Laboratory, M or T 2–4. Warren 201.

[122. *ACCOUNTING METHOD.* Spring term. Credit three hours. Two lectures and one laboratory period a week. Not given in 1950–1951.]

126. *FARMERS' COOPERATIVES.* Fall term. Credit three hours. Professor Hedlund. Lectures, M W 10. Warren 25. Discussions: for undergraduate students, W or Th 2–4; for graduate students, F 2–4. Warren 225.

127. *BUSINESS LAW.* Fall term. Credit three hours. Limited to upperclassmen. Mr. Allan H. Treman. Lectures, M W F 9, Rice 300. (Attention is called to a similar course in Hotel Administration, M W F 8.)

[226. *RESEARCH METHODS AND PROBLEMS IN THE FIELD OF FARMERS' COOPERATIVES.* Fall term. Offered in alternate years. Credit two hours. Open to graduate students who have had courses 126 and 240 or their equivalents. Professor Hedlund. M 2–4. Warren 205. Not given in 1950–1951.]

FARM MANAGEMENT

102. *FARM MANAGEMENT.* Spring term. Credit five hours. Professor Warren. Lectures, M W F 10. Warren 25. Laboratory, F 4–6. Warren 101. On days when farms are visited laboratory period will be 2–6.

105. *FARM LABOR.* Fall term. Credit three hours. Prerequisite, course 102 or its equivalent. Professor Hurd. Lectures, T Th 11. Discussion T or Th 2–4. Warren 325.

203. *BUSINESS ORGANIZATION AND MANAGEMENT OF SUCCESSFUL NEW YORK FARMS.* Fall term. Credit four hours. Prerequisite, course 102 or its equivalent. Professor SCOVILLE. F 2–4, S 8–10. Warren 140. Approximate transportation expenses for trips, $15.

207. *METHODS OF RESEARCH IN FARM MANAGEMENT AND LAND ECONOMICS.* Fall and spring terms. Credit two hours each term. Professor WARREN and Assistant Professor CONKLIN. Th 4–6. Warren 140.

FARM FINANCE AND FARM APPRAISAL

184. *FARM FINANCE.* Spring term. Credit three hours. Open to graduate students and to those undergraduate students who have passed course 102 with a grade of 80 or better. Professor HEDLUND. Lectures, W F 8. Discussion, F 2–4. Warren 225.

187. *FARM APPRAISAL.* Fall term. Credit three hours. Professor WARREN. Lecture, T 10. Laboratory, T 1–5. Warren 101.

284. *RESEARCH METHODS AND PROBLEMS IN FARM FINANCE.* Spring term. Offered in alternate years. Credit two hours. Open to graduate students who have had course 184 and one term of course 207 or their equivalents. Professors HILL and HEDLUND. F 4–6. Warren 205.

LAND ECONOMICS AND AGRICULTURAL GEOGRAPHY

2. *AGRICULTURAL GEOGRAPHY.* Fall term. Credit 4 hours. Professor DEGRAFF. Lectures, M W F 9 or 11. Warren 25. Discussion, graduate students, F 4–6. Warren 325.

160. *FOOD ECONOMICS.* Spring term. Credit three hours. Professor DEGRAFF. Designed especially for students in the School of Nutrition and in the College of Home Economics. Not open to students in the College of Agriculture except by permission of the instructor. Lectures and discussion, M W F 8. Warren 325.

181. *AGRICULTURAL LAND ECONOMICS.* Spring term. Credit three hours. Primarily for juniors, seniors, and graduate students. For undergraduates, courses 2 and 102 should precede or accompany this course. Assistant Professor CONKLIN. Lectures, T Th 8. Warren 125. Discussion and laboratory: primarily for graduate students, T 2–4; primarily for undergraduate students, Th 2–4. Warren 140.

280. *SEMINAR IN AGRICULTURAL GEOGRAPHY.* Spring term. Credit two hours. Registration by permission. Professor DEGRAFF. W 7:30. Warren 330.

281. *SPECIAL PROBLEMS IN AGRICULTURAL LAND ECONOMICS.* Fall or spring term. Credit one or more hours. Open only to graduate students. Registration by permission. Assistant Professor CONKLIN.

MARKETING

141. *MARKETING.* Spring term. Credit three hours. Associate Professor BRUNK. Lectures, W F 11. Warren 25. Discussion, M or T 2–4. Warren 225.

142. *MARKETING FRUITS AND VEGETABLES.* Fall term. Credit four hours. Professor RASMUSSEN. Lectures, M W F 9. Warren 225. Laboratory, W 2–4, Warren 25, or F 2–4, Warren 225.

143. *MARKETING DAIRY PRODUCTS.* Spring term. Credit four hours. Professor SPENCER. Lectures, M W F 9. Warren 225. Laboratory, Th or F 2–4 (Thursday preferred for graduate students). Warren 240. Field trips to visit dairy plants will be arranged in place of one or more laboratory meetings.

144. *MARKETING POULTRY, EGGS, AND LIVESTOCK.* Spring term. Credit

three hours. Associate Professor DARRAH. Lectures, T Th 10. Discussion, Th 2–4. Warren 225.

147. *MARKETING TRIP TO NEW YORK CITY.* Spring term. Credit one hour. Enrollment limited. Associate Professors BRUNK and DARRAH. Total cost of the trip need not exceed $50 in addition to transportation to and from New York City.

240. *INTRODUCTION TO MARKETING RESEARCH.* Spring term. Credit two hours. Enrollment limited to graduate students. Associate Professor BRUNK. M 7:30. Warren 240.

[242. *CURRENT PROBLEMS IN THE MARKETING OF FRUITS AND VEGETABLES.* Fall term. Credit two hours. Limited to students who have done superior work in course 142 or its equivalent. Registration by special permission. Professor RASMUSSEN. Not given in 1950–1951.]

245. *RESEARCH IN MARKETING OF FRUITS AND VEGETABLES.* Fall term. Given in alternate years. Credit two hours. Open to graduate students who have had course 142 or 240 or its equivalent. Professor RASMUSSEN and Associate Professor BRUNK. W 4–6. Warren 228. Given in 1950–1951 if 5 or more students register.

246. *RESEARCH IN MARKETING OF DAIRY PRODUCTS.* Spring term. Offered in alternate years. Credit two hours. Professor SPENCER. W 4–6. Warren 213. Consult instructor for permission to register.

247. *SEMINAR IN POULTRY AND LIVESTOCK MARKETING RESEARCH.* Spring term. Offered in alternate years. Credit two hours. Open to graduate students who have had courses 144 and 240 or their equivalent. Associate Professor DARRAH. W 4–6. Warren 238.

PRICES AND STATISTICS

Attention is directed to courses in Mathematics and Statistics in the Colleges of Arts and Sciences and Engineering, and in the School of Industrial and Labor Relations.

111. *STATISTICS.* Fall term. Credit three hours. Mr. WEST. Lecture, M 8. Warren 125. Laboratory, M 2–4. Warren 25

112. *STATISTICS.* Spring term. Credit three hours. Mr. WEST. Prerequisite, course 111. Lecture, M W 8. Laboratory, M 2–4. Warren 25 and 40.

115. *PRICES.* Spring term. Credit three hours. Professor PEARSON. Lectures, T Th 9. Laboratory, W 2–4. Warren 25.

[215. *PRICES.* Fall and spring terms. Credit one hour a term. Professor PEARSON. Prerequisite, course 115. Not given in 1950–1951.]

PUBLIC ADMINISTRATION AND FINANCE

Attention is directed to the courses in Government and Economics in the College of Arts and Sciences.

135. *LOCAL GOVERNMENT.* Fall term. Credit three hours. Associate Professor LUTZ. Lectures, T Th 9. Warren 125. Laboratory, T or Th 2–4. Warren 201.

138. *TAXATION.* Fall term. Credit three hours. Professor KENDRICK. Lectures. M W F 11. Plant Science 233.

236. *PROBLEMS IN PUBLIC ADMINISTRATION.* Fall term. Credit three hours. Associate Professor LUTZ. Time and room to be arranged. Primarily for graduate students.

238. *SEMINAR IN PUBLIC FINANCE.* Spring term. Credit two hours. Professor KENDRICK. W 2–4. Warren 218. Prerequisite, graduate status with necessary preparation.

502. *FEDERAL PUBLIC FINANCE.* Spring term. Credit three hours. Prerequisite, Taxation 138. Professor KENDRICK. M W F 11. Warren 225.

AGRICULTURAL POLICY

251. *PUBLIC PROBLEMS OF AGRICULTURE.* Fall term. Credit two hours. Professor HILL. Lecture, W 8. Discussion, W 2–4. Warren 125.

DEPARTMENTAL SEMINAR

299. *SEMINAR.* Continues through fall and spring terms. Departmental staff. M 4. Warren 401.

AGRICULTURAL ENGINEERING

Professors O. C. FRENCH, B. B. ROBB, A. M. GOODMAN, B. A. JENNINGS, C. W. TERRY, F. B. WRIGHT; *Associate Professor* C. N. TURNER; *Assistant Professors* H. E. GRAY, L. L. BOYD, E. S. SHEPARDSON, W. W. GUNKEL.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Farm Structures 1, 2, 3, 4	Agricultural Engineering 1, 2, 3, 4
Farm Equipment 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. First-hand knowledge of farm life and of rural conditions generally is 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.

For undergraduate courses which often meet the needs of graduate students see the *Announcement of the College of Agriculture,* Department of Agricultural Engineering, courses 101, 102, 103, 221, 21, 31, 40, 41, 42, 43, Drawing 2.

203. *AGRICULTURAL MACHINERY DESIGN.* Fall term. 3 hours. Professor TERRY. Prerequisites, Engineering Drawing, Mechanics (Statics, Dynamics), Strength of Materials. Two lectures and one computing period a week, to be arranged.

231. *FARM STRUCTURES DESIGN.* Spring term. Three hours. Assistant Professors BOYD and GRAY. Prerequisite, Strength of Materials.

251. *RESEARCH IN AGRICULTURAL ENGINEERING.* Fall and spring term. One or more hours. Prerequisite, permission to register. Professors FRENCH, ROBB, GOODMAN, JENNINGS, TERRY, and WRIGHT; Associate Professor TURNER, and Assistant Professors BOYD, GRAY, GUNKEL, and E. S. SHEPARDSON. Hours as arranged.

252. *SEMINAR.* Required of graduate students. Both terms. Credit one hour a term. Professor FRENCH and STAFF. T 12:30–1:30.

AGRONOMY

Professors R. BRADFIELD, H. B. HARTWIG, R. B. MUSGRAVE, MICHAEL PEECH, M. G CLINE, H. A. MACDONALD, M. B. RUSSELL, J. E. DAWSON, W. K. KENNEDY, N. C. BRADY, EARL STONE, and PAUL ZWERMAN, *Assistant Professor* BROADBENT.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Soils 1, 2, 3, 4
Field Crop Production 1, 2, 3, 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 RUSSELL in soil physics; Professor CLINE in the Morphology, classification, and cartography of soils; Professor BROADBENT in microbiology; Professor DAWSON in organic soils; Professor STONE in forest soils; Professor ZWERMAN in soil erosion control; Professor BRADY in plant nutrition; Professor HARTWIG in field crop production; Professors KENNEDY and MACDONALD in pasture production and management; and Professor MUSGRAVE in field crop ecology and grain production; and Professor —— in soil testing. 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, mathematics through calculus, analytical, organic, and physical chemistry, general botany, bacteriology, genetics, 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. Preregistration required.

6. *Soils.* Spring term. Credit three hours. Preregistration required.

101. *SOIL CLASSIFICATION AND SURVEY.* Spring term. Credit three hours. Prerequisite, Agronomy 1 or 6 or equivalent. Lectures T Th 10. Laboratory Th 2–4:40. Caldwell 143. Field work replaces the laboratory as soon as weather permits; time to be arranged. Professor CLINE.

102. *SOIL CONSERVATION.* Spring term. Credit two hours. Prerequisite, Agronomy 1 or 6 and 2 or 11 or their equivalent. Farm background essential. Lectures, T Th 11. Caldwell 100. Laboratories will be arranged. Associate Professor ZWERMAN. Two all-day Saturday field trips.

[103. *ORGANIC SOILS.* Fall term. Credit two hours. Given in alternate years. Prerequisite, Agronomy 1. Associate Professor DAWSON. Not given in 1950–1951.]

104. *FOREST SOILS.* Fall term. Credit two hours. Given in alternate years. Prerequisite, Agronomy 1 and Botany 31. Assistant Professor STONE. Occasional field trips. Transportation costs to be arranged.

105. *SOIL AND CROP MANAGEMENT.* Fall term. Credit three hours. Primarily for advanced undergraduates and graduate minors in Agronomy. Prerequisite, Agronomy 1 or 6 and 2 or 11, or permission of the instructor. Lectures, T Th 9. Laboratory, Th 2–4:30. Caldwell 143. Professor CLINE. A few field trips to near-by farms.

106. *SOIL MICROBIOLOGY.* Fall term. Credit three hours. With the approval of the instructor, the lectures without the laboratory may be taken for two-hour credit. Prerequisite, Agronomy 1, except for students majoring in bacteriology, Bacteriology 1, and Chemistry 201 or its equivalent. Lectures, M W 8. Caldwell 143. Laboratory, F 2–4:30. Caldwell 201. Assistant Professor BROADBENT.

107. *PHYSICAL EDAPHOLOGY.* Fall term. Credit three hours. Primarily for advanced undergraduates and graduate minors in Agronomy. Prerequisite, Agronomy 1 or permission of the instructor. Lectures, M W F 8. Caldwell 143.

201. *SOIL CHEMISTRY, LECTURES.* Spring term. Credit three hours. Prerequisite, Agronomy 1 and Qualitative and Quantitative Analysis. A course in physical chemistry is recommended. M W F 9. Caldwell 143. Professor PEECH.

202. *CHEMICAL METHODS OF SOIL ANALYSIS.* Spring term. Credit three hours. Prerequisite, Agronomy 1 and Qualitative and Quantitative Analysis. Enrollment limited. T Th 2–4:30. Caldwell 350. Preregistration required. Professor PEECH.

[203. *THE GENESIS, MORPHOLOGY, AND CLASSIFICATION OF SOILS.* Credit three hours. Lectures, M W F 9. Caldwell 143. Given in alternate years. Professor CLINE. Not given in 1950–1951.]

205. *SOIL FERTILITY, ADVANCED COURSE.* Fall term. Credit three hours. Prerequisite, Agronomy 1 and Chemistry 201 or its equivalent. Lectures, T Th S 8. Caldwell 143. Professor BRADFIELD.

[207. *SOIL PHYSICS.* Fall term. Credit three hours. Primarily for graduate students. Prerequisite, Agronomy 107 or permission of the instructor. Lectures, M W F 10. Caldwell 143. Given in alternate years. Professor RUSSELL. Not given in 1950–1951.]

208. *PHYSICAL PROPERTIES OF SOILS, LABORATORY.* Fall term. Credit three hours. Must be preceded or accompanied by course 207. Enrollment limited. M W 2–4:30. Caldwell 294. Professor RUSSELL.

209. *RESEARCH IN SOIL SCIENCE.* Fall and spring terms. Professors BRADFIELD, PEECH, HOWE, CLINE, and RUSSELL; Associate Professor DAWSON, and Assistant Professors BRADY and STONE.

210. *SELECTED TOPICS IN SOIL SCIENCE.* Fall and spring term. Credit one to three hours. Prerequisite, ten credit hours in Soil Science. Time to be arranged.

Topics for 1950–1951 are:

Fall term: (a) Soil Temperature; Professor RUSSELL; one credit hour. (b) To be arranged; STAFF; one to three credit hours.

Spring term: (a) Clay Minerals; Professor RUSSELL; one credit hour. (b) Ionic Equilibria in Soils; Professor PEECH; one credit hour. (c) To be arranged; STAFF; one to three credit hours.

FIELD CROPS

2. *Introduction to Field Crops.* Spring term. Credit three hours. Preregistration required.

11. *Production of Field Crops.* Fall term. Credit four hours. Preregistration required.

211. *SPECIAL TOPICS IN FIELD CROPS.* Spring term. Credit one to two hours. Professors HARTWIG, KENNEDY, MACDONALD, MUSGRAVE. Meeting once weekly.

112. *PASTURE AND HAY CROPS.* Spring term. Credit three hours. For juniors, seniors, and graduate students. Prerequisite, Agronomy 1 and 11 or 2 and 6 by permission. Lectures, T Th 9. CALDWELL 143. Laboratory and field trip, W Th 2–4:30, and two all-day field trips. Professor KENNEDY.

213. *CROP ECOLOGY.* Fall term. Credit three hours. Prerequisites, Agronomy 11 and Botany 31 or their equivalent. Lectures, T Th S 10. Caldwell 31. Associate Professor MUSGRAVE.

214. *GRASSLAND RESEARCH.* Fall term. Credit three hours. Prerequisites, Agronomy 1, 11, and 112, or permission of the instructor. Botany 31 and Plant Breeding 102 or their equivalent.

219. *RESEARCH IN FIELD-CROP PRODUCTION.* Fall, spring, and summer terms. Professors HARTWIG and KENNEDY; and Associate Professors MUSGRAVE and MACDONALD.

DEPARTMENTAL SEMINAR

290. *SEMINAR.* Fall and spring terms. Required of graduate students taking work in the Department, S 11–12:30. Caldwell 143.

ANIMAL HUSBANDRY

Professors K. L. TURK, S. A. ASDELL, J. K. LOOSLI, L. A. MAYNARD, C. M. MCCAY, J. I. MILLER, F. B. MORRISON, and J. P. WILLMAN; *Associate Professors* R. W. BRATTON, C. R. HENDERSON, J. T. REID, S. E. SMITH, and G. W. TRIMBERGER; *Assistant Professors* WM. HANSEL, L. H. SCHULTZ, and J. J. WANDERSTOCK.

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)

Dairy Husbandry 1, 2, 3, 4

Note: If the major for the Ph.D. degree lies in one of these 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 Nutrition and detailed descriptions of the courses in this field see the statements under that subject.

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 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.

Also, the student should have basic courses in general biology or zoology, introductory chemistry, organic chemistry, animal physiology, and genetics. In the course of their graduate study, candidates for the Doctor's degree will be expected to take training in biochemistry, physiology, genetics, biological statistics, and other related fields.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Animal Husbandry, courses 1, 10, 20, 50, 60, 70, 80, and 90.

110. *PRINCIPLES OF ANIMAL NUTRITION.* Fall term. See *ANIMAL NUTRITION.*

111. *LABORATORY WORK IN ANIMAL NUTRITION.* Fall term. Laboratory course. See *ANIMAL NUTRITION.*

115. *ADVANCED LIVESTOCK FEEDING AND APPLIED ANIMAL NUTRITION.* Spring term. Credit two hours. Prerequisites, a course in livestock feeding and a course in animal nutrition. Professor MORRISON. Lectures and discussions, T Th 9.

120. *PROBLEMS IN ANIMAL BREEDING.* Fall term. Credit two hours. Prerequisite, Animal Husbandry 20 or Plant Breeding 101. Professor HENDERSON. T Th 11.

125. *PHYSIOLOGY OF REPRODUCTION.* Spring term. Credit two hours. Prerequisite, a course in human or veterinary physiology. Professor ADSELL. M W 10.

126. *APPLIED ANIMAL PHYSIOLOGY.* Fall term. Credit one hour. Professor ASDELL. T 9.

127. *ELEMENTARY ENDOCRINOLOGY.* Fall term. Credit two hours. Professor HANSEL. T Th 10.

150. *ADVANCED DAIRY PRODUCTION.* Spring term. Credit three hours. Prerequisite, Course 50. Professor TRIMBERGER. Lecture, T Th 11. Discussion and practice, T 2–4:30.

210. *SPECIAL TOPICS IN ANIMAL NUTRITION.* Spring term. See *ANIMAL NUTRITION.*

215. *HISTORY OF NUTRITION.* Fall term. See *ANIMAL NUTRITION.*

219. *SEMINAR IN ANIMAL NUTRITION.* Fall term. See *ANIMAL NUTRITION.*

200. *RESEARCH.* Fall and spring terms. Hours by arrangement. Professors MORRISON, MILLER, REID, SMITH, TRIMBERGER, TURK, J. P. WILLMAN, BRATTON, HENDERSON, ASDELL, LOOSLI, MAYNARD, and MCCAY.

201. *SEMINAR 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 TURK and departmental STAFF. M 11.

DAIRY SCIENCE

Professors J. M. SHERMAN, A. C. DAHLBERG, B. L. HERRINGTON, R. F. HOLLAND, H. B. NAYLOR, V. N. KRUKOVSKY, J. C. WHITE, and F. V. KOSIKOWSKY.

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 starting 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.* Fall term. Credit three hours a week.

5. *Technical Control of Dairy Products.* Second term. Two hours a week.

102. *MARKET MILK.* Spring term. Credit five hours. Prerequisites, course 1, and Bacteriology 1 or its equivalent. Professors HOLLAND and WHITE. Lectures, M W 11; laboratory, M W 2–5:30. Dairy Building 119 and 146. Preregistration required.

103. *MILK-PRODUCTS MANUFACTURING.* Fall term. Credit five hours. Prerequisite, course 1. Professor KOSIKOWSKY. Lectures, recitations, and laboratory practice, T Th 11–4:30. Dairy Building 120. Preregistration required.

104. *MILK-PRODUCTS MANUFACTURING.* Spring term. Credit five hours. Prerequisite, course 1; should be preceded or accompanied by course 5. Mr. JORDAN. Lectures, recitation, and laboratory practice, F 12–5, S 8–1. Preregistration required.

111. *ANALYTICAL METHODS.* Spring term. Credit four hours. Prerequisite, quantitative analysis. Professor HERRINGTON. Lectures, T Th 11. Laboratory practice, T 1–5. Dairy Industry Building 120. Preregistration required.

113. *CHEMISTRY OF MILK.* Fall term. Credit two hours. Prerequisites, qualitative and quantitative analysis and organic chemistry; must be preceded or accompanied by course 1 or its equivalent. Professor HERRINGTON. Lectures, M W 8. Dairy Building 119.

DAIRY BACTERIOLOGY. (See Bacteriology 191.)

220. *CHEMISTRY OF MILK PRODUCTS.* Spring term. Credit four hours. Must be preceded by course 113. Professor ——. Lectures, M T W Th 8. Dairy Building 218.

252. *SEMINAR.* 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.

FLORICULTURE AND ORNAMENTAL HORTICULTURE

Professors L. H. MACDANIELS, KENNETH POST, J. P. PORTER, A. M. S. PRIDHAM, W. E. SNYDER, ARTHUR BING, and J. F. CORNMAN.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Floriculture and Ornamental Horticulture 1, 2, 4

Studies in the propagation, nutrition, culture, and improvement of ornamental plants may be undertaken. Monographic studies of ornamental groups and their adaptability to use are also suitable problems.

Most of the problems in this field are basically those of plant response with relation to environment, and therefore the student majoring in the department should have adequate preparation in Botany, Plant Physiology, Genetics, Biometry, 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.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Floriculture and Ornamental Horticulture, courses 1, 2, 5, 10, 12, 13, and 32. For courses 10, 12, 13, and 32, preregistration is required.

113. *WOODY-PLANT MATERIALS, ADVANCED COURSE.* Fall term. Credit two hours. Prerequisite, course 13. Assistant Professor CORNMAN. Lecture, T 9. Laboratory, T 2–4:30. Plant Science 29.

[114. *TURF.* Spring term. Credit two hours. Prerequisite, Agronomy 1 and permission to register. Assistant Professor CORNMAN. Given in alternate years. Not given in 1950–1951.]

115. *PLANT PROPAGATION.* Fall term. Credit three hours. Prerequisites, courses 12 and 13 and Botany 31 or their equivalent. Associate Professor SNYDER. Lectures, T Th 8. Plant Science 37. Laboratory, Th 2–4:30 or S 9–11. Greenhouses.

[215. *PLANT PROPAGATION, ADVANCED COURSE.* Fall term. Credit two hours. Associate Professor SNYDER. Given in alternate years. Not given in 1950–1951.]

123. *FLORIST CROP PRODUCTION.* Fall term. Credit four hours. Prerequisites, course 115, Botany 31, Agronomy 1, and the practice requirement. Professor POST. Lectures and recitation, M W F 9. Plant Science 37. Laboratory, M 2–4:30. Greenhouses.

124. *COMMERCIAL GREENHOUSE PRODUCTION.* Spring term. Credit three hours. Prerequisite, course 123. Assistant Professor BING. Lectures, M W 9. Plant Science 37. Laboratory, W 2–4:30. Greenhouses.

117. *COMMERCIAL NURSERY MANAGEMENT.* Spring term. Credit three hours. Prerequisite, course 115. Associate Professor PRIDHAM. Lectures W F 11. Plant Science 37. Laboratory, T 2–4:30. Greenhouses.

119. *PLANTING AND MAINTENANCE OF ORNAMENTAL PLANTS.* Fall term. Credit three hours. Prerequisite, course 115. Associate Professor PRIDHAM. Lectures, T Th 11. Plant Science 37. Laboratory, T 2–4:30. Greenhouse.

125. *FLOWER STORE MANAGEMENT.* Spring term. Credit two hours. Prerequisites, course 5 and permission to register. Miss HAKANSON. Lecture M 11. Plant Science 37. Laboratory, M 2–4:30. Plant Science 22.

132. *LANDSCAPE PLANNING AND PLANTING OF SMALL PROPERTIES.* Fall and spring terms. Credit four hours each term. Prerequisites, courses 12, 113, and 32. Should be accompanied by course 134 during fall term. Assistant Professor PIERCE and Associate Professor PORTER. Lecture, T 10. Plant Science 432.

Laboratory, T Th 2–4:30 and one additional three-hour period. Plant Science 433.

134. *NURSERY-LANDSCAPE CONSTRUCTION AND ESTIMATING.* Fall term. Credit three hours. Intended for advanced students specializing in landscape services. Must be taken in conjunction with course 132. Assistant Professor PIERCE. Lecture, Th 9. Laboratory, Th 10–12:30. Plant Science 433.

241. *SEMINAR.* Fall and spring terms. One hour to be arranged. Required of all graduate students in the Department and recommended for senior majors.

POMOLOGY[1]

Professors A. J. HEINICKE, M. B. HOFFMAN, R. M. SMOCK, DAMON BOYNTON, and L. J. EDGERTON.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Pomology 1, 2, 4

Laboratory, greenhouse, and orchard facilities at Ithaca and Geneva are available for graduate use. Each year a large collection of exotic fruit is brought together at the College; herbarium and preserved material is also available Opportunity for investigation of fruit storage problems is afforded by a cold storage plant that is equipped for experimental purposes.

Special facilities for research work in fruit breeding, nursery stock investigations, and other phases of pomology are also available at Geneva (for further information, see page 182).

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. Students are required as part of their graduate work in Pomology to take advanced courses in Plant Physiology, Plant Anatomy, Cytology, and Chemistry. They are urged to choose one minor in some phase of Botany, particularly Plant Physiology.

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.

For undergraduate courses, see the *Announcement of the College of Agriculture,* Department of Pomology, courses 1, 102, 112. Preregistration required.

111. *HANDLING, STORAGE, AND UTILIZATION OF FRUIT.* Credit three hours. Fall term, Prerequisite Pomology 1. Professor R. M. SMOCK. Lectures, T Th 8. Laboratory, Th or F 2–4:30.

[121. *ECONOMIC FRUITS OF THE WORLD.* Fall term, alternate years. Credit three hours. Prerequisites, Pomology 131 or permission to register. Professor BOYNTON. Lectures, M W 12. Laboratory, F 2–4:30. Not given in 1950–1951.]

131. *ADVANCED POMOLOGY.* Fall term. Credit three hours. Prerequisites, Botany 31. Professors HEINICKE, BOYNTON, or HOFFMAN. Lectures, M W F 9.

200. *SEMINAR.* Fall and spring terms. Members of the STAFF. T 11. Plant Science 404.

201. *RESEARCH PROBLEMS IN POMOLOGY.* Fall and spring terms. Professors HEINICKE, HOFFMAN, SMOCK, BOYNTON, and EDGERTON.

[231. *SPECIAL TOPICS IN EXPERIMENTAL POMOLOGY.* Spring term, al-

[1]See also Pomology, p. 182 (Agricultural Sciences at Experiment Station at Geneva).

ternate years. Credit three hours. Prerequisite, Pomology 131. Professors HEINICKE, HOFFMAN, BOYNTON, and SMOCK; and Associate Professor EDGERTON. Conference periods, M W F 9. Not given in 1950–1951.]

POULTRY HUSBANDRY

Professors J. H. BRUCKNER, R. K. COLE, G. O. HALL, G. F. HEUSER, F. W. HILL, F. B. HUTT, L. C. NORRIS, A. L. ROMANOFF, M. L. SCOTT.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Animal Genetics 1, 2, 3, 4	Chemical Embryology 1, 2, 3, 4
Animal Nutrition 1, 2, 3, 4	Poultry Husbandry 2, 4

The Department provides excellent facilities for research in the genetics, physiology, incubation, embryology, nutrition, marketing, and behavior of domestic birds. A flock of more than 6000 birds of various breeds of domestic fowl, ducks, and turkeys is maintained, and geese and game birds can be obtained when needed. There are 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.

Students for the Ph.D. degree in this department may elect Animal Genetics, Animal Nutrition, or Chemical Embryology as the major field of study. Those studies may also be elected as major or minor fields for the M.S. or M.S. in Agriculture degree. For requirements and courses in Animal Nutrition see p. 80.

Poultry Husbandry may be elected as a major or minor for the M.S. or M.S. in Agriculture degree, and as a minor for the Ph.D. degree when the major is taken in a field of study other than Animal Genetics, Animal Nutrition, or Chemical Embryology.

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.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Agriculture,* Department of Poultry Husbandry. Preregistration is required.

[120. *POULTRY GENETICS.* Spring term. Credit three hours. Prerequisites, Zoology 103–104, Plant Breeding 101, or equivalents, and permission of the instructor. Professor HUTT. M W F 9. Given in alternate years. Not given in 1950–1951.]

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.

210. *EXPERIMENTAL METHODS IN POULTRY NUTRITION.* Spring term. For details see ANIMAL NUTRITION.

219. *ANIMAL NUTRITION SEMINAR.* Spring term. For details see ANIMAL NUTRITION.

220. *SPECIAL TOPICS IN ANIMAL GENETICS.* Fall term. Credit one hour. Registration by permission. Professors HUTT and COLE. Hours to be arranged. Not given every year, but only when the number of qualified students warrants.

[230. *AVIAN EMBRYOLOGY.* Spring term. Given in alternate years with Course 235. Credit two hours. For graduate students. Undergraduates by special permission. Prerequisite, Biology 1, or Zoology 103–104 or the equivalent. Lec-

ture and laboratory demonstration. Professor ROMANOFF. Hours to be arranged. Rice Hall. Not given in 1950–1951.]

235. *THE AVIAN EGG.* Spring term. Credit two hours. Given in alternate years with Course 230. For graduate students and qualified juniors and seniors. Prerequisite, Biology 1, or Zoology 103–104 or the equivalent, and permission of the instructor. Professor ROMANOFF. Lecture and laboratory. Hours by arrangement. Rice Hall.

239. *SPECIAL TOPICS IN CHEMICAL EMBRYOLOGY.* Fall term. Credit one hour. Registration by permission. Rice Hall. Professor ROMANOFF.

VEGETABLE CROPS

Professors H. S. THOMPSON, PAUL WORK, E. V. HARDENBERG, ORA SMITH, G. J. RALEIGH, J. D. HARTMAN, A. J. PRATT, R. D. SWEET, H. M. MUNGER, W. C. JACOB, H. J. CAREW, J. H. ELLISON, and W. C. KELLY; at GENEVA, *Professors* C. B. SAYRE, W. T. TAPLEY, C. H. DEARBORN, and M. T. VITTUM.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Vegetable Crops 1, 2, 4

Research in Vegetable Crops is the application of fundamental scientific methods to the solution of problems in the growing and handling of vegetables. These problems may involve control of flowering and fruiting, use of organic growth regulators, determination of fertilizer requirements, adaptation of rapid tests for diagnosing nutrient deficiencies, development of objective methods for the determination of edible and market quality, physiological effects of various methods of harvesting, shipping, packaging, storing, and otherwise handling vegetables, control of physiological diseases, chemical and mechanical weed killers, and the like.

The facilities available include the usual classrooms and laboratories; research laboratories with equipment for chemical, physiological, and anatomical work; cold storage and common storage rooms; greenhouses (about 7500 square feet) with heat controls; about 30 acres of land at Ithaca devoted to research and teaching and an additional 50 acres devoted to research on Long Island.

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, 112. These courses are outlined in the *Announcement of the College of Agriculture.* In case a student has not had all 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 courses 101, 113, 225, and to attend the seminar. Basic training in quantitative chemical analysis, organic chemistry, biological chemistry, physics and mathematics, through elementary analytical geometry or calculus, is highly desirable.

1. *Vegetable Crops.* Spring term. Credit four hours. Preregistration required.

2. *Special Cash Crops.* Spring term. Credit three hours. Botany 1 should precede or accompany this course. Preregistration required.

101. *ADVANCED VEGETABLE CROPS.* Fall term. Credit three hours. Prerequisites, course 1 and Botany 31. Professor THOMPSON. Lectures, M W F 9. East Roberts 223. Preregistration required.

112. *POST-HARVEST HANDLING OF VEGETABLE CROPS.* Fall term. Credit four hours. Professor HARTMAN. Lectures, T Th 11, East Roberts 222. Laboratory, T or W 2–4:30, East Roberts 223. One two-day and three afternoon trips required. Estimated partial cost of transportation to be collected from the student, $2. Preregistration required.

113. *TYPES AND VARIETIES OF VEGETABLES.* Fall term. Credit three hours. Alternate years. Prerequisites, Vegetable Crops 1 or 2 or permission. Professor SWEET. Lecture and laboratory F 2–4:30, East Ithaca Gardens and East Roberts 223. Required instruction beginning 9 A.M., M (Sept. 11), continuing through T (Sept. 19), East Ithaca. Preregistration required.

[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 HARTMAN, and Associate Professor SWEET. East Roberts 223. Given in alternate years. Not given in 1950–1951.]

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. Credit one hour. Members of the department STAFF. Recent literature is taken up for discussion and graduate thesis problems are reported. 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 183.

SCHOOL OF EDUCATION

EDUCATION AND RURAL EDUCATION

Professors T. L. Bayne, C. K. Beach, Sara Blackwell, J. M. Brophy, J. E. Butterworth, C. H. Crawford, R. H. Dalton, L. H. Elliott, L. A. Emerson, Jean Failing, F. S. Freeman, M. D. Glock, E. L. Gordon, Esther Harris, Helen Hoefer, E. R. Hoskins, M. Hutchins, J. P. Leagans, C. B. Moore, H. Moser, A. G. Nelson, E. L. Palmer, H. I. Patterson, W. A. Smith, F. H. Stutz, Ethel Waring, A. L. Winsor, and *Deans* Lucile Allen and Frank Baldwin.

APPROVED MAJOR AND MINOR SUBJECTS (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 (including Statistics) 2, 3, 4
Educational and Mental Measurement 2, 3, 4.
Educational Method 3, 4
Educational Psychology 1, 2, 3, 4
Extension Education 1, 2, 3, 4
Guidance and Personnel Administration 1, 2, 3, 4
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

Students in Education may become candidates for two types of advanced degrees: (1) the degrees of Master of Arts, Master of Science, Master of Science in Agriculture, Doctor of Education, 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 Graduate School under the special jurisdiction of the School of Education.

ADMISSION

A student may be admitted to candidacy for any of the degrees, Master of Arts, Master of Science, Master of Science in Agriculture, Doctor of Education, or Doctor of Philosophy, with a major or minor or both in some phase of Education.

The requirements for admission to candidacy for the Master of Science degree in Education are the same as those for the Master of Arts or Master of Science degrees, except that there is no requirement in foreign language.

Inquiries should be addressed 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 program for this degree is planned for students seeking an additional year of preservice preparation for teaching. Applicants who, as undergraduates, have not completed professional requirements for certification to teach may do so by taking one year and one summer session of professional work leading toward this degree.

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, extension workers, 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 and hours see the Announcements of the colleges concerned.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the School of Education,* courses 10, 106, 107, 108, 111, 112, 117, 121, 128, 129, 130, 131, 132, 133, 134, 135, 136, 138, and 190; also the *Announcement of the College of Arts and Sciences,* courses Human Growth and Development 201–202, Sociology 101.

SECONDARY SCHOOL TEACHING

200. *APPRENTICE TEACHING.* (Ed. and R.E.) An eight-week period off campus to be arranged. Members of the STAFF. May be required of a candidate for the M.Ed. degree. Prerequisite: satisfactory completion of the first four years of the five-year program, or the equivalent, or special permission.

210. *SPECIAL PROBLEMS IN TEACHING.* (Ed. and R.E.) Fall and spring term. Members of the STAFF.

R.E. 244. *PHILOSOPHY OF EDUCATION.* Spring term. Professor MOORE. S 9–10:40.

Psych. 675. *SEMINAR IN HUMAN DEVELOPMENT AND BEHAVIOR.* Spring term. Primarily for graduate students. Professor FREEMAN. M 4–6.

NATURE STUDY AND SCIENCE TEACHING

R.E. 202. *NATURE LITERATURE.* Fall term. Credit two hours. Open to graduate students and seniors interested in science and science teaching. Assistant Professor GORDON. M W 10.

[R.E. 203. *RESEARCH AND WRITING IN NATURE AND CONSERVATION EDUCATION.* Spring term. Credit two hours. Professor PALMER. T Th 10. Not given in 1950–1951.]

R.E. 205. *THE TEACHING OF CONSERVATION.* Spring term. Credit two hours. Professor PALMER. T Th 10.

R.E. 207. *METHODS AND MATERIALS FOR THE TEACHING OF SCIENCE IN SECONDARY SCHOOLS.* Spring term. Credit two hours. Registration by permission only. Mr. ECKERT. Hours to be arranged.

[R.E. 209. *THE DEVELOPMENT OF NATURE AND SCIENCE EDUCATION IN THE UNITED STATES.* Fall term. Credit two hours. Assistant Professor GORDON. M W 10. Not given in 1950–1951.]

R.E. 226. *RESEARCH IN SCIENCE TEACHING.* Fall or spring term. Credit one hour. Professor PALMER, Assistant Professor GORDON, and Mr. ECKERT.

EDUCATIONAL PSYCHOLOGY

R.E. 211. *EDUCATIONAL PSYCHOLOGY.* Fall term. Credit three hours. For mature students with teaching or extension experience. Professor GLOCK. M F 11–12:20.

R.E. 213. *PSYCHOLOGY OF LEARNING IN THE SCHOOL SUBJECTS.* Fall term. Credit two hours. Associate Professor BAYNE. S 9–10:30.

R.E. 218. *SEMINAR IN EDUCATIONAL PSYCHOLOGY.* Spring term. Credit two hours. Professor GLOCK. F 4–5:30.

R.E. 219. *SEMINAR IN PERSONNEL ADMINISTRATION IN EDUCATIONAL INSTITUTIONS.* Spring term. Credit two hours. For graduate students in education. Professor WINSOR. Th 4–6.

R.E. 228. *SEMINAR IN CHILD GUIDANCE* (Child Development and Family Relationships 450). Spring term. Credit two hours. Professor WARING. W 4–6.

Psych. 618. *INDIVIDUAL DIFFERENCES.* Spring term. Credit three hours. Prerequisite, Psychology 607 or equivalent, or consent of instructor. Professor FREEMAN. T Th 2–3:15.

EXTENSION EDUCATION

R.E. 223. *SEMINAR IN EXTENSION EDUCATION.* Fall or spring terms. Credit two hours each term. Open to graduate students in Extension Education and others with extension experience. Professor LEAGANS. W 4–5:30.

R.E. 224. *PROGRAM BUILDING IN EXTENSION EDUCATION.* Fall term. Credit two hours. For graduate students in Extension Education and others with extension experience. Professor LEAGANS. T 2–3:30.

R.E. 225. *TEACHING IN EXTENSION EDUCATION.* Spring term. Credit two hours. For graduate students in Extension Education and others concerned with teaching adults. Professor LEAGANS. T 2–3:30.

Courses suggested for additional basic work in this field:

Rural Education (211, 219, 244, 299)

Education (296)

Home Economics Education (437, 438, 459)

Rural Sociology (132, 203, 212, 218, 219)

Agricultural Economics (160, 181, 251)

Further selection from a broad range of University offerings may be made by the student to meet his special interests and needs.

AGRICULTURAL EDUCATION

R.E. 230. *SEMINAR IN AGRICULTURAL EDUCATION.* Spring term. Credit two hours. Associate Professor HOSKINS and members of the STAFF. W 4–6.

R.E. 231. *SUPERVISION IN VOCATIONAL AGRICULTURE.* Spring term. Credit two hours. Open to students with experience in vocational agriculture, or by permission. Associate Professor SMITH. T 11–1.

R.E. 232. *EVALUATION AND PROGRAM PLANNING IN AGRICULTURAL EDUCATION.* Spring term. Credit two or three hours. Associate Professor HOSKINS. Th 4:15–6 and special trips to be arranged.

[R.E. 233. *SUPERVISED FARMING PROGRAMS IN VOCATIONAL AGRICULTURE.* Fall term. Credit two or three hours. Professor ——. M 2–5. Not given in 1950–1951.]

R.E. 234. *EDUCATION FOR LEADERSHIP OF FARM YOUTH AND ADULT GROUPS.* Fall term. Credit two or three hours. Associate Professor HOSKINS. M 7:15–9 P.M.

R.E. 235. *THE PREPARATION OF TEACHERS IN VOCATIONAL AGRICULTURE.* Fall term. Credit two or three hours. Open to students with ex-

perience in vocational agriculture or by permission. Associate Professor SMITH. M 4:15–6.

[R.E. 236. *THE ORGANIZATION AND ADMINISTRATION OF VOCATIONAL AGRICULTURE IN THE SECONDARY SCHOOL.* Spring term. Credit two or three hours. Associate Professor HOSKINS. T Th 11–12:30. Not given in 1950–1951.]

R.E. 237. *COURSES OF STUDY IN VOCATIONAL AGRICULTURE.* Fall term. Credit two hours. Associate Professor HOSKINS. T 4:15–6.

R.E. 238. *MATERIALS OF INSTRUCTION IN VOCATIONAL AGRICULTURE.* Spring term. Credit two hours. Open to students with experience in teaching vocational agriculture. Professor ——. M 7:15–9 p.m.

[R.E. 239. *METHODS AND MATERIALS OF INSTRUCTION FOR PREVOCATIONAL AGRICULTURE.* Spring term. Credit two hours. M 7:15–9 p.m. Not given in 1950–1951.]

SUPERVISION

[R.E. 241. *THE PREPARATION OF TEACHERS FOR NORMAL SCHOOLS AND COLLEGES.* Spring term. Credit two hours. Professor MOORE. Not given in 1950–1951.]

R.E. 243. *PROCEDURES AND TECHNIQUES IN SUPERVISION.* Fall term. Credit three hours. Professor MOORE. M W F 10.

R.E. 245. *SEMINAR FOR PRINCIPALS.* Fall term. Credit two hours. Required of all graduate students who are candidates for a principal's certificate. Professor MOORE. S 9–10:40.

R.E. 246. *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. T Th S 2–3:30.

[R.E. 247. *SEMINAR IN ELEMENTARY EDUCATION.* Spring term. Credit three hours. Professor MOORE. Not given in 1950–1951.]

APTITUDE AND ACHIEVEMENT 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. Associate Professor BAYNE. S 11–12:30 and an additional hour to be arranged.

R.E. 253. *INTRODUCTION TO EDUCATIONAL STATISTICS.* Fall term. Credit three hours. Associate Professor BAYNE. T Th 10 and an hour to be arranged.

[R.E. 254. *STATISTICAL INSTRUMENTS IN EDUCATION.* Spring term. Credit two hours. Prerequisite, a first course in statistics and permission of the instructor. Associate Professor BAYNE. T 10 and a period to be arranged. Not given in 1950–1951.]

R.E. 255. *USE AND ADMINISTRATION OF TESTS IN GUIDANCE AND PERSONNEL ADMINISTRATION.* Fall term. Credit two hours. Open to students in guidance or personnel administration. Professor WINSOR. Th 4–6.

Psychology 607. *PSYCHOLOGICAL TESTS I:* Tests of intelligence and specific aptitudes. Fall term. Credit three hours. Not open to sophomores. Prerequisite, a course in psychology and a course in statistics; or consent of the instructor. T Th S 9. Professor FREEMAN.

Psychology 608. *PSYCHOLOGICAL TESTS II:* Tests of personality and social behavior. Spring term. Credit three hours. Prerequisite, Psychology 607 or consent of the instructor. T Th S 9. Professor FREEMAN.

ADMINISTRATION, SECONDARY EDUCATION, AND CURRICULUM

[R.E. 260. *THE TWELVE-GRADE PRINCIPALSHIP.* Spring term. T Th 2–3:30. Not given in 1950–1951.]

R.E. 261. *FUNDAMENTALS OF EDUCATIONAL ORGANIZATION AND ADMINISTRATION.* Fall term. Credit three hours. Professor BUTTERWORTH. T Th 11–12:30. Candidates for a state administrative certificate must register also for course R.E. 400.

R.E. 262. *THE SECONDARY SCHOOL PRINCIPALSHIP.* Spring term. Credit two hours. Assistant Professor ELLIOTT. Th 2–4.

[R.E. 263. *THE PRINCIPALSHIP OF THE ELEMENTARY SCHOOL.* Professor MOORE. Not given in 1950–1951.]

R.E. 264. *FINANCIAL POLICIES AND PRACTICES IN PUBLIC SCHOOLS.* Fall term. Credit two hours. Prerequisite, R.E. 261 or equivalent. Professor BUTTERWORTH. T 4:15–5:45.

R.E. 265. *THE SCHOOL PLANT.* Spring term. Credit two hours. Prerequisite, R.E. 261 or equivalent. Professor BUTTERWORTH. S 11–12:30.

[R.E. 267. *THE LEGAL PROBLEMS OF THE SCHOOL ADMINISTRATOR.* Mr. ——. Not given in 1950–1951.]

R.E. 268. *SEMINAR IN RURAL SCHOOL ADMINISTRATION.* Fall term. Professor BUTTERWORTH. S 11:00–12:30. Topic to be announced.

[R.E. 269. *SEMINAR IN CITY SCHOOL ADMINISTRATION.* Spring term. Special lecturer. S 9–10:30. Not given in 1950–1951.]

R.E. 276. *PRINCIPLES OF CURRICULUM BUILDING.* Fall term. Credit two or three hours. Assistant Professor ELLIOTT. W 4–6 and one hour to be arranged for those enrolled for three hours' credit.

[R.E. 277. *SEMINAR IN CURRICULUM.* Fall term. Credit two hours. Prerequisite, R.E. 276 or equivalent. Assistant Professor ELLIOTT. S 9–11. Not given in 1950–1951.]

R.E. 278. *SEMINAR IN RURAL SECONDARY EDUCATION.* Spring term. Credit two hours. Assistant Professor ELLIOTT. F 2–3:30.

R.E. 290. *SECONDARY EDUCATION.* Fall term. Credit three hours. Assistant Professor ELLIOTT. M W F 9.

GUIDANCE AND PERSONNEL ADMINISTRATION

Ed. 280. *STUDENT PERSONNEL ADMINISTRATION.* Throughout the year. Credit two, three, or four hours. Graduates only. Prerequisite, consent of the instructor. Dean LUCILE ALLEN, Dean F. C. BALDWIN, and ASSISTANTS. T 9–11. Conference Room. Administration Building.

Ed. 281. *SEMINAR IN STUDENT PERSONNEL ADMINISTRATION.* Throughout the year. Credit four hours. Graduates only. Students will be admitted upon consultation with the instructor. Dean LUCILE ALLEN and ASSISTANT.

R.E. 282. *EDUCATIONAL AND VOCATIONAL GUIDANCE.* Fall term. Credit two hours. For graduate students. T 4:15–6:00. Associate Professor NELSON.

R.E. 283. *COUNSELING METHODS.* Spring term. Credit four hours. For graduate students. Prerequisites, courses 255 and 282, or equivalents. Associate Professor NELSON. T Th 4:15–6:00.

R.E. 284. *GROUP TECHNIQUES IN GUIDANCE.* Spring term. Credit two hours. Associate Professor NELSON. M 4:15–6:00.

R.E. 285. *OCCUPATIONAL AND EDUCATIONAL INFORMATION.* Fall

term. Credit four hours. Associate Professor NELSON. T Th 1:00. Field trips on Wednesday afternoons.

R.E. 289. *SUPERVISED PRACTICE IN TESTING AND COUNSELING.* Spring term. Credit three hours. For advanced graduate students only. Prerequisites, 255, 282, 283 (or their equivalent) and permission of the instructor. Associate Professor NELSON. W 5:00. Hours for observation and practice to be arranged.

Psych. 680. *PROCEDURES IN CLINICAL CHILD GUIDANCE.* Fall term. Credit three hours. Primarily for graduate students. Prerequisite, Psychology 607 or equivalent. All students must have consent of the instructor. Professor FREEMAN. M 4–6, and conferences.

GENERAL

R.E. 194. *PRINCIPLES OF VOCATIONAL EDUCATION.* Spring term. Credit two hours. Associate Professor SMITH. T 4:15–6.

R.E. 199. *INFORMAL STUDY IN EDUCATION.* Maximum credit three hours each term. Members of the STAFF.

R.E. 291. *THE EDUCATIONAL PROGRAM FOR UNDEVELOPED COMMUNITIES.* Spring term. Credit two hours. Assistant Professor ELLIOTT. T 4–5:30.

Ed. 292. *SEMINAR IN SOCIAL STUDIES EDUCATION.* Fall or spring term. Associate Professor STUTZ. T 4:15.

[R.E. 295. *COMPARATIVE EDUCATION.* Fall term. Professors BUTTERWORTH and MOORE. Not given in 1950–1951.]

Ed. 296. *HISTORY OF AMERICAN EDUCATION.* Spring term. Credit three hours. Associate Professor STUTZ. M W F 9.

[Ed. 297. *HISTORY OF EDUCATION IN THE MODERN PERIOD.* Fall term. Credit three hours. Associate Professor STUTZ. T Th S 9. Not given in 1950–1951.]

R.E. 298. *SEMINAR IN RURAL EDUCATIONAL LEADERSHIP.* Spring term. Professor BUTTERWORTH and others. T Th 11–12:30.

R.E. 400. *INTERNSHIP IN EDUCATION.* Throughout the year. Credit two to six hours as arranged. Members of the STAFF.

Ed. 499. *INFORMAL STUDY IN EDUCATION.* Maximum credit three hours each term. Members of the STAFF.

ADULT AND HIGHER EDUCATION

R.E. 214. *COLLEGE TEACHING.* Fall term. Credit two hours. Assistant Professor ELLIOTT and others. M 7–9 P.M.

[R.E. 293. *ADULT EDUCATION.* Associate Professor HOSKINS. Not given in 1950–1951.]

R.E. 401. *PROBLEMS IN HIGHER EDUCATION.* Spring term. Professor BUTTERWORTH, Professor PETRY, and others. T 4:15–5:45.

RESEARCH

R.E. 299. *SEMINAR IN EDUCATIONAL RESEARCH PROCEDURES AND TECHNIQUES.* Fall term. Credit two hours. For graduate students preparing for or engaged in research problems in education. Professor LEAGANS. Th 2–3:30.

R.E. 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.

Ed. 500. *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.

HOME ECONOMICS EDUCATION

See HOME ECONOMICS, pp. 162–163.

INDUSTRIAL AND TECHNICAL EDUCATION

See INDUSTRIAL AND LABOR RELATIONS, pp. 169–172.

CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS

See HOME ECONOMICS, pp. 157–159.

ENGINEERING

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 (Aero.E., Chem. and Met.E., C.E., E.E., E.P., 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;[2] 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 six subdivisions is as follows:

COMMITTEES ON GRADUATE WORK

AERONAUTICAL ENGINEERING — W. R. SEARS, *Chairman,* 269 Aeronautical Engineering Building; J. M. WILD, *Secretary,* 256 Aeronautical Engineering Building.

CHEMICAL AND METALLURGICAL ENGINEERING — F. H. RHODES, *Chairman,* 124 Olin Hall; C. C. WINDING, *Secretary,* 228 Olin Hall; C. W. MASON, 318 Olin Hall.

CIVIL ENGINEERING — N. A. CHRISTENSEN, *Chairman,* 122 Lincoln Hall; R. Y. THATCHER, *Secretary,* 308 Lincoln Hall; M. BOGEMA, 234 Temporary Building.

ELECTRICAL ENGINEERING — C. R. BURROWS, *Chairman,* 107 Franklin Hall; J. G. TARBOUX, *Secretary,* 105 Franklin Hall; E. M. STRONG, 116 Franklin Hall.

MECHANICAL ENGINEERING — H. J. LOBERG, *Chairman,* 15 West Sibley; W. R. CORNELL, *Secretary,* 304 West Sibley; L. L. OTTO, Mechanical Laboratory.

ENGINEERING PHYSICS — LLOYD P. SMITH, *Chairman,* 120 Rockefeller Hall; A. B. CREDLE, M-207 Franklin Hall; H. S. SACK, 156 Rockefeller Hall.

DIVISION REPRESENTATIVE on the General Committee of the Graduate School, and Chairman of Group E—C. O. MACKEY.

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 Metallurgical Engineering (M.Met.E.), Master of Engineering Physics (M.E.P.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) are granted in the field of engineering.

[2]Except in the case of candidates for the degree M.Aero.E. (see p. 137).

THE DEGREE M.AERO.E.

The degree Master of Aeronautical Engineering (M.Aero.E.) is administered by the Faculty of the Graduate School of Aeronautical Engineering. Candidates for this degree are not admitted to the Graduate School of the University. Information regarding the requirements for this degree will be found in the *Announcement of the College of Engineering.*

ADMISSION[3]

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.

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 8, but in addition (a) a statement showing, if possible, his relative standing in his class, (b) a catalogue of the institution from which he was 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.

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.

A prospective graduate student is urged to write to the office concerned (Aeronautical, Chemical, Civil, Electrical, or Mechanical Engineering) for advice or information.

Candidacy for M.Chem.E., M.C.E., M.E.E., M.Met.E., M.E.P. or M.M.E. 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.

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.

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.

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.

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 noncandidate, 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.

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.

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[3]Candidates for the degree of M.Aero.E. see p. 137.

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.

Preregistration is required for all courses.

Graduate students in engineering will 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.*

FIELDS OF GRADUATE INSTRUCTION

A candidate for the Master's degree (M.Chem.E., M.Met.E., M.C.E., M.E.E., M.M.E., M.E.P.) must select his major field from the list given below. 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, provided his entire program shows a unified purpose.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

IN CHEMICAL ENGINEERING AND METALLURGICAL ENGINEERING

Chemical Engineering 1, 2, 4

Metallurgical Engineering 1, 2, 4

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

Structural Engineering
- Structural Engineering 1, 2, 3, 4
- Theory of Structures 1, 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

Surveying
- Geodetic Engineering 1, 2, 3, 4
- Topographic Engineering 1, 2, 3, 4

IN ELECTRICAL ENGINEERING

Electric Power System Engineering
- Transmission and Distribution 1, 2, 3, 4
- System Stability 1, 2, 3, 4
- Economics of Utilities 2, 3, 4
- High Voltage Engineering 2, 3, 4
- Power Generation 2, 3, 4
- Relaying and Control 2, 3, 4

Electric Power Utilization and Control
- Electrical Machinery 1, 2, 3, 4
- Industrial Control and Applications 1, 2, 3, 4
- Industrial Electronics 1, 2, 3, 4
- Illuminating Engineering 2, 3, 4
- Servomechanisms 1, 2, 3, 4

Communication Engineering

Communication Systems 1, 2, 3, 4
Electron Tubes 1, 2, 3, 4
Electromagnetism 1, 2, 3, 4
Microwave Engineering 1, 2, 3, 4
Radio Engineering 1, 2, 3, 4
Radio-Wave Propagation 1, 2, 3, 4
Acoustical Engineering 2, 3, 4
Carrier Systems 2, 3, 4
Economics of Communication Services 2, 3, 4
Wire Transmission 2, 3, 4

General

Electric-Circuit Analysis 1, 2, 3, 4
Electrical Measurements 1, 2, 3, 4
Materials in Electrical Engineering 2, 3, 4

IN MECHANICAL ENGINEERING

Administrative Engineering 1, 2, 3, 4
Automotive Engineering 1, 2, 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
Mechanics 1, 2, 3, 4
Metallography 1, 2, 4

IN AERONAUTICAL ENGINEERING

Aeronautical Engineering 1, 3, 4
Aerodynamics 4

IN ENGINEERING PHYSICS

Engineering Physics 1, 2, 4

AERONAUTICAL ENGINEERING

Professors W. R. SEARS; *Associate Professors* A. R. KANTROWITZ and J. M. WILD; *Assistant Professors* Y. H. KUO and C. RIPARBELLI.

Application for admission to candidacy for the degree M.Aero.E. should be made directly to the Director of the Graduate School of Aeronautical Engineering, College of Engineering, Cornell University. A special application blank for this purpose can be obtained from the office of the Director. This degree is awarded upon satisfactory completion of a required curriculum of studies and an acceptable thesis. For further details, see the *Announcement of the College of Engineering.*

Students who desire to work for the Ph.D. degree with Aeronautical Engineering as their major subject must be admitted to the Graduate School of the University in the usual manner. They should make application to the Dean of the Graduate School. Such candidates will be expected to complete courses and original research in the scientific fields that constitute the background of aeronautics, such as mechanics, fluid dynamics, and structural theory.

Close contact is maintained between the Graduate School of Aeronautical Engineering at the University and the Cornell Aeronautical Laboratory in Buffalo, N.Y. Certain periods of employment at the Laboratory are usually offered to aeronautical engineering students — ordinarily during their summer vacations. It is also possible that certain experimental equipment of that Laboratory will occasionally be available to graduate students in connection with their original research.

The Graduate School of Aeronautical Engineering is equipped with a fluid mechanics laboratory on the campus for fundamental scientific research in fluid mechanics and aerodynamics.

GRADUATE COURSES

7101. *AIRPLANE MECHANICS I.* Fall term. Credit four hours. Prerequisite: Engineering Mechanics. Associate Professor WILD.

7102. *AIRPLANE MECHANICS.* Spring term. Credit four hours. Prerequisite: 7101. Associate Professor WILD.

7103. *AIRCRAFT PROPELLER DESIGN.* Spring term. Credit three hours. Prerequisite, 7101. Preregistration required.

7104. *MECHANICS OF ROTARY-WING AIRCRAFT.* Spring term. Credit three hours. Prerequisite, 7101. Preregistration required.

7203. *AERODYNAMICS OF POWER PLANTS.* Fall term. Credit three hours. Prerequisites, 7101, Physics. Associate Professor WILD. Preregistration required.

7204. *GASDYNAMICS.* Spring term. Prerequisites: Physics, Integral Calculus, Engineering Thermodynamics. Associate Professor KANTROWITZ. Credit four hours.

7205. *KINETIC THEORY.* Fall term. Prerequisites: Physics, Integral Calculus, Engineering Thermodynamics. Associate Professor KANTROWITZ. Credit two hours.

7301. *THEORETICAL AERODYNAMICS I.* Six hours a week throughout the first half of the fall term. Credit three hours. Prerequisites, Math 611 and 612 or equivalent, Engineering Mechanics or Analytical Mechanics. Professor SEARS.

7302. *THEORETICAL AERODYNAMICS II.* Spring term. Credit three hours. Prerequisite, 7301. Professor SEARS.

7303. *THEORETICAL AERODYNAMICS III.* Six hours a week throughout the second half of the fall term. Credit three hours. Prerequisites, 7201, 7202, 7301. Assistant Professor KUO and Professor SEARS.

7304. *THEORETICAL AERODYNAMICS IV.* Spring term. Credit three hours. Prerequisite, 7301. Assistant Professor KUO. Preregistration required.

7401. *AIRPLANE STRUCTURES.* Fall term. Credit three hours. Prerequisite, Strength of Materials. Assistant Professor RIPARBELLI.

7402. *AIRPLANE STRUCTURES.* Spring term. Credit three hours. Prerequisite, 7401. Assistant Professor RIPARBELLI.

7403. *AIRPLANE DESIGN.* Fall term. Credit one hour.

7404. *AIRPLANE DESIGN.* Spring term. Credit one hour.

7405. *AERO-ELASTIC PROBLEMS.* Spring term. Credit three hours. Prerequisites, 7101, 7102. Preregistration required.

7801. *RESEARCH IN AERONAUTICAL ENGINEERING.* Credit to be arranged. Prerequisites, admission to the Graduate School of Aeronautical Engineering and approval of the Director.

7901. *AERONAUTICAL ENGINEERING COLLOQUIUM.* Each term. Credit one hour. T 4:30–6.

7902. *ADVANCED SEMINAR IN AERONAUTICS.* Each term. Credit two hours. Prerequisite, approval of the Director.

AGRICULTURAL ENGINEERING

See above under AGRICULTURE.

AUTOMOTIVE ENGINEERING

Associate Professor L. L. OTTO.

Special problems related to Automotive Engineering may be selected for advanced study. Laboratory facilities are available for research on internal com-

bustion 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 3741, 3743, and 3750 suitable as a foundation.

3741. *AUTOMOTIVE ENGINEERING.* Fall term. Credit three hours. Prerequisite, 3353.

3743. *AUTOMOTIVE COMPUTATIONS.* Spring term. Credit two hours. Prerequisite, 3741.

3750. *ADVANCED AUTOMOTIVE ENGINEERING.* Each term. Credit two to five hours as arranged. Permission of instructor required for registration.

CHEMICAL AND METALLURGICAL ENGINEERING

Professors J. L. GREGG, J. E. HEDRICK, P. E. KYLE, C. W. MASON, F. H. RHODES, C. C. WINDING; *Assistant Professors* M. S. BURTON, J. C. SMITH, R. L. VON BERG, H. F. WIEGANDT.

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	CHEMICAL ENGINEERING ECONOMICS
UNIT PROCESSES	CHEMICAL PLANT DESIGN
METALLURGY	METALLURGICAL ENGINEERING

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* School of Chemical and Metallurgical Engineering, courses 1255, 1256, 5203, 5204, 5303, 5304, 5353, 5354, 5501, 6110, 6113, 6114, 6501. Preregistration is required for these courses.

5103. *CHEMICAL ENGINEERING THERMODYNAMICS.* Fall term. Credit three hours. Prerequisite, Chemistry 405b. Assistant Professor VON BERG.

5104. *CHEMICAL ENGINEERING THERMODYNAMICS.* Spring term. Credit two hours. Prerequisite, Chemical Engineering 5103. Assistant Professor VON BERG. Lectures. Continuation of course 5103.

5503. *CHEMICAL ENGINEERING COMPUTATIONS.* Fall term. Credit two hours. Conferences and lectures. Prerequisite, course 5303. Professor WINDING.

5504. *CHEMICAL ENGINEERING COMPUTATIONS.* Spring term. Credit two hours. Conferences and lectures. Prerequisite, course 5304. Professor WINDING.

5505. *ADVANCED PROBLEMS IN HEAT TRANSFER.* Fall term. Credit three hours. Conferences and lectures. Prerequisites, courses 5503 and 5504. Professors RHODES and WINDING and Assistant Professor SMITH.

5506. *ADVANCED PROBLEMS IN DIFFUSIONAL OPERATIONS.* Spring term. Credit three hours. Conferences and lectures. Prerequisites, courses 5503 and 5504. Professors RHODES and WINDING, and Assistant Professor SMITH.

5603. *CHEMICAL ENGINEERING EQUIPMENT DESIGN.* Fall term. Two hours credit. Lectures. Prerequisite, course 5504. Assistant Professor SMITH.

5604. *CHEMICAL ENGINEERING EQUIPMENT DESIGN.* Spring term. Two hours credit. Lectures. Prerequisite, course 5504. Assistant Professors SMITH and VON BERG.

5605. *CHEMICAL ENGINEERING PLANT DESIGN.* Fall term. Two hours credit. Professor RHODES and WINDING and Assistant Professors SMITH, VON BERG, and WIEGANDT.

5606. *CHEMICAL ENGINEERING PLANT DESIGN.* Spring term. Two hours credit. Professors RHODES and WINDING and Assistant Professors SMITH, VON BERG, and WIEGANDT.

5701. *PLANT INSPECTIONS.* Spring term. One hour credit. Prerequisite, course 5504. Professors RHODES and WINDING. Preregistration required.

5711. *LIBRARY USE AND PATENTS.* Spring term. One hour credit. Professors RHODES and MASON. Primarily for undergraduates.

5741. *PETROLEUM REFINING.* Fall term. Three hours credit. Lectures. Prerequisite, course 5304. Professor WINDING.

5742. *SYNTHETIC RESINS AND PLASTICS.* Spring term. Three hours credit. Lectures. Prerequisite or parallel, course 5304. Professor WINDING.

5743. *OPERATION CONTROL IN CHEMICAL PLANTS.* Fall term. Three hours credit. Lectures. Prerequisite or parallel, course 5304. Professor RHODES.

5746. *CHEMICAL ENGINEERING ECONOMICS.* Spring term. Credit three hours. Prerequisite, course 5304. Professor HEDRICK.

5851. *CHEMICAL MICROSCOPY.* Either term. Three hours credit. Lectures and laboratory. Prerequisite or parallel, course Chemistry 404 and Physics 17 or 18 or special permission. Professor MASON and ASSISTANTS. Preregistration required.

5853. *MICROSCOPICAL QUALITATIVE ANALYSIS (INORGANIC).* Either term. Credit two or more hours. Laboratory practice. Prerequisite, Chemical Engineering 5851. Professor MASON. Preregistration required.

5854. *MICROSCOPICAL METHODS IN ORGANIC CHEMISTRY.* Either term. Credit two or more hours. Laboratory practice. Prerequisites, Chemical Engineering 5851 and special permission. Professor MASON. Preregistration required.

5859. *ADVANCED CHEMICAL MICROSCOPY.* Either term. Credit one or more hours. Laboratory practice. Prerequisite, course 5851 and special permission. Professor MASON and ASSISTANTS. Preregistration required.

6203. *SLAG-METAL-ATMOSPHERE REACTIONS.* Fall term. Credit three hours. Prerequisites, Engineering 1256, Chemistry 404, and Metallurgical Calculations, Engineering 6501. Mr. GREGG. Lectures.

6253. *UNIT PROCESSES IN METALLURGY.* Fall term. Credit three hours. Prerequisite or parallel course, Slag-Metal-Atmosphere Reactions, Engineering 6203. Mr. GREGG. One lecture and one laboratory period each week, with reports.

6254. *UNIT PROCESSES IN METALLURGY.* Spring term. Credit two hours. Prerequisite, Unit Processes in Metallurgy, Engineering 6253. Mr. GREGG. One lecture and one laboratory period each week with reports.

6311. *PHYSICAL METALLURGY.* Fall term. Credit three hours. Prerequisite, Introductory Metallography, Engineering 6811. Mr. MASON. Lectures.

6323. *ADVANCED FERROUS METALLURGY.* Fall term. Credit three hours. Prerequisite course, Physical Metallurgy, Engineering 6311. Lectures.

6324. *ADVANCED NON-FERROUS METALLURGY.* Spring term. Credit three hours. Prerequisite course, Physical Metallurgy, Engineering 6311. Lectures.

6351. *PHYSICAL METALLURGY LABORATORY.* Fall term. Credit three hours. Parallel course, Physical Metallurgy, Engineering 6311. Messrs. MASON and BURTON. Laboratory periods and conferences.

6602. *METALLURGICAL DESIGN.* Spring term. Credit three hours. Prerequisite, Physical Metallurgy, Engineering 6311, or special permission. Lectures.

6701. *PLANT INSPECTIONS.* Spring term. Credit one hour. Preregistration required.

6811. *INTRODUCTORY METALLOGRAPHY.* Spring term. Credit three hours. Prerequisites, Engineering 1255 or 1222. Messrs. MASON and BURTON. One lecture and two laboratory periods each week.

6953, 6954. *SENIOR PROJECT.* Two terms. Credit three hours each term. Prerequisite, Unit Processes in Metallurgy, Engineering 6254.

DESCRIPTIVE GEOMETRY AND DRAWING

IN CIVIL ENGINEERING

Professor H. T. JENKINS.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* School of Civil Engineering, courses 2001 and 2002.

2004. *ADVANCED DRAWING.* Either term. Credit and hours to be arranged. Prerequisite Courses, Engineering 2002, or equivalent. Mr. JENKINS.

IN MECHANICAL ENGINEERING

Professor S. F. CLEARY; *Associate Professor* W. E. MORDOFF; *Assistant Professors* T. J. BAIRD and R. H. SIEGFRIED.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Engineering,* courses 3111, 3112, 3116. Preregistration required.

ELECTRICAL ENGINEERING

Professors C. R. BURROWS, W. C. BALLARD, H. G. BOOKER, L. A. BURCKMYER, JR., R. F. CHAMBERLAIN, A. B. CREDLE, H. B. HANSTEEN, M. G. MALTI, H. G. MAYER, M. S. MCILROY, T. MCLEAN, W. E. MESERVE, B. K. NORTHROP, H. G. SMITH, E. M. STRONG, J. G. TARBOUX, S. W. ZIMMERMAN; *Associate Professors* P. D. ANKRUM, W. W. COTNER, C. L. COTTRELL, W. H. ERICKSON, C. E. INGALLS, W. R. JONES, R. E. OSBORN, S. L. SCHAUSS; *Assistant Professors* N. H. BRYANT, A. E. DAVIES, M. J. KELLY, S. LINKE, J. C. LOGUE, H. S. MCGAUGHAN, B. NICHOLS, and C. L. SEEGER.

The School of Electrical Engineering has the following laboratories suitable for graduate work:

ADVANCED ELECTRICAL MACHINERY LABORATORY
ELECTRICAL MEASUREMENTS AND STANDARDIZATION LABORATORY
BASIC ELECTRONICS LABORATORY
RADIO AND COMMUNICATIONS LABORATORY
INDUSTRIAL ELECTRONICS LABORATORY
ELECTRONICS APPARATUS AND PROJECT LABORATORY
SERVOMECHANISMS LABORATORY
HIGH-VACUUM AND TUBE-CONSTRUCTION LABORATORY

Special equipment for experimental research is provided through a fully equipped and manned machine shop.

Undergraduate courses: For undergraduate courses which meet needs of certain graduate students, see the *Announcement of the College of Engineering,* School of Electrical Engineering, courses 4112, 4121, 4122, 4126, 4131, 4211, 4216, 4221, 4226, and 4611.

Graduate courses and topics: In addition to the formal courses listed below, members of the faculty are prepared to guide individual students in special topics. Seminars are conducted by members of the faculty for groups of graduate students interested in closely related lines of study and research.

Adequate work in advanced Physics and Mathematics is required of candidates for the Ph.D. degree majoring in a field of Electrical Engineering, even though these sciences may not be specified as minor subjects.

ELECTRIC POWER SYSTEM ENGINEERING

4326. *POWER LABORATORY.* Fall term only. Credit three hours. Prerequisites, 4226 and 4311. Professor BURCKMYER. One lecture and one lecture-laboratory period each week.

4334. *ECONOMICS OF PUBLIC UTILITIES.* Spring term only. Credit two hours. Prerequisite, a course in Economics. Professor MCILROY. Two recitations each week.

4361. *POWER SYSTEMS.* Spring term only. Credit three hours. Prerequisite, 4221. Professor TARBOUX. Two lectures and one computing period each week.

4362. *TRANSMISSION OF ELECTRIC ENERGY.* Fall term only. Credit three hours. Prerequisites, 4311 and 4361. Professor TARBOUX. Two lectures and one computing period each week.

4363. *STABILITY OF ELECTRIC POWER SYSTEMS.* Spring term only. Credit two hours. Must be preceded or accompanied by 4362. Professor TARBOUX. Two lectures each week.

4364. *PROTECTION AND RELAYING ON POWER CIRCUITS.* Fall term only. Credit three hours. Must be preceded or accompanied by 4371. Professor TARBOUX. Three lectures each week.

4365. *SYMMETRICAL COMPONENTS.* Fall term only. Credit three hours. Prerequisites, 4311, 4321, and 4361. Professor MCILROY. Three lectures each week.

4371. *HIGH VOLTAGE PHENOMENA.* Spring term only. Credit three hours. Prerequisite, 4362. Professor ZIMMERMAN. Two lectures and one computing period each week.

TOPICS SUGGESTED FOR ADVANCED WORK

Electric Power Generation
Electric Power-System Stability and Regulation
Electric Power Transmission and Distribution
Electrical Control and Relaying
High-Voltage Phenomena
Symmetrical Components
Economics of Public Utilities

ELECTRIC POWER UTILIZATION AND CONTROL

4321. *ELECTRICAL MACHINE THEORY.* Spring term only. Credit three hours. Prerequisite, 4221. Professor TARBOUX. Three recitations each week.

4331. *ELECTRICAL DESIGN ECONOMICS.* Fall term only. Credit three hours. Prerequisites, 4211 and 4221. Professor MCILROY. Two recitations and one computing period each week.

4341. *MOTOR CONTROL.* Fall term only. Credit two hours. Prerequisite, 4226. Professor MESERVE. One lecture and one recitation each week.

4342. *APPLICATION OF MOTORS.* Spring term only. Credit three hours. Prerequisite, 4341. Professor MESERVE. One lecture, one recitation, and one computing period each week.

[4343. *AIRCRAFT AND MARINE ELECTRIC POWER AND CONTROL SYSTEMS.* Credit two hours. Prerequisites, 4321 and 4341. Professor MESERVE. Two recitations each week. Not offered in 1950–1951.]

[4351. *LOW-FREQUENCY HEATING AND INDUSTRIAL DISTRIBUTION SYSTEMS.* Credit three hours. Must be preceded or accompanied by 4311. Professor NORTHROP. Two lectures and one computing period each week. Not offered in 1950–1951.]

4411. *ELECTRONIC CONTROL EQUIPMENT.* Spring term only. Credit three hours. Prerequisites, 4121 and 4126. Professor NORTHROP. Two lectures and one laboratory period each week.

4415. *ADVANCED ELECTRONIC CONTROLS.* Spring term only. Credit three hours. Prerequisite, 4411. Professor NORTHROP. Two recitations and one computing period each week.

4421. *ELECTRONIC POWER CONVERTERS.* Fall term only. Credit three hours. Prerequisite, 4411. Professor NORTHROP. Two lectures and one lecture-laboratory period each week.

4451. *HIGH FREQUENCY HEATING.* Fall term only. Credit three hours. Prerequisite, 4421. Professor NORTHROP. Two lectures and one laboratory period each week.

4612. *ILLUMINATING ENGINEERING.* Spring term only. Credit three hours. Prerequisite, 4611. Professor STRONG. Two recitations and one lecture-laboratory period each week.

4615. *ILLUMINATION SEMINAR.* Fall term only. Credit two hours. Prerequisite, 4611. Professor STRONG. One two-hour period each week.

4711. *SERVOMECHANISMS: AUTOMATIC CONTROL SYSTEMS.* Fall term only. Credit three hours. Prerequisites, 4121, 4126, 4216, and 4221. Professor MESERVE. Two lecture-recitations and one laboratory or computing period each week.

4712. *ADVANCED SERVOMECHANISMS.* Spring term only. Credit three hours. Prerequisite, 4711. Professor MESERVE. Two lecture-recitations and one laboratory or computing period each week.

Special attention is called to the following courses listed under other fields: Physics 215, Psychology 211, Speech and Drama 437.

TOPICS SUGGESTED FOR ADVANCED WORK

Electronic Controls
Electronic Metering
Electronic Power Converters
High-Frequency Heating
Low-Frequency Heating
Motor Applications and Control
Illuminating Engineering
Illumination and Color
Illumination Distribution in Interiors
Illumination and Vision
Illumination Measurements
Special Lighting Problems
Servomechanisms

COMMUNICATION ENGINEERING

4511. *RADIO AND COMMUNICATION THEORY.* Spring term only. Credit three hours. Prerequisite, 4122. Professor CREDLE. Two lectures and one recitation or computing period each week.

4512. *RADIO AND COMMUNICATION THEORY.* Fall term only. Credit three hours. Must be preceded or accompanied by 4511. Professor MCLEAN. Two lectures and one recitation each week.

4513. *COMMUNICATION NETWORKS.* Spring term only. Credit three hours. Must be preceded or accompanied by 4122. Professor MCLEAN. Three recitations each week.

4516. *RADIO AND COMMUNICATION LABORATORY.* Spring term only. Credit three hours. Must be preceded or accompanied by 4511. Associate Professor INGALLS. One recitation and one laboratory period each week. Experiments paralleling the work of course 4511.

4517. *RADIO AND COMMUNICATION LABORATORY.* Fall term only. Credit three hours. Must be preceded or accompanied by 4512. Professor CREDLE.

One recitation and one laboratory period each week. Experiments paralleling the work of course 4512.

4521. *RADIO BROADCASTING.* Spring term only. Credit three hours. Prerequisite, 4511. Must be preceded or accompanied by 4512. Professor SMITH. Two lectures and one lecture-laboratory or computing period each week.

4522. *TELEPHONE AND TELEGRAPH SYSTEMS.* Spring term only. Credit two hours. Prerequisite, 4131. Professor BALLARD. Two recitations each week.

4526. *DESIGN AND CONSTRUCTION OF VACUUM TUBES.* Spring term only. Credit three hours. Prerequisite, 4511. Associate Professor JONES. Two lecture-recitations and one laboratory period each week.

4531. *TELEVISION SYSTEMS.* Fall term only. Credit three hours. Prerequisites, 4511 and 4513. Associate Professor INGALLS. Two lectures and one laboratory period each week.

4541. *APPLIED ACOUSTICS AND AUDIO ENGINEERING.* Fall term only. Credit two hours. Prerequisites, 4122 and 4131. Professor MCLEAN. Two recitations each week.

4551. *RADIO AIDS TO NAVIGATION.* Spring term only. Credit two hours. Prerequisite, 4131. Professor MCLEAN. Two recitations each week.

4561. *ULTRA-HIGH-FREQUENCY SYSTEMS.* Fall term only. Credit two hours. Must be preceded or accompanied by 4565. Professor BALLARD. One recitation and one laboratory period each week.

4563. *PULSE TECHNIQUE IN COMMUNICATION AND RADAR.* Spring term only. Credit three hours. Prerequisites, 4511 and 4516. Associate Professor INGALLS. Three recitations each week.

4564. *TRANSMISSION OF INFORMATION.* Spring term only. Credit three hours. Prerequisites, 4511 and 4516. Assistant Professor MCGAUGHAN. Three recitations each week.

4565. *ELECTROMAGNETIC THEORY.* Fall term only. Credit three hours. Prerequisite, 4512. Professor BOOKER. Three lecture-recitations each week.

4566. *RADIO WAVES.* Spring term only. Credit three hours. Prerequisite, 4565. Professor BOOKER. Three lecture-recitations each week.

4567. *RADIO WAVES.* Fall term only. Credit three hours. Prerequisite, 4566. Professor BOOKER. Three lecture-recitations each week.

4568. *ANTENNAS.* Spring term only. Credit three hours. Prerequisite, 4565. Professor BOOKER. Three lecture-recitations each week.

4571. *THEORY OF FOUR-TERMINAL NETWORKS.* Fall term only. Credit three hours. Prerequisite, 4513. Assistant Professor MCGAUGHAN. Three lecture-recitations each week.

TOPICS SUGGESTED FOR ADVANCED WORK

Acoustical Engineering
Analysis of Communication Networks
Carrier Systems
Communication-System Engineering
Design and Construction of Vacuum Tubes
Economics of Communication Services
Microwave Theory and Techniques
Radio Aids to Navigation
Radio Engineering
Radio Transmitters and Receivers
Radio-Wave Propagation
Television Systems
Wire Transmission

GENERAL

4035. *OPERATIONAL ANALYSIS.* Fall term only. Credit three hours. Prerequisite, 4311. Professor MALTI. Two recitations and one computing period each week.

4036. *OPERATIONAL ANALYSIS.* Spring term only. Credit three hours. Prerequisite, 4035. Professor MALTI. Two recitations and one computing period each week.

4311. *ADVANCED CIRCUIT ANALYSIS.* Spring term only. Credit three hours. Prerequisites, 4221 and Mathematics 201 or 608. Professor MALTI. Two lectures and one computing period each week.

4386. *ELECTRICAL MEASUREMENTS.* Available upon sufficient demand. Credit two hours or more. Prerequisites, 4311 and 4326. Professor BURCKMYER. The course emphasizes the development of electrical apparatus and methods for specialized measuring purposes. Topics of investigation will be selected in accordance with the major interests of those enrolled.

TOPICS SUGGESTED FOR ADVANCED WORK

Alternating-Current Circuit Analysis
Electrical-Machine Theory and Operation
Properties of Solid Dielectrics
Research in Magnetic Materials
Electrical Measuring and Testing

ENGINEERING PHYSICS

Professors LLOYD P. SMITH, C. R. BURROWS, A. B. CREDLE, T. R. CUYKENDALL, G. E. GRANTHAM, D. F. GUNDER, M. KAC, H. S. SACK, W. R. SEARS; *Associate Professors* D. R. CORSON, P. L. HARTMAN, B. M. SIEGEL.

The aim of graduate work in Engineering Physics is to undertake concentrated work on an advanced level in a field of specialization which may cross conventional subject matter boundaries as well as deepen and enlarge the general scientific and engineering background of the student. For this reason, the minor subject or subjects should be chosen in approved fields outside Engineering Physics.

The thesis can be done in any field represented by the members of the Engineering Physics Faculty, or, if the student's special committee approves, in other fields in which the engineering physics aspects may be significant. The course work in Engineering Physics will be chosen from the graduate courses offered in the various schools of the College of Engineering or in the Departments of Physics, Chemistry, or Mathematics of the College of Arts and Sciences. The members of the student's committee in charge of Engineering Physics will advise the student in the choice of these courses.

8512. *ELECTRON MICROSCOPY.* Spring term. Credit three hours. Prerequisite, consent of the instructor. Lecture and laboratory hours to be arranged. Associate Professor SIEGEL.

8517. *ELECTRON OPTICS AND THE ELECTRON MICROSCOPE.* Fall term. Credit three hours. Prerequisite, Physics 225 (Physics 215 advised but not required). M W F 11. Associate Professor SIEGEL.

8090. *INFORMAL STUDY IN ENGINEERING PHYSICS.* Either term. Laboratory or theoretical work in any branch of Engineering Physics under the direction of a member of the staff. Hours to be arranged.

HEAT-POWER ENGINEERING

Professors C. O. MACKEY, F. S. ERDMAN, P. F. MARTINUZZI; *Associate Professors* W. C. ANDRAE, R. E. CLARK, D. DROPKIN, H. N. FAIRCHILD, N. R. GAY, I. KATZ, L. L. OTTO, E. B. WATSON; *Assistant Professors* C. R. OTTO, D. G. SHEPHERD, W. J. SKINNER, T. B. TRACY, E. R. WATT.

As prerequisite for graduate study in this field, 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 assigned work to make up the deficiency.

Opportunities for analytical work include: original investigations in engineering thermodynamics; interpretive studies of available data; investigations in power plant economics; design, selection, and arrangement of apparatus to meet specific requirements.

The laboratories and shops of the Sibley School of Mechanical Engineering are available for carrying on experimental and laboratory work in this field. In these laboratories there is equipment for the advanced study of internal combustion engines, gas turbines, steam engines, steam turbines, pumps, compressors, fans, steam generating units, heat transfer, refrigeration, air conditioning, and engineering instruments.

Students who contemplate doing laboratory work in this field should communicate with the Department in advance of beginning work in order to arrange for the use of equipment.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering*, Department of Heat-Power Engineering, courses 3501, 3502, 3503, 3504, 3505, 3506, 3507.

3550. *HEAT-POWER RESEARCH.* Either term. Credit depends upon actual work as arranged with Department. Preregistration required.

3551. *STEAM TURBINES.* Fall term. Credit two hours. Prerequisite, 3501. Associate Professor CLARK. Preregistration required.

3553. *TEMPERATURE MEASURING INSTRUMENTS.* Spring term. Credit two hours. Associate Professor DROPKIN. Preregistration required.

3554. *DIMENSIONAL ANALYSIS.* Spring term. Credit one hour. Associate Professor ANDRAE. Preregistration required.

3555. *GRAPHICAL COMPUTATION AND REPRESENTATION.* Fall term. Credit two hours. Professor MACKEY. Preregistration required.

3556. *ADVANCED AIR CONDITIONING.* Fall term. Credit three hours. Prerequisite, 3505. Professor MACKEY. Preregistration required.

3560. *AIRCRAFT POWER PLANTS.* Either term. Credit three hours. Prerequisite, 3507. Associate Professor KATZ. Preregistration required.

3561. *AIRCRAFT ENGINE DESIGN.* Either term. Credit three hours. Prerequisites, 3660, 3507, 3353. Associate Professor KATZ. Preregistration required.

3563. *ADVANCED THERMODYNAMICS.* Spring term. Credit three hours. Prerequisite, 3501. Associate Professor GAY. Preregistration required.

3570. *AUTOMATIC CONTROL ENGINEERING.* Either term. Credit three hours. Prerequisite or parallel course, 3502 and 2331. Assistant Professor C. R. OTTO. Preregistration required.

3580. *DIESEL ENGINES.* Each term. Credit three hours. Prerequisites, 3501, 3507. Associate Professor WATSON. Preregistration required.

3590. *GAS-TURBINE PLANTS.* Either term. Credit two hours. Prerequisite, 3501. Professor MARTINUZZI. Preregistration required.

3591. *PRINCIPLES OF TURBO-MACHINERY.* Either term. Credit three hours. Prerequisites, 2331, 3501. Assistant Professor SHEPHERD. Preregistration required.

TOPICS SUGGESTED FOR ADVANCED WORK

Advanced Engineering Thermodynamics
Aircraft Power Plants
Air Conditioning
Combustion Engines
Compressors and Pumps
Flow of Fluids
Fuels, Combustion, Burners, Furnaces
Heat Transfer
Instruments and Controls
Refrigeration
Steam Engineering

HYDRAULICS AND HYDRAULIC ENGINEERING

IN CIVIL ENGINEERING

Associate Professors MARVIN BOGEMA, LINCOLN REID, M. S. PRIEST; *Assistant Professor* G. B. LYON.

Major work in Experimental Hydraulics, Theoretical Hydraulics, or Hydraulic Engineering may consist in part (subject to the thesis requirements) 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.

For major work in Experimental (or Theoretical) Hydraulics the thesis requirements 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.

2303. *ADVANCED HYDRAULICS.* Fall term. Credit three hours. Prerequisites, 2302 (or 2351). Mr. BOGEMA. Three recitations a week as arranged.

2304. *HYDRAULIC MEASUREMENTS.* Fall term. Credit three hours. Prerequisites, 2302 (or 2351). Mr. REID. One lecture and two laboratory periods a week as arranged.

2305. *HYDRODYNAMICS.* Spring term. Credit three hours. Prerequisites, 2302 (or 2351) and Differential Equations. Mr. PRIEST. Three recitations a week as arranged.

2306. *PUMPS AND TURBINES.* Spring term. Credit three hours. Prerequisites, 2302 (or 2351). Mr. BOGEMA. Two recitations and one laboratory or computation period a week.

2307. *FLOW OF LIQUIDS IN OPEN CHANNELS.* Fall term. Credit three hours. Prerequisites, 2302 (or 2351). Mr. PRIEST. Two lectures and one computation period a week.

2308. *HYDRAULIC MODELS.* Spring term. Credit three hours. Prerequisites, 2302 (or 2351). Mr. REID. One lecture and two laboratory or computation periods a week.

2342. *HYDRAULIC RESEARCH.* Either term. Credit as arranged. Prerequisites, 2302 (or 2351). Messrs. BOGEMA, PRIEST, and REID.

2343. *HYDRAULIC SEMINAR.* Either term. Credit as arranged. Messrs. BOGEMA, PRIEST, and REID.

HYDRAULIC ENGINEERING

For undergraduate courses which often meet the needs of graduate students, see *Announcement of the College of Engineering,* Department of Hydraulics, courses 2401 and 2402. Preregistration is required for both courses.

2404. *WATER POWER.* Fall term. Credit three hours. Prerequisite, 2401. Mr. REID. Time to be arranged.

2410. *EROSION AND SEDIMENTATION.* Either term. Credit three hours. Prerequisites, 2401. Elective. Seniors and graduates.

2411. *RIVERS AND HARBORS.* Fall term. Credit three hours. Prerequisites, 2302 and 2401. Mr. PRIEST.

2442. *HYDRAULIC ENGINEERING RESEARCH.* Either term. Prerequisites, 2401 and additional courses in selected field. STAFF. Time to be arranged.

2443. *HYDRAULIC ENGINEERING SEMINAR.* Either term. Prerequisites to be arranged. STAFF. Time to be arranged.

INDUSTRIAL AND ENGINEERING ADMINISTRATION

Professor H. J. LOBERG, C. I. MILLARD; *Associate Professors* A. SCHULTZ, JR., K. C. WHITE; *Assistant Professors* M. W. SAMPSON, B. W. SAUNDERS.

Graduate training in this department has two objectives: (1) to develop exceptional abilities in specific fields of Industrial and Engineering Administration, (2) to develop balanced training in the factors that are related to this specialization. The emphasis is on the development of initiative and self-reliance that go with individual study and the practical application of methods to working solutions. Aspects of economy and potential dollar return are stressed whenever feasible. Much of the work requires the integration of a knowledge of processes and process tools, product design, materials, methods, design of tools, jigs and fixtures, inspection, cost data, and market needs. Other projects might be wholly concerned with the development of systems or techniques by the application of basic principles of any of the above fields.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* Department of Industrial and Engineering Administration, courses 3232, 3254, 3262, 3263, 3270.

3242. *STATISTICAL QUALITY CONTROL.* Credit three hours. Prerequisite, 3241 or equivalent. Associate Professor SCHULTZ. Preregistration required.

3265. *PRODUCTION CONTROL.* Credit three hours. Prerequisite, 3264. Professor MILLARD. Two recitations and one laboratory period a week. Preregistration required.

3266. *ADVANCED METHODS ENGINEERING.* Credit three hours. Prerequisite, 3262. Associate Professor WHITE. One recitation and two laboratory periods a week. Preregistration required.

3271. *INDUSTRIAL MARKETING RESEARCH.* Credit three hours. Prerequisite, 3270. Professor LOBERG. Preregistration required.

3272. *INDUSTRIAL SALESMANSHIP.* Credit two hours. Prerequisite, 3270. Professor LOBERG. One recitation and one computing period a week. Preregistration required.

3290. *SPECIAL INVESTIGATIONS IN INDUSTRIAL AND ENGINEERING ADMINISTRATION.* Credit as arranged. Offered to qualified students individually or in small groups. Preregistration required.

TOPICS SUGGESTED FOR ADVANCED WORK

Motion and Micro-Motion Analysis
Practical Economic and Production Investigation in Near-by Industries
Economic Control of Quality in Production
Industrial Marketing Studies
Statistical Aspects of Quality Control
Industrial Applications of Statistics
Cost Control Through Unit Costs
Plant Layout and Materials-Handling Problems
Engineering Economy Studies
Time Study Standards
Elemental Time Standards
Problems in Production and Management Control
Personnel Studies

MACHINE DESIGN

Professor A. H. BURR; *Associate Professor* G. B. DUBOIS; *Assistant Professors* S. G. HOLT, JR., H. H. MABIE, F. SALTZ, and W. A. WHEELER, JR.

Opportunity is provided for graduate work in the application of theory and the results of experimental investigations to the design of machines and machine members, and provision is made for original work, under guidance, in the design and development of complete machines, and in the analysis and experimental investigation of machines and their components.

The College of Engineering Library and the Department have an excellent collection of books and periodicals related to machine design and analysis. There is a unique collection of mechanism models and machinery components. Photoelastic equipment, vibration and strain indicating instruments, balancing machines, and machines for performance tests on bearings and friction materials are available for experimental investigations.

For undergraduate courses which may meet the needs of graduate students see the *Announcement of the College of Engineering,* Department of Machine Design, courses 3352, 3353, 3354, and 3356. For these courses preregistration is required.

3361. *ADVANCED MACHINE ANALYSIS.* Fall term. Credit three hours. Prerequisite, 3353 or equivalent. Professor BURR. Three lecture-discussion periods a week. Preregistration required.

3366. *ADVANCED KINEMATICS.* Spring term. Credit three hours. Prerequisite, 3352 or equivalent. Professor MABIE. Two lecture-discussion periods and one design period a week. Preregistration required.

3367. *DESIGN PROBLEMS IN VIBRATIONS AND DYNAMICS.* Spring term. Credit three hours. Prerequisites, 1155, 3352, and 3353 or equivalent. Professor HOLT. Two lectures and one experimental laboratory or computing period a week. Preregistration required.

3370. *SPECIAL INVESTIGATIONS IN MACHINE DESIGN.* Each term. Credit arranged.

3372. *MACHINE DESIGN LABORATORY.* Fall term. Credit three hours. Prerequisite 3353 or equivalent. Professor HOLT. One lecture and two laboratory periods a week. Preregistration required.

3373. *CREATIVE DESIGN.* Fall term. Credit two hours. Prerequisite, 3354 or

3356 or equivalent. Professor DuBois. Two design periods a week. Preregistration required.

3375. *MACHINERY SURVEY.* Spring term. Credit three hours. Prerequisite, 3353 or equivalent. Professor Burr. Two lectures and one laboratory period for field trips each week. Preregistration required.

TOPICS SUGGESTED FOR ADVANCED WORK

Design and Development of a Special Machine
Bearings and Lubrication
Special Gear Teeth, Cams, or Linkages
Vibration, Noise, or Impact in a Machine
Photoelastic or Other Experimental Stress Analysis of a Machine Component
Balancing of Rotation Components
Jigs and Fixture Design

MATERIALS PROCESSING

Associate Professors Erik K. Henriksen and Roger L. Geer.

A general survey on an advanced background is given of the principal features of cutting tools, work and tool holding devices and the machine tools, illustrated by the assignment of projects to be worked out in the laboratory, which also provides facilities for individual work on the measuring of performance and efficiency of tools and machines, testing and inspecting of equipment, experimental investigation of new methods, introduction of improvements, and participation in research projects.

3411. *CUTTING TOOLS.* Either term. Credit three hours. Prerequisite, 3403 or equivalent; desirable, 6110 or 1221 or equivalent. Associate Professors Geer and Henriksen. Two lecture periods and one laboratory period a week.

3413. *MACHINE TOOLS.* Either term. Credit three hours. Prerequisite 3351 or equivalent. Associate Professors Geer and Henriksen. Two lecture periods and one laboratory period a week.

TOPICS SUGGESTED FOR ADVANCED WORK

Force Measurement on Tools
Tool Wear and Tool Life
Effect of Cutting Conditions on Work Hardening and Surface Quality
Cutting Fluids
Tool Lay-Out
Prevention of Chatter
Precision and Rigidity Problems in Machine Tools
Relative Performance of Mechanical, Hydraulic, and Electric Drives in Machine Tools
Modernization of Machine Tools

MANAGEMENT ENGINEERING

IN CIVIL ENGINEERING

Professors R. Y. Thatcher; *Associate Professors* Carl Crandall and J. E. Perry, and *Assistant Professor* J. C. Gebhard.

The graduate student who is not familiar with methods of construction may well take course 2901. Graduate students who have not had a course in engineering economics will take course 2903.

2602. *TRANSPORTATION.* Both terms. Credit three hours. Mr. PERRY. Lectures and recitations three hours a week as scheduled.

2901. *CONSTRUCTION METHODS.* Either term. Credit three hours.

2902. *ENGINEERING LAW.* Either term. Credit three hours.

2903. *ECONOMICS OF ENGINEERING.* Either term. Credit three hours.

2904. *PUBLIC ADMINISTRATION.* Required in fifth year. Either term. Credit three hours. Lectures and recitations three hours a week. Mr. CRANDALL.

2905. *VALUATION ENGINEERING.* Credit three hours. Prerequisites, 2901 and 2902. May be taken concurrently with course 2902. Mr. CRANDALL. Lectures, recitations, and reports.

2906. *ADVANCED ENGINEERING LAW.* Credit three hours. Prerequisites 2902. Mr. THATCHER. Lectures and recitations, three hours a week.

2907. *CONSTRUCTION MANAGEMENT.* Credit three hours. Prerequisites 2901 and 2903. Mr. CRANDALL. Lectures and recitations three hours a week.

2942. *RESEARCH IN MANAGEMENT ENGINEERING.* Any term. Credit three hours or more.

MATERIALS OF ENGINEERING

Professors D. F. GUNDER, J. O. JEFFREY, J. R. MOYNIHAN, H. S. SACK; *Associate Professor* F. O. SLATE; *Assistant Professors* F. W. OCVIRK, J. R. YOUNG.

The Department of Engineering Materials offers work in both theoretical and experimental procedures for evaluating the properties of engineering materials. All graduate students are urged to acquire fundamental training in both of these phases. In addition to the courses listed below many other courses listed under Mechanics, Metallurgy, and Physics should be considered as appropriate and necessary supplements in an adequate training in the field of Materials Engineering. Laboratory facilities are available for investigations in metals, concrete, cement, concrete aggregate, timber, plastics, fuels, lubricants, and miscellaneous materials. Preregistration is required in all courses. All courses are open to graduates or qualified undergraduates unless otherwise specified.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* Department of Materials of Engineering, 1211, 1212, 1221, 1222, 1231, 1232, 1255, 1256.

1215. *MATERIALS SEMINAR.* Elective. One one-hour period for each credit hour.

1216. *STRUCTURE AND PROPERTIES OF MATTER.* Fall term. Credit two hours. For graduate students in any branch of engineering. Prerequisite, permission of the instructor. Associate Professor SLATE.

1251. *ENGINEERING MATERIALS RESEARCH.* Each term. Prerequisites, 1231, 1232, or 1212. Professors MOYNIHAN, JEFFREY, and SLATE. Credit one hour for forty hours of actual work.

1252. *APPLIED PHYSICAL METALLURGY.* Alternate terms. Prerequisite, 1231. Professors JEFFREY or MOYNIHAN.

1253. *PHYSICS OF ENGINEERING MATERIALS.* Any term. Open to graduate students by permission. Associate Professor SACK, Engineering Physics.

1261. *PLASTIC BEHAVIOR OF SOLIDS.* Fall term. Associate Professor SACK.

TOPICS SUGGESTED FOR ADVANCED WORK

Applied Physical Metallurgy
Control of Properties of Engineering Materials

Properties of Engineering Materials, Metallic or Nonmetallic
Physics of Engineering Materials
Fuels
Insulating Materials
Lubrication
Radiographic Examination of Metals and Alloys
Properties of Plastics
Properties of Lubricants
Thermal Qualities of Quenching Liquids
Low-Temperature Behavior of Engineering Materials
Heat Treatment and Isothermal Quenching

MECHANICS

Professors H. D. CONWAY, T. R. CUYKENDALL, D. F. GUNDER; *Associate Professors* E. V. HOWELL, H. C. PERKINS.

The Department of Mechanics endeavors to serve a twofold purpose in the field of graduate study. It offers training for men who intend to make teaching and academic research their field and for men who intend to devote their attention to industrial research. It is believed that both these groups are best served by a broad fundamental training, and, although the work in this Department is devoted primarily to the mechanics of particles and rigid bodies and of deformable solids, all students are encouraged to take work also in the fields of the mechanics of liquids and gases and in the related fields of Materials, Physics, and Mathematics. Opportunity is provided for graduate students interested in teaching to participate in the teaching program in the University. Opportunity is likewise provided for those primarily interested in industrial research to participate in projects in this field. Candidates planning to complete a Master's degree in one year must have had Mechanics 1154 and 1155 or the equivalent upon entering. Preregistration is required in all courses. All courses are open to graduates or qualified undergraduates unless otherwise indicated.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* Department of Mechanics, courses 1134, 1145, 1151, 1152, 1153, 1154, 1156, for all of which preregistration is required.

1162. *MECHANICS OF VIBRATIONS.* Fall term. Prerequisite 1155 or equivalent. Elective for graduates and qualified undergraduates. Professor CONWAY.

1163. *APPLIED ELASTICITY.* Spring term. Prerequisites, 1155 or a knowledge of elementary differential equations, and permission of the instructor. Professor CONWAY. Hours arranged.

1164. *APPLIED ELASTICITY.* Fall term. Prerequisites, 1170 or a knowledge of elementary Fourier's series and permission of the instructor. Professor CONWAY. M W F 2. Continuation of 1163.

1165. *THEORY OF ELASTIC STABILITY.* Spring term. Prerequisites, 1154, 1155, or equivalents. Professor CONWAY.

1167. *THEORY OF PLATES AND SHELLS.* Spring term. Prerequisite, 1155 or knowledge of elementary differential equations and permission of instructor. Professor CONWAY.

1168. *ANALOGIES IN THE SOLUTION OF BOUNDARY VALUE PROBLEMS OF ENGINEERING.* Spring term. Prerequisite, permission of the instructor. Associate Professor CUYKENDALL.

1170. *ADVANCED MECHANICS*, Spring term. Prerequisite, 1155 and permission of the instructor. Professor GUNDER.

1171. *ADVANCED MECHANICS*. Fall term. Professor GUNDER. Continuation of 1170.

1172. *SELECTED TOPICS IN ADVANCED MECHANICS*. Offered as required. Special studies in selected topics.

1181. *ANALYSIS OF CURRENT LITERATURE IN APPLIED MECHANICS*. Fall term. Open to graduate students only. Registration by permission of instructor only. Professor GUNDER.

TOPICS SUGGESTED FOR ADVANCED WORK

Theory of Elasticity
Elastic Stability
Vibration
Fluid Motion
Photoelastic Stress Analysis

SANITARY ENGINEERING

Professor H. M. GIFFT; *Associate Professor* C. D. GATES; *Assistant Professor* W. O. LYNCH.

For undergraduate courses which often meet the needs of graduate students, see the *Announcement of the College of Engineering*, School of Civil Engineering, courses 2501, 2502, 2503.

2504. *SANITARY BIOLOGY*. Either term. Mr. GATES. Three credit hours, one lecture and two laboratory periods.

2506. *ADVANCED WATER SUPPLY*. Spring term. Three credit hours. Prerequisite 2502. Mr. GIFFT. Two recitations and one computing or laboratory period.

2507. *ADVANCED SEWERAGE WORKS*. Fall term. Three credit hours. Prerequisite 2503. Mr. GIFFT. Two recitations and one computing or laboratory period.

2508. *INDUSTRIAL WASTES*. Either term. Three credit hours. Prerequisite, 2503. Mr. GIFFT. Three lecture recitation periods.

2509. *PUBLIC HEALTH*. Spring term. Three credit hours. Mr. GATES. Three lecture-recitation periods.

2510. *ENVIRONMENTAL SANITATION*. Fall term. Three credit hours. Mr. GATES. Three lecture-recitation periods.

2511. *SANITARY ENGINEERING LABORATORY*. Either term. Three credit hours. Mr. GATES, Mr. LYNCH. One lecture and two laboratory periods.

2541. *SANITARY ENGINEERING DESIGN*. Either term. Three or more credit hours, as arranged. Prerequisites, 2502 or 2503. Mr. GIFFT.

2542. *SANITARY ENGINEERING RESEARCH*. Either term. Three or more credit hours, as arranged. Messrs. GIFFT, GATES, and LYNCH.

2543. *SANITARY ENGINEERING SEMINAR*. Either term. One or more credit hours, as arranged. Messrs. GIFFT, LYNCH, and GATES.

STRUCTURAL ENGINEERING AND SOIL ENGINEERING

Professor GEORGE WINTER; *Associate Professors* E. N. BURROWS, B. K. HOUGH, R. M. MAINS, P. P. BIJLLARD; *Assistant Professors* G. P. FISHER, W. MCGUIRE.

Preregistration is required for all courses in Structural Engineering. For undergraduate courses which often meet needs of graduate students, see the *Announce-*

ment of the College of Engineering, School of Civil Engineering, courses 2704, 2720, 2725, for which preregistration is required.

2706. *STEEL BUILDINGS.* Either term. Three credit hours. Prerequisite, 2703. Mr. BURROWS.

2707. *STEEL BRIDGES.* Either term. Three credit hours. Prerequisite, 2703. Mr. BURROWS.

2708. *INVESTIGATION AND RATING OF EXISTING STEEL STRUCTURES.* Either term. Three credit hours. Prerequisite, 2703. Mr. BURROWS.

2709. *ADVANCED STRUCTURAL ANALYSIS.* Spring term. Three credit hours. Prerequisite 2704. Mr. MAINS.

2710. *STRENGTH OF STRUCTURES.* Fall term. Three credit hours. Prerequisite or parallel course, 2704. Mr. WINTER.

2711. *BUCKLING OF STRUCTURES.* Spring term. Three credit hours. Prerequisites, 2715, 2704, and differential equations. Mr. WINTER.

2712. *TANKS, BINS, AND ROOFS.* Spring term. Credit three hours. Prerequisites, 2715, 2704, and differential equations. Mr. WINTER.

2716. *ADVANCED REINFORCED CONCRETE DESIGN.* Either term. Credit three hours. Prerequisite, 2715. Messrs. MAINS and FISHER.

2717. *REINFORCED CONCRETE BRIDGES.* Either term. Three credit hours. Prerequisites, 2715 and 2704. Mr. FISHER.

2723. *LONG SPAN BRIDGES.* By arrangement. Three credit hours. Prerequisite, 2709. Differential Equations. Mr. WINTER.

2741. *STRUCTURAL ENGINEERING DESIGN.* Either term, by arrangement. Messrs. WINTER, BURROWS, MAINS, and FISHER.

2742. *STRUCTURAL ENGINEERING RESEARCH.* Either term, by arrangement. Messrs. WINTER, MAINS, and FISHER.

2743. *STRUCTURAL ENGINEERING SEMINAR.* Either term, by arrangement. One to six hours credit. STAFF.

SOIL ENGINEERING

2726. *SOILS ENGINEERING THEORY.* First term. Three credit hours. Prerequisite 2725. Mr. HOUGH.

2727. *APPLIED SOILS ENGINEERING.* Second term. Three credit hours. Prerequisite 2726. Mr. HOUGH.

TRANSPORTATION ENGINEERING

Professor D. J. BELCHER, *Associate Professor* J. E. PERRY, *Associate Professor* T. D. LEWIS; *Assistant Professor* R. J. HODGE.

The laboratories for the examination of nonbituminous and bituminous materials and their utilization, soils, subgrade stabilization problems, etc., are 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.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Engineering,* School of Civil Engineering,

courses 2610, 2612, 2613, 2620, 2621. (For graduate credit, additional work is required in 2612 and 2613.)

Advanced work in Engineering Interpretation of Aerial Photographs and Traffic Engineering falls into the research category.

2603. *RAILROAD MAINTENANCE OF WAY.* Term arranged. Credit three hours. Prerequisite, 2110. Mr. PERRY.

2604. *RAILROAD OPERATION AND MANAGEMENT.* Term arranged. Credit three hours. Prerequisite, 2110. Mr. PERRY.

2614. *ADVANCED HIGHWAY ENGINEERING.* Spring term. Credit three hours. Prerequisite, 2610. Messrs. BELCHER and LEWIS.

2617. *AIRPORTS.* Fall term. Credit three hours. Prerequisite, 2610. Mr. HODGE.

2618. *LOW COST ROADS.* Either term. Credit three hours. Prerequisite, 2610, or its equivalent. Mr. BELCHER.

2641. *TRANSPORTATION ENGINEERING DESIGN.* Any term. Credit three or more hours. Messrs. BELCHER, HODGE, LEWIS, and PERRY.

2642. *TRANSPORTATION ENGINEERING RESEARCH.* Any term. Credit three or more hours. STAFF.

TOPOGRAPHIC, GEODETIC, AND PHOTOGRAMMETRIC ENGINEERING

Professor F. J. SPRY and *Associate Professor* A. J. MCNAIR.

The preliminary training as a qualification for work in this field should include the equivalent of the regular undergraduate course in civil engineering, including work in 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 Photogrammetry. 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.

2105. *LEAST SQUARES.* Adjustment of Observation. Term arranged. Three hours credit. Elective for upperclassmen and graduate students. Prerequisites, Calculus and Physics. Mr. SPRY.

2106. *ADVANCED TOPOGRAPHIC SURVEYING.* Credit two hours. Prerequisite, 2103. Elective for upperclassmen and graduate students. Mr. MCNAIR.

2107. *GEODESY AND GEODETIC LABORATORY.* Term arranged. Credit three hours. Prerequisites, 2102 and 2103. Mr. MCNAIR. Elective for upperclassmen and graduate students.

2109. *MAP PROJECTIONS AND MAPPING.* Term arranged. Credit three hours. Mr. MCNAIR. Elective for upperclassmen and graduate students.

2142. *GEODETIC ENGINEERING RESEARCH.* Prerequisites will depend upon the line of work to be pursued.

2143. *SEMINAR IN GEODESY OR PHOTOGRAMMETRY.* One to six hours credit. Elective. Open to specially selected seniors or graduate students.

2120. *ALTIMETRY.* Any term. Credit three hours. Prerequisites, Summer Survey 2103. Elective for upperclassmen and graduates. Mr. MCNAIR.

2121. *ELEMENTS OF PHOTOGRAMMETRY.* Any term. Credit three hours.

Prerequisites, Summer Survey 2103. Mr. McNAIR. Elective for upperclassmen and graduates.

2122. *ADVANCED PHOTOGRAMMETRY.* Any term. Credit three hours. Prerequisite, 2121. Mr. McNAIR. Elective for seniors and graduates.

2123. *SURVEYING AND MAPPING INSTRUMENTATION DESIGN.* Any term. Credit three hours. Prerequisite, 2122. Mr. McNAIR. Elective for graduates.

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 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 semester during the regular academic year is usually necessary for candidates for the Master's degree on Plan A.

CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS

Professors ROBERT DALTON, URIE BRONFENBRENNER, LEMO ROCKWOOD, ETHEL WARING; *Associate Professors* MARY FORD, KATHERINE REEVES, RUSSELL SMART; and Mr. HAROLD FELDMAN.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Child Development and Family Relationships 1, 2, 3, 4

Child Development 2, 3, 4

Child Guidance 2, 3, 4,

Family Relations 2, 3, 4

Marriage 3, 4

Family Counseling 3, 4

As a basis for graduate work in Child Development and Family Relationships elementary courses in psychology, sociology and/or child development and family relationships are required. As a background for advanced work some experience in one of the following areas is also desirable: teaching or other experience with young children, school children, adolescents, or adults; social or clinical work; or extension teaching or administration.

In addition to course work the department offers opportunities for field work with families and with young children. Laboratory experience is provided in the Department nursery school, in public nursery schools, play groups in the settlement houses, and in other organized groups.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Child Development and Family Relationships, courses 120, 140, 150, 215.

303. *HISTORY AND PHILOSOPHY OF EARLY CHILDHOOD EDUCATION.* Spring term. Credit three hours. Associate Professor REEVES. M W F 10. Room 124. Preregistration required.

305. *METHODS OF CHILD STUDY.* Spring term. Credit two hours. Primarily for seniors and graduate students. Limited to twelve students. Prerequisite, twelve or more credit hours in Child Development and Family Relationships and/or Psychology and Child Development and Family Relationships 330, or permission of the instructor. Associate Professor FORD. T Th 9. Room G–22. Preregistration required.

310. *PRINCIPLES OF CHILD GUIDANCE.* Fall and spring terms. Credit three hours. Observation in the Nursery School. Weekly small group discussions. Professor WARING. M W F 8. Room 124. Preregistration required.

315. *CHILD DEVELOPMENT.* Advanced course. Fall term. Credit three hours. Primarily for seniors and graduate students. Prerequisite, Child Development and Family Relationships 215 or equivalent. Associate Professor SMART. T Th S 9. Preregistration required.

325. *EXCEPTIONAL CHILDREN IN THE FAMILY.* Fall term. Credit three hours. Open to juniors, seniors, and graduate students. Prerequisite, six or more credit hours in Child Development and Family Relationships and/or psychology. Associate Professor FORD. M W F 9. Room 124. Preregistration required.

332. *SPECIAL PARTICIPATION AND NURSERY SCHOOL EDUCATION PROBLEMS.* Fall and spring terms. Credit and hours to be arranged. Associate Professor REEVES (Community Schools), Assistant Professor HARRIS (Campus Nursery School). Preregistration required.

[360. *PSYCHODYNAMICS OF HUMAN BEHAVIOR.* Fall term. Credit three hours. Open to juniors, seniors, and graduate students. Limited to forty-five students. Prerequisite, one course in Child Development and Family Relationships or Psychology. Professor DALTON. M W F 11. Room 124. Not given in 1950–1951.]

361. *FAMILY RELATIONSHIPS AND THE PSYCHODYNAMICS OF FAMILY DEVELOPMENT.* Fall term. Credit three hours. Professor ROCKWOOD. T Th 11–12:30. Room 121. Preregistration required.

370. *MARRIAGE.* Spring term. Credit three hours. Permission to register must be obtained from Professor ROCKWOOD. Professor ROCKWOOD and Associate Professor SMART. M W F 10 or 11. Room 121. Preregistration required.

373. *THE INFANT AND HIS FAMILY IN OUR CULTURE.* Spring term. Credit three hours. Open to juniors, seniors, and graduate students. Limited to twenty students. Associate Professor SMART. T Th S 9. Room 3M11. Preregistration required.

403 *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department STAFF. Preregistration required.

[405. *SEMINAR — RESEARCH METHODS.* Fall term. Credit two hours. Not offered in 1950–1951.]

407. *THESIS AND RESEARCH.* Fall and spring terms. Credit and hours to be arranged. Registration by permission of the instructor. Professors BRONFENBRENNER and WARING, Associate Professors FORD, REEVES, and SMART, Assistant Professor HARRIS, Mr. FELDMAN, and ——. Preregistration required.

[415. *SEMINAR IN CHILD DEVELOPMENT.* Spring term. Credit three hours. Open to graduate students by permission of the instructor. Prerequisite, Child Development and Family Relationships 360, or equivalent. Professor DALTON. Th 2–4:30. Room G–22. Not given in 1950–1951.]

[420. *PROSEMINAR IN CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS.* Fall term. Credit three hours. Not offered in 1950–1951.]

[440. *SEMINAR — THE FAMILY.* Throughout the year. Credit two hours. Not offered in 1950–1951.]

450. *SEMINAR — CHILD GUIDANCE.* (See Rural Education 228.) Spring term. Credit two hours. Prerequisite, some work in Child Development and Family Relationships. Professor WARING. W 4–6. Van R. Room G–22. Preregistration required.

[460. *FAMILY RELATIONSHIPS AND FAMILY DEVELOPMENT.* Fall term. Credit three hours. Professor Rockwood. T Th 11–12:30. Room 121. Not given in 1950–1951.]

475. *FAMILY LIFE EDUCATION IN COLLEGES AND HIGH SCHOOLS.* Spring term. Credit three hours. Registration with permission of instructor. Professor ROCKWOOD. T Th 11–12:30. Room 121. Preregistration required.

[480. *PERSONAL COUNSELING.* Spring term. Credit three hours. Not offered in 1950–1951.]

ECONOMICS OF THE HOUSEHOLD AND HOUSEHOLD MANAGEMENT

Professor HELEN CANON; *Associate Professors* ELLA M. CUSHMAN, MABEL ROLLINS, LUCILLE WILLIAMSON, MARY KOLL HEINER, and ANN AIKIN; *Assistant Professor* ESTHER C. BRATTON.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Economics of the Household and Household Management 1, 2, 4

Students selecting a major in Economics of the Household and Household Management are expected to take courses in both phases of the field; for the Ph.D. degree the minor subjects are usually selected to support one phase or the other. Appropriate minor subjects may be chosen from a variety of fields including, besides other branches of home economics, agricultural economics, economics, education, psychology, sociology.

As a background for graduate work in this field, a well-rounded undergraduate program in home economics is preferable, in general, to specialization. Undergraduate courses in mathematics, statistics, economics, history, sociology, psychology, physics, chemistry, and bacteriology are also useful.

260. *PROBLEMS IN PROVIDING CONSUMERS' GOODS.* Fall term. Credit three hours. Open to undergraduate and graduate students. Prerequisite, Economics of the Household 130 or the equivalent. Associate Professor ROLLINS. M W F 8, and one additional hour at the convenience of the student. Room 121. Preregistration required.

310. *MANAGEMENT PROBLEMS IN HOMES.* Fall and spring terms. Credit two hours for juniors and seniors; three hours for graduate students. Prerequisite for juniors and seniors, Economics of the Household 128 or 308. Graduate students should consult the instructor before registering. Associate Professor CUSHMAN and Miss ——. W F 2–4:20. One additional hour to be arranged for graduate students. Room G–19. Preregistration required.

320. *MANAGEMENT IN RELATION TO HOUSEHOLD EQUIPMENT.* Spring term. Credit three hours. For juniors, seniors, and graduate students. Agricultural Engineering 10 or the equivalent, and Economics of the Household 128 and 310 desirable as a background. Associate Professor WILLIAMSON. T Th 11–1. Room G–19. Preregistration required.

330. *MANAGEMENT IN RELATION TO PERSONAL FINANCES.* Spring term. Credit three hours. For juniors, seniors, and graduate students. Prerequisite, Economics of the Household 130 or permission of the instructor. Associate Professor AIKIN. M W F 9. Room 121. Preregistration required.

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department STAFF. Preregistration required. For graduate students recommended by their chairmen and approved by the head of the department and the instructor in charge for independent, advanced work.

407. *THESIS AND RESEARCH.* Fall and spring terms. Credit and hours to be arranged. Registration with permission of the instructor. Professor CANON, As-

sociate Professors CUSHMAN, ROLLINS, WILLIAMSON, HEINER, and AIKIN, and Assistant Professor BRATTON. Preregistration required.

408. *WORK SIMPLIFICATION IN HOME ECONOMICS.* Spring term. Credit two hours. Prerequisite, Economics of the Household 310 or permission of the instructor. Associate Professor HEINER. T 2–4. Room 124. Preregistration required.

420. *HOME PROCESSES.* Spring term. Credit two hours. Students will attend specified lectures given by the instructors in Economics of the Household 128. The instructor should be consulted before registering. Miss PURCHASE. Lecture, M W 10. Amphitheatre. Laboratory, M 11–1. Room G–19. Preregistration required.

430. *ECONOMIC CONDITIONS IN RELATION TO THE WELFARE OF FAMILIES.* Fall and spring terms. Credit three hours. Graduate section of 130. Associate Professors ROLLINS and AIKIN. M W F 11 and one additional hour to be arranged. Amphitheatre. Preregistration required.

432. *PERSONAL FINANCES.* Fall term. Credit two hours. Prerequisite, Economics of the Household 330 or the equivalent. The instructor should be consulted before registering. Associate Professor AIKIN. F 2–4. Room 133. Preregistration required.

461. *PROBLEMS IN THE DISTRIBUTION OF CONSUMERS' GOODS.* Spring term. Credit two hours. Prerequisite, Economics of the Household 260 or the equivalent. The instructor should be consulted before registering. Associate Professor ROLLINS. F 2–4. Room 124. Preregistration required.

490. *REVIEW OF RESEARCH IN HOME MANAGEMENT.* Fall term. Credit two hours. Prerequisite or parallel, Economics of the Household 310. The instructor should be consulted before registering. Professor CANON. Th 2–4. Room 108. Preregistration required.

495. *ECONOMIC PROBLEMS OF FAMILIES.* Spring term. Credit two hours. The instructor should be consulted before registering. Professor CANON. Th 2–4. Room 108. Preregistration required.

499. *SEMINAR.* Fall and spring terms. For graduate students. Department STAFF. T 4–5:15. Room 114. Preregistration required.

FOOD AND NUTRITION

Professors FAITH FENTON, HAZEL HAUCK, L. A. MAYNARD, C. M. MCCAY, CATHERINE PERSONIUS, MARION PFUND, GRACE STEININGER; *Associate Professors* ALICE BRIANT, FRANCES JOHNSTON, CHARLOTTE YOUNG; *Assistant Professor* BETTY STEELE.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Food and Nutrition 1, 2, 3, 4 — Food 2, 3, 4
Nutrition 1, 2, 3, 4

As a basis for graduate work in food and nutrition, elementary courses in home economics and courses in inorganic and organic chemistry are expected. A knowledge of quantitative chemical analysis, biochemistry, physiology, bacteriology, physics, physical chemistry, and statistics is 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, Professor PERSONIUS.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Food and Nutrition, courses, 103, 190, 214, 215, 225, 230, 240, 260.

305. *FOOD DEMONSTRATIONS.* Fall and spring terms. Credit one hour. Prerequisites, Food and Nutrition 215, or 225. Registration with permission. Associate Professor FOSTER. T Th 2:30–4. Room 361. Preregistration required.

314. *FOOD SCIENCE.* Fall term. Credit three hours. Prerequisite, Food and Nutrition 215 or 225 and 240 or 260. Registration with permission. Professor PERSONIUS. Lectures, T Th 8. Room 339. Laboratory, S 8–10. Room 358. Preregistration required. (Note: F.N. 314 and 315 are designed as a unit to cover the material formerly covered in F.N. 310 and 320.)

315. *FOOD SCIENCE. INTRODUCTORY EXPERIMENTAL COOKERY.* Spring term. Credit three hours. Prerequisite, Food and Nutrition 314. Registration with permission. Professor FENTON. Lectures, T Th 8. Laboratory, S 8–11. Room 358. Preregistration required.

330. *DIET THERAPY.* Fall term. Credit three hours. Prerequisite, Food and Nutrition 230 or equivalent. Registration with permission. Professor HAUCK. M W F 8. Room 426. Preregistration required.

340. *FAMILY NUTRITION, WITH SPECIAL EMPHASIS ON CHILD FEEDING.* Fall and spring terms. Credit two hours. Prerequisite, Food and Nutrition 103 or 190. Miss NEWMAN. W F 8. Room 339. Preregistration required.

342. *CHILD FEEDING LABORATORY.* Spring term. Credit one hour. Prerequisite, Food and Nutrition 340 or equivalent. Miss NEWMAN. Th 10–12. Room 352. Preregistration required.

360. *SEMINAR IN FOOD AND NUTRITION.* Fall term. Credit one hour. Primarily for seniors; open to graduate students. Prerequisites, Elementary Nutrition and Food and Nutrition 215 or 225. Professor FENTON and Miss NEWMAN. Th 2. Room 3M11. Preregistration required.

400. *READINGS IN NUTRITION.* Spring term. Credit two hours. Registration with permission of instructor. Professor HAUCK. T Th 11. Room 301. Preregistration required.

[401. *READINGS IN NUTRITION.* Spring term. Offered in alternate years. Credit two hours. Registration with permission of instructor. Professor HAUCK. T Th 11. Preregistration required. Not given in 1950–1951.]

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department STAFF. Preregistration required.

407. *THESIS AND RESEARCH.* Fall and spring terms. Credit and hours to be arranged. Registration with permission of the instructor. Professors FENTON, HAUCK, MAYNARD, MCCAY, PERSONIUS, PFUND, and STEININGER; Associate Professors BRIANT, JOHNSTON, and YOUNG; Assistant Professor STEELE. Preregistration required.

[414. *ADVANCED EXPERIMENTAL COOKERY.* Fall term. Credit three hours. Prerequisite, Food and Nutrition 315. Registration with permission of instructor. Professor PFUND. M W 2–5. Preregistration required. Not given in 1950–1951.]

420. *ADVANCED SEMINAR IN NUTRITION.* Fall term. Credit one hour. Professor STEININGER and Department STAFF. T 4. Room 301. Preregistration required.

421. *ADVANCED SEMINAR IN FOOD.* Spring term. Credit one hour. Professor PERSONIUS and Department STAFF. T 4. Room 301. Preregistration required.

440. *NUTRITION OF GROWTH AND DEVELOPMENT.* Spring term. Credit two hours. Prerequisite 230 or equivalent. Professor STEININGER. T Th 8. Room 301. Preregistration required.

Note: See FOOD SCIENCE AND TECHNOLOGY for graduate research in biochemistry and bacteriology, particularly as applied to food problems. Attention is also called to the courses offered in other departments of the University, listed in the *Announcement of the School of Nutrition.*

HOME ECONOMICS EDUCATION

Professor MARGARET HUTCHINS; *Associate Professors* HELEN HOEFER and IRENE PATTERSON; *Assistant Professors* SARA BLACKWELL, CAROLYN CRAWFORD, and HELEN MOSER.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Home Economics Education 1, 2, 3, 4

The types of advanced degrees for which graduate students in Home Economics Education may become candidates are:

1. Master of Science (Plan A or Plan B)
2. Master of Science in Education
3. Doctor of Philosophy
4. Doctor of Education

As a basis for graduate work in Home Economics Education, undergraduate courses in Home Economics and Education are desirable. Some experience with children and adults, such as teaching in extension and in schools, is advisable. The Department offers opportunities for field experience in extension and school programs at all age levels.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Home Economics Education, courses 320, 321, 330, 331.

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and Spring terms. Department STAFF. Credit and hours to be arranged. For graduate students recommended by their chairmen and approved by the instructor in charge for independent advanced work.

407. *THESIS AND RESEARCH.* Fall and spring terms. Registration with permission of the chairman of the graduate committee and the instructor. Professor HUTCHINS, Associate Professors HOEFER and PATTERSON, Assistant Professors BLACKWELL, CRAWFORD, and MOSER. Credit and hours to be arranged.

[435. *METHODS AND MATERIALS IN TEACHING HOME ECONOMICS.* Fall term. Credit two hours. Professor HUTCHINS. Not given in 1950–1951.]

437. *ADULT EDUCATION.* Fall and spring terms. Credit two or three hours. Associate Professor PATTERSON. M 4 and other hours to be arranged. Room 124. Preregistration required. Estimated cost of transportation, $3 to $5.

[438. *TEACHING HOMEMAKING TO ADULTS.* Fall and spring terms. Credit two or three hours. Associate Professor PATTERSON. Not given in 1950–1951.]

439. *THE TEACHING OF HOME ECONOMICS.* Spring term. Credit two hours. Associate Professor PATTERSON. T 4 and other hours to be arranged. Room 124. Preregistration required.

449. *CURRICULUM PLANNING IN HOME ECONOMICS.* Fall term. Credit one hour. Students must also register for two credits of R.E. 276. Assistant Professor BLACKWELL. Th 4. Room 301. Preregistration required. Estimated transportation cost, $3.

459. *EVALUATION.* Spring term. Credit two hours. Assistant Professor BLACKWELL. S 10. Room 301. Preregistration required.

[469. *ADMINISTRATION OF HOME ECONOMICS.* Spring term. Credit two hours. Professor HUTCHINS. Not given in 1950–1951.]

[479. *RESEARCH IN HOME ECONOMICS EDUCATION.* Credit two hours. Not given in 1950–1951.]

480. *SEMINAR IN HOME ECONOMICS EDUCATION.* Fall term. Credit one hour. Department STAFF, Professor HUTCHINS, coordinator. W 4–6. Room 121. Preregistration required.

481. *SEMINAR IN SUPERVISION IN HOME ECONOMICS EDUCATION.* Spring term. Credit two hours. Department STAFF. Professor HUTCHINS, coordinator. Preregistration required.

485. *SUPERVISION OF HOME MANAGEMENT RESIDENCE EXPERIENCE.* Spring term. Credit two hours. Assistant Professor CRAWFORD. T 9–11. Apartment A. Preregistration required.

HOUSING AND DESIGN

Professors VIRGINIA TRUE and GLENN BEYER; *Associate Professors* HELEN J. CADY, DORA W. ERWAY, MABEL WILKERSON, MIRIAM T. WILLIAMS, and ROBERT K. WILLIAMS.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Housing and Design 1, 2, 3, 4

Graduate work for the Master's degree and the Doctor's degree is offered in Housing and Design.

Before entering upon advanced work in Housing and Design 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.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Housing and Design, courses 100, 110, 130, 160, 170, 200, 216, 220, 235.

305. *FASHION ILLUSTRATION.* Spring term. Credit three hours. Prerequisites, Housing and Design 100 and Architecture 340 or the equivalent. Clothing courses desirable. Miss STRAIGHT. M W 10–1. Room 322. Preregistration required. Minimum materials, $7.

320. *HISTORIC FURNITURE AND INTERIOR DESIGN.* Fall term. Credit two hours. Prerequisite, Housing and Design 220. Associate Professor WILKERSON. T Th 11. Room 317. Preregistration required.

325. *FURNISHINGS: SPECIAL EMPHASIS ON DESIGN OF FURNITURE AND BACKGROUND OF ROOMS.* Spring term. Credit three hours. Prerequisite, Housing and Design 220. Limited to fifteen students. Associate Professor CADY. Lecture, W 2. Room 317. Laboratory, M F 2–4. Room 327. Preregistration required.

340. *HOUSE PLANNING.* Fall term. Credit three hours. For juniors, seniors, and graduate students. Associate Professor ROBERT K. WILLIAMS. Lecture, F 9. Room 317. Laboratory, M W 9–11. Room 408. Preregistration required.

346–347. *FUNDAMENTALS OF HOUSING.* Throughout the year. Credit three hours a term. Open to juniors, seniors, and graduate students, or permission of the instructor. Associate Professor MIRIAM T. WILLIAMS. Lectures, M W F 9. Room 3M11. Preregistration required.

350. *SEMINAR IN FURNISHINGS.* Fall term. Credit one hour. Primarily for upperclassmen and graduate students. Department STAFF. M 4. Room 3M11. Preregistration required.

400. *SEMINAR IN CURRENT HOUSING PROBLEMS.* Spring term. Credit three hours. Registration by permission of staff based upon student's training, experience, and interest. Professor BEYER and outside speakers. M 4–6. Room 3M11. Preregistration required.

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department STAFF. Preregistration required. For graduate students recommended by their chairmen and approved by the head of the department in charge for independent, advanced work.

407. *THESIS AND RESEARCH.* Fall and spring terms. Registration with permission of the instructor. Professors TRUE and BEYER, Associate Professors CADY, ERWAY, WILKERSON, MIRIAM T. WILLIAMS, and ROBERT K. WILLIAMS. Preregistration required.

[425. *GRADUATE COURSE IN HOUSE FURNISHINGS FOR EXTENSION WORKERS.* Spring term. Credit six hours. Prerequisite, undergraduate courses in furnishings, and/or experience in extension furnishings work. Registration by permission of the instructor. Not given in 1950–1951.]

440–441. *HOUSE PLANNING.* Throughout the year. Credit three hours a term. Prerequisite, Housing and Design 340. Associate Professor ROBERT K. WILLIAMS. Lecture, W 2; laboratory, M W 2–4. Room 408. Preregistration required.

INSTITUTION MANAGEMENT

Professor KATHARINE W. HARRIS and *Assistant Professor* HELEN RIPLEY.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Institution Management 2, 4

Advanced work in institution management requires undergraduate courses in this subject and/or food and nutrition with some administrative experience in the field of managerial dietetics.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Institution Management, courses 100, 220, 230, 240, 300.

310. *CATERING.* Fall and spring terms. Credit three hours. Permission of the instructor required. Prerequisite, Institution Management 200, 210, or 230, or equivalent experience. Special catering assignments require 15 to 20 hours in addition to the scheduled laboratories. Assistant Professor RIPLEY and Miss——. Fall term, T or Th 8:30–2, or W 2–7:30; spring term, T or Th 8:30–2. Discussion S 9. Green Room. Preregistration required.

320. *INSTITUTION ORGANIZATION AND ADMINISTRATION.* Spring term. Credit four hours. Advised for all students specializing in institution management or dietetics. Prerequisites, Institution Management 230 and Hotel Accounting 240 or equivalent courses. Registration by permission of the instructor. M F 2–4. Room 124. Preregistration required.

330. *QUANTITY FOOD PREPARATION AND CATERING, ADVANCED COURSE.* Fall and spring terms. Credit five hours. Permission of the instructor required. Prerequisites, Institution Management 200, 210, or 230, or equivalent courses. Special catering assignments require 25 to 30 hours in addition to the scheduled laboratories. Assistant Professor RIPLEY. T Th 8:30–2. Lecture and

discussion, S 9. Conference hours by appointment. Green Room. Preregistration required.

350. *INSTITUTION PRACTICE.* Fall and spring terms. Credit three hours. Open to a limited number of graduate students specializing in institution management, with the permission of the instructor. Practice assignments require approximately 10 hours a week for the full semester. Conference hours to be arranged. Students will meet with the instructor the first day of the semester, 4–5 G64. Professor HARRIS. Preregistration required.

[400. *READINGS IN INSTITUTION MANAGEMENT.* Spring term. Offered in alternate years. Credit one hour. Registration with permission of the instructor. Professor HARRIS. Th 4–5:30. Preregistration required. Not given in 1950–1951.]

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department STAFF. Preregistration required.

407. *THESIS AND RESEARCH.* Fall and spring terms. Registration with permission of the instructor. Professor HARRIS and Assistant Professor RIPLEY. Preregistration required.

410. *SEMINAR IN INSTITUTION ORGANIZATION AND ADMINISTRATION PROBLEMS.* Spring term. Offered in alternate years. Credit one hour. Th 4–5:30. For students with adequate training in institution management. Professor HARRIS and departmental STAFF. Preregistration required.

TEXTILES AND CLOTHING

Professor BEULAH BLACKMORE; *Associate Professors* MURIEL BRASIE, GLADYS BUTT, ELSIE FROST MCMURRY, MARGARET HUMPHREY, RUTH SCOTT, and *Assistant Professor* RYAN.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Textiles and Clothing 2, 3, 4

The work in Textiles and Clothing may emphasize either the economic, sociological, educational, technical, or art aspects of the subject.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the College of Home Economics,* Department of Textiles and Clothing, courses 100, 101, 110, 130, 150, 200, 205, 210.

235. *SCIENCE RELATED TO TEXTILES.* Spring term. Credit two hours. Prerequisites, Food and Nutrition 215 or elementary organic chemistry or the equivalent; Textiles and Clothing 130 or 310. Miss WHITE. W F 8–10. Room 353. Preregistration required.

[310. *HOUSEHOLD TEXTILES.* Fall term. Credit two hours. See Textiles and Clothing 410 and consult with instructor. Professor BLACKMORE. T Th 9–11. Room 278. Not given in 1950–1951.]

320. *PROBLEMS IN BUYING CLOTHING.* Fall and spring terms. Credit three hours. Associate Professor BRASIE. M W F 11. Preregistration required.

330. *HISTORY OF COSTUME.* Fall term. Credit three hours. Associate Professor MCMURRY. M W F 2. Room 216. Preregistration required.

340. *ADVANCED DRESSMAKING.* Fall term. Credit three hours. Prerequisite, Textiles and Clothing 200 or the equivalent. Registration limited to sixteen students. Associate Professor HUMPHREY. T Th 9–12. Room 234. Estimated cost of materials, $20 to $35. Preregistration required.

345. *TAILORING.* Spring term. Credit three hours. Prerequisite, Textiles and Clothing 200 or the equivalent. Registration limited to sixteen students. Associate Professor HUMPHREY. T Th 9–12. Room 234. Preregistration required. Estimated cost of materials, $25 to $50.

350. *TEXTILES: ADVANCED COURSE.* Fall and spring terms. Credit two hours. Prerequisite, Textiles and Clothing 130 or 310 or the equivalent. Miss WHITE. W F 11–1. Room 278. Preregistration required. Estimated cost of materials, $5 to $15.

400. *DRESS DESIGN, ADVANCED COURSE.* Spring term. Credit three hours. Prerequisites, Textiles and Clothing 200 and 340 or their equivalent. Textiles and Clothing 330 recommended. Associate Professor MCMURRY. T Th 1:40–4:30. Room 217. Preregistration required.

403. *SPECIAL PROBLEMS FOR GRADUATE STUDENTS.* Fall and spring terms. Credit and hours to be arranged. Department STAFF. Preregistration required. For graduate students recommended by their chairmen and approved by the head of the department and the instructor in charge for independent, advanced work.

407. *THESIS AND RESEARCH.* Fall and spring terms. Registration with permission of the instructor. Professor BLACKMORE, Associate Professors BRASIE, MCMURRY, HUMPHREY, and SCOTT. Preregistration required.

[410. *SEMINAR IN TEXTILES.* Fall and spring terms. Credit one hour. Parallel course, Textiles and Clothing 310. Consult the instructor before registering. Professor BLACKMORE. Hours to be arranged. Not given in 1950–1951.]

430. *SEMINAR IN CLOTHING.* Spring term. One hour by arrangement. Assistant Professor RYAN in charge. Room 216. Preregistration required.

HOTEL ADMINISTRATION

Professors H. B. MEEK, F. H. RANDOLPH, LOUIS TOTH, JOHN COURTNEY, C. I. SAYLES, C. E. CLADEL, T. W. SILK, H. J. RECKNAGEL, G. W. LATTIN.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Hotel Administration 1, 2, 4 Hotel Accounting 2, 3, 4

Graduate work in the field of Hotel Administration is open to those who have completed in full the requirements for the undergraduate degree in the Department of Hotel Administration or their equivalent and to them only.

Students who hold bachelor's degrees in the liberal arts or general business administration who wish a program in hotel administration normally enroll in the undergraduate division. They may become candidates for an additional Bachelor's degree or at their choice enroll simply for a specialized program of Hotel Administration courses suited to their particular needs. Full information is contained in the *Announcement of the Department of Hotel Administration.*

To those who are qualified to pursue advanced work, programs leading either to the Master's degree or the Doctor's degree are offered.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the Department of Hotel Administration,* courses 81, 82, 114, 181, 182, 183, 184, 187, 240, 282, 283, 340, 261, 262, 264. Preregistration required.

HOTEL PLANNING (Hotel Engineering 265). Fall term, to be repeated in the spring term. Credit three hours. Open to seniors and graduate students. Discussion, T Th 9–11:30. Professor RANDOLPH. Preregistration required.

HOTEL STRUCTURES AND MAINTENANCE (Hotel Engineering 266). Fall term. Credit three hours. Lectures, M W F 10. Laboratory sections as assigned in alternate weeks. Associate Professor SAYLES. Preregistration required.

HOTEL ACCOUNTING PROBLEMS (Hotel Accounting 185). Spring term. Credit two hours. Prerequisite, Hotel Accounting 182 or its equivalent. Assistant Professor TOTH.

INTERPRETATION OF HOTEL FINANCIAL STATEMENTS (Hotel Accounting 186). Spring term. Credit two hours. Prerequisite, Hotel Accounting 182 or its equivalent. Assistant Professor TOTH. Preregistration required.

PROBLEMS IN ANALYSIS AND INTERPRETATION (Hotel Accounting 189). Fall term, to be repeated in the spring term. Credit two hours. Registration limited. Assistant Professor COURTNEY.

SEMINAR IN HOTEL ADMINISTRATION (Hotel Administration 153). Fall term, to be repeated in the spring term. Credit two hours. Registration limited. Professor MEEK. Preregistration required.

PERSONNEL ADMINISTRATION IN HOTELS. (Hotel Administration 119). Fall term, to be repeated in spring term. Credit three hours. Prerequisite, Hotel Administration 114 or its equivalent. Assistant Professor LATTIN. Preregistration required.

INDUSTRIAL AND LABOR RELATIONS

Professors M. P. CATHERWOOD, L. P. ADAMS, C. K. BEACH, E. BROOKS, J. M. BROPHY, T. BURLING, R. N. CAMPBELL, M. G. CLARK, L. A. EMERSON, R. H. FERGUSON, C. A. HANSON, D. HYATT, J. J. JEHRING, V. H. JENSEN, M. R. KONVITZ, A. H. LEIGHTON, P. J. MCCARTHY, J. W. MCCONNELL, JEAN T. MCKELVEY, J. G. MILLER, R. E. MONTGOMERY, J. E. MORTON, PHILOMENA MULLADY, M. F. NEUFELD, N. A. TOLLES, W. F. WHYTE, B. F. WILLCOX, A. L. WINSOR.

DEGREES OFFERED AND REQUIREMENTS

The Division of Industrial and Labor Relations offers an opportunity for candidacy for the degrees of Master of Science in Industrial and Labor Relations (M.S. in I.L.R.), Master of Science (M.S.), and the Ph.D. Students interested in working for the degree of Master of Science in Education (M.S. in Ed.) may become candidates for this degree with specialization in Industrial Education.

The degree of Master of Science in Industrial and Labor Relations provides broad coverage in the field of Industrial and Labor Relations at the graduate level, plus a limited opportunity for specialization, whereas the degree of Master of Science provides for specialization in a major and a minor subject. In general, the previous academic preparation and experience of the candidate will determine which program will be followed.

The degree of Master of Science in Industrial and Labor Relations is under the special jurisdiction of the Division.

The program requirements for both the degree of Master of Science in Industrial and Labor Relations and the Master of Science are such that under most circumstances three terms of full-time residence study or the equivalent will be necessary for the completion of the requirements. Under appropriate circumstances and with the approval of the Dean of the Graduate School, residence credit can be earned during the summer.

A candidate for the degree of M.S. in Industrial and Labor Relations (M.S. in I.L.R.) follows a program outlined by the graduate staff of the Division. Included in the program for the M.S. in I.L.R. candidate are three basic requirements·

(1) The candidate will complete a graduate course in each of eight subject matter areas. A total of 24 semester hours will be needed to satisfy this requirement.

(2) The candidate will be required, in addition, to complete satisfactorily four graduate seminars or courses, as determined in consultation with his adviser. One of the four seminars or courses shall be a graduate course in Report Writing

(3) The candidate for the M.S. in I.L.R. must complete satisfactorily a final written comprehensive examination covering the field of Industrial and Labor Relations. This examination will be taken at or near the completion of the student's program.

Requirements for the degrees of M.S. and Ph.D. are described in the front of this *Announcement.*

SELECTION OF GRADUATE STUDENTS

Admission to graduate standing is determined by the Dean of the Graduate School. Candidates for advanced degrees in the field of Industrial and Labor Relations will be recommended for admission in terms of the following criteria: (1) the nature and quality of previous academic preparation; (2) the capacity of the

applicant for graduate study as determined through personal interviews and testing; (3) substantial work experience which demonstrates a positive interest and maturity for work in industrial and labor relations.

Persons interested in admission to graduate study in this field should write to the Dean of the Graduate School, Cornell University, for application material and should return such material when completed to the Dean of the Graduate School.

The School of Industrial and Labor Relations desires interviews with all applicants. If at all possible, persons interested in admission should arrange for a visit to Ithaca. Inquiries concerning admission interviews and graduate assistantships and fellowships should be sent to the Director of Student Personnel, New York State School of Industrial and Labor Relations.

Fellowships in Industrial Psychiatry

Funds granted to Cornell University by the Carnegie Corporation permit the appointment of two fellows in Industrial Psychiatry. The purpose of the fellowships is to provide an opportunity for trained psychiatrists to study at the New York State School of Industrial and Labor Relations and to apply psychiatric knowledge and methods to the problems of industry in actual plant situations. The fellowships are granted for a period of two years. Applicants must hold an M.D. degree, and have completed a minimum of one year's internship in psychiatry. These fellowships are administered by the School of Industrial and Labor Relations.

APPROVED MAJOR AND MINOR SUBJECTS (key to symbols on p. 42)

Collective Bargaining, Mediation, and Arbitration 1, 2, 3, 4
Economic and Social Statistics 1, 2, 3, 4
Human Relations 1, 2, 3, 4
Industrial and Labor Problems 4
Industrial Education 1, 2, 3, 4
Labor Market Economics and Analysis 1, 2, 3, 4
Labor Union History, Government, and Administration 1, 2, 3, 4
Personnel Administration 1, 2, 3, 4
Social Security and Protective Labor Legislation 1, 2, 3, 4

Candidates for the M.S. and Ph.D. degrees proposing to major or minor in Industrial and Labor Relations must select areas of specialization from the above subjects. Candidates for the Master of Science in Industrial and Labor Relations do not select majors or minors, but rather, follow a program designed to provide broad coverage in the field of Industrial and Labor Relations.

For both the M.S. and Ph.D. degrees emphasis is placed upon independent study and research. The following are minimum requirements prerequisite to the independent investigations required for these degrees:

COLLECTIVE BARGAINING, MEDIATION, AND ARBITRATION. For a major in this subject, the candidate must show knowledge of: (1) the history, current developments, and issues in labor relations, collective bargaining practices and procedures; (2) the content of trade agreements in different types of industry; (3) state and federal legislation in the field of labor relations, collective bargaining, mediation, and arbitration; (4) leading cases in the field of labor law; (5) administrative agencies and their functions. For a minor, (1), (3), and (5) are required.

ECONOMIC AND SOCIAL STATISTICS 1, 2, 3, 4. For a major in this subject the candidate must show: (1) good command of the principles of statistical reasoning; (2) proficiency in the use of statistical methods and in the processing

of statistical data; (3) qualified skill in the application of proper statistical tools of analysis to a specific topic in economics or social studies, including a thorough knowledge of statistical sources; (4) knowledge of differential and integral calculus. For a minor, (1), (2), (3) are required, the level being less advanced than for a major.

HUMAN RELATIONS. For a major in this subject, the candidate must present: (1) acquaintance with the fields basic in human and social behavior including biology, the physiology of the nervous system, and the psychology of the individual; (2) comprehensive knowledge of relevant areas in social psychology and cultural anthropology, especially the fundamentals of individual and group behavior and the nature of institutions; (3) familiarity with the principal human relations problems commonly found in industrial and labor relations and the bearing of these problems on other fields such as collective bargaining, labor organization, management organization, economics, and law; (4) knowledge of the problems involved in the relationship between industries and communities; (5) thorough knowledge of pertinent research techniques and methods employed in human relations problems; (6) knowledge of resources generally available in educational techniques and in community services that have bearing on human relations problems. For a minor, (1), (2), and (3) are required.

INDUSTRIAL AND LABOR PROBLEMS. (Offered as a minor only to graduate students in fields of study other than Industrial and Labor Relations.) A candidate for an advanced degree must have a general understanding of the subject matter in the field of Industrial and Labor Relations. In order to prepare for a minor in this field, the candidate will normally complete three to five courses in accordance with a program approved by his special committee.

INDUSTRIAL EDUCATION. For a major in this subject, the candidate must show: (1) comprehensive understanding of industrial and technical education programs in public institutions, private institutions, and industry; (2) ability to develop analyses for instructional purposes and prepare an educational or training program based upon analyses; (3) understanding of economic, social, and scientific factors which may modify industrial and technical education programs; (4) understanding of instructional methods and their application in learning situations; (5) ability to apply administrative and supervisory principles to industrial and technical education programs; (6) detailed knowledge of bibliographies and sources of information in this field. For a minor, (1), (2), (3) are required.

LABOR MARKET ECONOMICS AND ANALYSIS. For a major in this subject, the candidate must show: (1) comprehensive knowledge of the factors governing labor supply and demand; (2) thorough understanding of basic economic processes, especially in relation to employment, national income, production, wages, prices, and profits; (3) qualified skill in analyzing some specific labor market relationship such as manpower, labor mobility, wage determination, wage differentials, changes in wage structures, productivity, labor costs, or consumer incomes and expenditures; (4) competence in the use and application of quantitative methods; (5) knowledge of the history and the literature related to the subject. For a minor, (1), (2), and (4) are required. When this subject is elected as a major, Labor Economics may not be elected as a minor.

LABOR UNION HISTORY, GOVERNMENT, AND ADMINISTRATION. For a major in this subject, the candidate must present: (1) a working knowledge of the history of the American labor movement; (2) a working knowledge of the government and administration of the American labor movement; (3) specific and detailed knowledge of the history, government, and administration of inter-

national and national labor unions in the United States; (4) familiarity with types of union leadership and rank-and-file behavior; (5) familiarity with the history, government, and administration of labor movement in other countries; (6) detailed knowledge of the bibliography and sources of information in this field. For a minor in this subject (1), (2), and (6) are required.

PERSONNEL ADMINISTRATION. For a major in this subject, the candidate must present: (1) comprehensive knowledge of the general principles of administration, including personnel organization and operation; (2) ability to appraise critically personnel methods and procedures; (3) knowledge of labor and industrial legislation and functions of government as they relate to the personnel function; (4) knowledge of business and labor organizations and their impact on collective bargaining; (5) insight concerning the basic attitudes modifying the relationships between individuals, groups, and organizations; (6) detailed knowledge of the bibliography and sources of information in this field. For a minor, (1), (2), (3), and (6) are required.

SOCIAL SECURITY AND PROTECTIVE LABOR LEGISLATION. For a major in this subject, the candidate must show; (1) familiarity with the sources and nature of insecurity; (2) a comprehensive knowledge of the origin, development, constitutionality, and administration of legislation in such fields as labor relations, minimum wage, hours, protection of women and children, discrimination and civil rights, health and safety, workmen's compensation, and social insurance; (3) a knowledge of the efforts of labor industry, and the community to meet these problems on a voluntary basis; (4) familiarity with one special field of legislation, and the administrative and legal experience in that field; (5) knowledge of the past and current proposals for improving and extending legislation. For a minor, (1), (2), and (5) are required.

GRADUATE COURSES

Designed primarily for students in candidacy for the M.S. in I.L.R. degree. Open to other graduate students upon consent of instructor.

500. *COLLECTIVE BARGAINING, MEDIATION AND ARBITRATION.* Spring term.

510. *ECONOMIC AND SOCIAL STATISTICS.* Fall term.

520. *HUMAN RELATIONS.* Spring term.

530. *INDUSTRIAL EDUCATION.* Spring term.

540. *LABOR MARKET ECONOMICS.* Prerequisites, six semester hours of college economics or consent of instructor. Fall term.

550. *LABOR UNION HISTORY, GOVERNMENT, AND ADMINISTRATION.* Fall term.

560. *PERSONNEL ADMINISTRATION.* Fall term.

570. *SOCIAL SECURITY AND PROTECTIVE LABOR LEGISLATION.* Spring term.

590. *REPORT WRITING.* Fall term.

SEMINARS

600. *COLLECTIVE BARGAINING — LABOR RELATIONS LAW AND LEGISLATION.* Fall term.

601. *COLLECTIVE BARGAINING — CONTRACTUAL RELATIONS.* Spring term.

610. *ECONOMIC STATISTICS.* Spring term.

611. *PROCESSING OF STATISTICAL DATA.* Spring term. Prerequisite: one Statistics course and permission of instructor.

620. *METHODS OF HUMAN RELATIONS RESEARCH.* Fall term. Prerequisite; consent of instructor. (Students are expected to meet the transportation cost of field trips.)

622. *THE DYNAMICS OF PERSONALITY.* Spring term. Permission of the instructor is required.

630. *SUPERVISION OF INDUSTRIAL EDUCATION.* Summer term.

631. *INDUSTRIAL EDUCATION.* Fall term.

632. *ADMINISTRATION OF INDUSTRIAL EDUCATION.* Summer term.

633. *RESEARCH PRACTICES IN INDUSTRIAL EDUCATION.* Summer term 1950.

634. *INDUSTRIAL EDUCATION IN SMALLER COMMUNITIES.* Summer term 1950.

640, 641. *LABOR MARKET ECONOMICS.* This course is offered throughout the year, but students may be admitted either the first or second term.

650. *LABOR UNION HISTORY, GOVERNMENT, AND ADMINISTRATION.* Spring term.

651. *THEORIES OF INDUSTRIAL AND LABOR RELATIONS.* Spring term.

660, 661. *PERSONNEL ADMINISTRATION.* Fall and spring terms respectively.

670. *COMPARATIVE PROTECTIVE LABOR LEGISLATION.* Fall term.

671. *CURRENT ISSUES IN SOCIAL SECURITY.* Spring term.

699. *SPECIAL STUDIES.* Directed research in special problems.

LAW

Professors R. S. Stevens, L. P. Wilson, G. J. Thompson, H. E. Whiteside, W. H. Farnham, J. W. MacDonald, A. J. Keeffe, A. E. Sutherland, Jr., Sherman Peer, H. A. Freeman, Arthur Larson, B. F. Willcox, L. W. Morse; *Associate Professors* R. B. Schlesinger and W. H. Shannon; *Assistant Professors* W. D. Curtiss and E. N. Warren.

All members of the Law Faculty are expected to be in residence during the academic year 1950–1951.

The Division of Law consists of members of the Faculty of Law, representatives of the Departments of Economics, Government, History, and Philosophy in the College of Arts and Sciences, the School of Business and Public Administration, and the School of Industrial and Labor Relations, and of such other members of the Graduate School Faculty as for the time being are serving on the special committees of candidates for such degrees.

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 of admission to the Graduate School as stated above, p. 00, the candidate must have received the degree of Bachelor of Laws from an approved law school (or have done work equivalent to that required for such a degree) 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, Business and Public Administration, Industrial and Labor Relations, and Philosophy); (2) shall complete with high merit such a program of instruction and investigation as shall be approved by his Special Committee and be 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 be acceptable to the Division. For further information see the *Announcement of the Law School.*

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.

Candidates for the LL.M. or J.S.D. degree are accepted only when the applicant shows unusual qualifications.

Candidates for either of the graduate degrees in law must be in residence no 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 the course in Jurisprudence will be found in the *Announcement of the Law School.*

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 ANIMAL SCIENCES, above)

VETERINARY ANATOMY

Professor MALCOLM E. MILLER; *Associate Professor* ROBERT E. HABEL.

The personnel and equipment of the Department are adequate to provide instruction in any branch of anatomy pertaining to the common domestic species.

The equipment and space in the Department are adequate for work on the large herbivores. Dissections and models of many of the regions and systems of the cow, dog, and horse are available for study. Reference reading material can be found in The Flower Library. Students who plan to do their major graduate work in Anatomy will be expected to be undergraduate majors in comparative anatomy or to be graduate veterinarians. Candidates for an advanced degree taking minor work in the department will be assigned a project or in certain cases will take course work.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the New York State Veterinary College,* Department of Anatomy, Courses 1, 2, 3 and 4. No preregistration is required.

In certain instances courses 211 and 212 Comparative Anatomy will be accepted in place of the courses in Anatomy.

6. *ANATOMY.* Fall and spring terms. Prerequisites, courses 1, 2, 3 and 4 or Comparative Anatomy 211 and 212 or their equivalents. Professor M. E. MILLER and Associate Professor R. E. HABEL. Hours to be arranged. Preregistration not required.

[9. *ANATOMY OF FARM ANIMALS.* Fall term. Credit two hours. Registration by permission. Professor M. E. MILLER and Associate Professor R. E. HABEL. Not given in 1950–1951.]

PHYSIOLOGY

Professors H. H. DUKES, J. A. DYE, R. W. DOUGHERTY; *Assistant Professor* CAROLYN F. SPRAGUE.

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 take the regularly scheduled courses of the department, or they may work on a special problem if they are qualified.

For undergraduate courses which often meet needs of graduate students, see the *Announcement of the New York State Veterinary College,* Department of Physiology, courses 303, 10, 11, 12, 13, 14. For courses 11 and 14, permission to register is required.

16. *ADVANCED EXPERIMENTAL PHYSIOLOGY.* Spring term. Credit three hours. Prerequisites, Physiology 12 or 13, or its equivalent, and Physiology 14, or its equivalent. Professors DUKES, DYE, and DOUGHERTY. Laboratory, F 9–1. A conference hour to be arranged. Permission to register required.

305. *ENDOCRINOLOGY AND METABOLISM.* Fall term. Credit three hours. Prerequisite, six or more hours each of biology and chemistry. Professor DYE. M W F 8.

18. *RESEARCH.* Throughout the year. Professors DUKES, DYE, DOUGHERTY, and SPRAGUE.

ANIMAL PATHOLOGY, BACTERIOLOGY, AND IMMUNOLOGY

(See also BACTERIOLOGY, above)

Professors PETER OLAFSON, W. A. HAGAN, H. L. GILMAN, P. P. LEVINE, D. W. BAKER, D. W. BRUNER; *Associate Professor* J. H. WHITLOCK.

The laboratories of pathology, bacteriology, and parasitology are well equipped with apparatus for research in pathological anatomy, pathogenic bacteriology, and parasitology. 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 complete set of current periodicals, and the more important books and monographs dealing with the work of the Department are available.

Candidates for advanced degrees electing pathology, bacteriology, or parasitology 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: 40, 40a, 41, 41a, 42, 46, 48, 62, 62a, 63, 64, 152, 153, 154. For additional information, see the *Announcement of the New York State Veterinary College.*

VETERINARY THERAPEUTICS AND DISEASES OF SMALL ANIMALS

Professors E. P. LEONARD and H. C. STEPHENSON.

The laboratories of the Department are well equipped for research in veterinary therapeutics and 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. *Therapeutics and Pharmacy.* Spring term. Six hours.

22. *Diseases of Small Animals.* Fall term. Three hours.

22a. *Diseases of Small Animals.* Fall term. Three hours.

23. *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.

24. *Small Animal Clinic.* Six actual hours a week.

VETERINARY MEDICINE, AMBULATORY CLINIC, AND OBSTETRICS INCLUDING DISEASES OF THE GENITAL ORGANS

Professors M. G. FINCHER, J. M. MURPHY, and S. J. ROBERTS.

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 opportunities to study infections 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.

The following courses are open to graduate students: 50, 51, 52. For additional information, see the *Announcement of the New York State Veterinary College.*

VETERINARY SURGERY

Professor A. M. MILLS.

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.* Spring term. Five hours. Professor MILLS.

RESEARCH IN SURGICAL DISEASES. Professor ——.

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 must direct their applications to: Chairman of Group F, the Graduate School, Cornell University Medical College, 1300 York Avenue, New York 21, N.Y. Professor C. V. Morrill, the present chairman, may be consulted at any time for further information. Because of limitations in space, only a few students can be accommodated in each department. 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 occupies a portion of the plant of the New York Hospital-Cornell Medical College Association. This medical center is located on the bank of the East River and 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.

ANATOMY

Professors J. C. Hinsey, C. V. Morrill, G. N. Papanicolaou, W. A. Geohegan, J. MacLeod, C. Berry, and G. J. Noback.

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, 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 microbiology and of immunology that are pertinent to an understanding of the etiology and patho-

genesis 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.

Graduate and special students. Opportunities for advanced study and for research will be offered to students particularly interested in microbiology and immunology. Hours to be arranged.

BIOCHEMISTRY

Professors V. DU VIGNEAUD, D. B. MELVILLE, J. R. RACHELLE, R. W. BONSNES, G. B. BROWN, C. G. MACKENZIE, and *Drs.* J. G. PIERCE and J. E. WILSON.

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, JOHN M. PEARCE, CHARLES T. OLCOTT, and AARON KELLNER.

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 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, HARRY GOLD, OSCAR BODANSKY, WALTER F. RIKER, JR., FREDERICK S. PHILIPS, and *Drs.* CHARLES J. KENSLER and W. C. WESCOE.

Facilities are available for advanced work and research in both the chemical and pharmacodynamic aspects of pharmacology. Special opportunities are offered for work in the pharmacology of muscle-nerve, enzyme systems, the circulation,

the autonomic nerves, and toxicology. 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.

Arrangements will be made for individuals or groups to participate in original investigations in ward patients and in ambulatory patients of the clinics. There are special opportunities for work on digitalis, the mercurial diuretics, cinchona alkaloids, and other problems related to the pharmacology of cardiovascular disorders.

An adequate preliminary training in chemistry and physiology is prerequisite for graduate work in pharmacology.

PHYSIOLOGY AND BIOPHYSICS

Professors JAMES D. HARDY, ROBERT F. PITTS, ——, and ——.

Graduate and research training is provided for students who wish to prepare themselves for teaching and research in the physiological 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.

PUBLIC HEALTH AND PREVENTIVE MEDICINE PARASITOLOGY

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.

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 500 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.

FOOD SCIENCE AND TECHNOLOGY

Professors D. B. HAND, A. W. AVENS, F. P. BOYLE, D. C. CARPENTER, J. G. HENING, A. W. HOFER, R. W. HOLLEY, G. J. HUCKER, Z. I. KERTESZ, F. A. LEE, G. L. MACK, J. C. MOYER, G. W. PEARCE, C. S. PEDERSON, and W. B. ROBINSON.

Opportunities for graduate research in fundamental aspects of chemistry and bacteriology, particularly as applied to food problems, are offered: the chemistry and technology of food processing; food bacteriology; the composition and nutritive value of fruit and vegetable varieties; insecticides and fungicides; protein chemistry; pectin and pectic enzymes; plant pigments, hormones, and enzymes.

Graduate research may be undertaken leading to degrees of Master of Science and Ph.D. in biochemistry and bacteriology. Research problems may be selected from the following fields:

THE CHEMISTRY OF FRUITS AND VEGETABLES. Professors AVENS, BOYLE, HAND, HOLLEY, and KERTESZ.

THE PROCESSING OF FRUITS AND VEGETABLES. Professors HAND, HENING, LEE, MOYER, PEDERSON, and ROBINSON.

CLEANING AND STERILIZING TECHNOLOGY. Professor HUCKER.

COMPOSITION AND NUTRITIVE VALUES OF FOODS. Professors AVENS, HAND, HOLLEY, LEE, MOYER, and ROBINSON.

FOOD POISONING. Professor HUCKER.

FOOD AND FERMENTATION BACTERIOLOGY. Professors HOFER, HUCKER, and PEDERSON.

INSECTICIDES AND FUNGICIDES. Professors AVENS, MACK, and PEARCE.

PROTEIN CHEMISTRY. Professor CARPENTER.

THE CHEMISTRY OF PECTIN AND PECTIC ENZYMES. Professor KERTESZ.

PIGMENTS, VITAMINS, ENZYMES, AND HORMONES. Professors BOYLE, HAND, HOLLEY, KERTESZ, and ROBINSON.

ENTOMOLOGY

Professors P. J. CHAPMAN, G. E. R. HERVEY, F. G. MUNDINGER, F. L. GAMBRELL, E. H. SMITH, E. H. GLASS, J. A. ADAMS, R. W. DEAN, and E. F. TASCHENBERG.

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, and biological control of insects.

INSECT PESTS OF FRUITS. Professors CHAPMAN, GLASS, DEAN, SMITH, MUNDINGER, and TASCHENBERG.

INSECT PESTS OF CANNING CROPS. Professors HERVEY and TASCHENBERG.

INSECT PESTS OF TURF NURSERY AND ORNAMENTAL PLANTS. Professors GAMBRELL and ADAMS.

BIOLOGICAL CONTROL OF INSECTS. Professor ADAMS.

INSECT TOXICOLOGY. Professors SMITH, HERVEY, GLASS, CHAPMAN, DEAN, and TASCHENBERG.

PLANT PATHOLOGY

Professors O. A. REINKING, J. M. HAMILTON, D. H. PALMITER, W. T. SCHROEDER, A. J. BRAUN, R. E. FOSTER, and H. C. YOUNG, JR.

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, BRAUN, and YOUNG.

DISEASES OF VEGETABLES. Professors SCHROEDER, FOSTER, and REINKING.

DISEASES OF CANNING CROPS. Professors SCHROEDER, REINKING, and FOSTER.

FUNGICIDES. Professors HAMILTON 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, GEORGE H. HOWE, GEORGE L. SLATE, JOHN C. CAIN, JOHN EINSET, N. J. SHAULIS, O. F. CURTIS, JR., R. C. LAMB, and DAVID R. RODNEY.

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, SLATE, and HOWE.

ROOTSTOCK PROBLEMS, INCLUDING STOCK AND SCION RELATIONS. Professors CURTIS and RODNEY.

FERTILIZATION AND NUTRITIONAL STUDIES WITH TREES. Professors HEINICKE, CAIN, and SHAULIS.

ORCHARD SOIL TECHNOLOGY. Professors HEINICKE, CAIN, and SHAULIS.

CYTOLOGY. Professor EINSET.

PHYSIOLOGY OF FRUIT PLANTS. Professor HEINICKE, CAIN, and CURTIS.

SEED INVESTIGATIONS

Professors M. T. MUNN, B. E. CLARK, 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, CLARK, and CROSIER.

VEGETABLE CROPS

Professors C. B. SAYRE, C. H. DEARBORN, W. T. TAPLEY, and M. T. VITTUM.

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, nutrient solutions for transplants, improved methods of plant growing, studies of canning crop rotations and cropping systems, and factors affecting maturity and quality of vegetables for canning and freezing. Most of these studies can be undertaken best during the summer.

EFFECTS OF FERTILIZERS ON YIELD AND QUALITY OF VEGETABLES FOR MANUFACTURE. Professor SAYRE.

FERTILIZATION AND NUTRITIONAL STUDIES WITH VEGETABLES. Professors SAYRE and VITTUM.

VARIETY STUDIES OF VEGETABLES. Professor TAPLEY.

VEGETABLE BREEDING PROBLEMS. Professors DEARBORN and TAPLEY.

VEGETABLE CANNING CROP RESEARCH PROBLEMS. Professor SAYRE.

CANNING CROP ROTATIONS AND SOIL MANAGEMENT. Professor VITTUM.

FELLOWS AND GRADUATE SCHOLARS IN 1949–50

RESIDENT DOCTORS

Coolidge Otis Chapman, Ph.D., Cornell University, 1927
Seymour Geller, Ph.D., Cornell University, 1949
Ross Buschlin Harvey, Ph.D., McGill University, 1940
Karla Longree, Ph.D., Berlin College of Agriculture, 1934; Ph.D., Cornell University, 1938
Harry Malisoff, Ph.D., Columbia University, 1940
Ian Wilbur McDonald, Ph.D., Cambridge University, 1948
Harold Wentworth, Ph.D., Cornell University, 1934
Darcy Walker, Ph.D., University of Birmingham, 1948

HONORARY FELLOWS

Douglas Blood, B.V.Sc., University of Sydney, 1942

ENDOWED AND UNIVERSITY FELLOWS

The Allen Seymour Olmstead Fellowships: James B. Burnell, B.A., M.A., University of Washington, 1941, 1947. Jules S. Levin, B.S., Massachusetts Institute of Technology, 1948.

The Anna Cora Smith Fellowship in Home Economics: Gladys Irene Bellinger, B.S. in Education, Emporia State Teachers College, 1933; M.S., Cornell, 1948.

The Charles Bull Earle Memorial Fellowships in Mechanical and Electrical Engineering: Leonard Gladstone Abraham, B.E.E., Cornell, 1949. Benjamin M. Hildebrant, B.E.E., Cornell, 1949.

The Clinton DeWitt Smith Fellowship in Agriculture: Arthur David Crowe, B.S., MacDonald College, 1948.

The Cornell Fellowship in English: Doris Virginia Falk, A.B., M.A., University of Georgia, 1941, 1942.

The du Pont Fellowship in Chemistry: Howard Hassell, B.Chem.E., Cornell, 1944.

The Edgar J. Meyer Memorial Fellowship in Engineering Research: Chi-Chuan, B.S., National Central University, 1944; M.S., Michigan State College, 1948.

The Elon Huntington Hooker Fellowship in Hydraulics: Jamshid Amouzegar, B.C.S., Cornell, 1945; M.S. in C.E., University of Washington, 1947.

The Erastus Brooks Fellowship in Mathematics: Jerome Blackman, B.S., Massachusetts Institute of Technology, 1948.

The Fellowship in American History: William Birdsall, A.B., Union College, 1942; A.M., New York State Teachers College, 1947.

The Fellowship in Greek and Latin: Dorothy Evelyn Grosser, A.B., Hunter College, 1947.

The Fellowship in Political Economy: Shang May Kwan, B.A., Catholic University, 1946.

The Glasgow Exchange Fellowship: Ray Clayton Roberts, B.A., University of Washington, 1947; M.A., University of Washington, 1948.

The Goldwin Smith Fellowship in Botany, Geology, or Physical Geography: Charles Robert Loose, B.S., University of Pittsburgh, 1949.

The Henry Strong Denison Fellowships in Agriculture: Donald Proctor Gowing, A.B., Cornell, 1949. Edward Owen Moe, B.S., Brigham Young University, 1938. Oliver S. Owen, B.A., M.A., University of Wisconsin, 1946, 1947.

The John E. Teeple Fellowship: Thomas B. Marshall, A.B., Princeton, 1942.

The McGraw Fellowship in Civil Engineering: David Knox Blythe, B.S. in C.E., University of Kentucky, 1940; C. E. (Professional), University of Kentucky, 1946.

The Martin Sampson Teaching Fellowship: John Walter Bicknell, B.S. Hamilton College, 1935; M.A., Hamilton College, 1936.

The President White Fellowship in Modern History: Margaret J. F. Whitssey Watson, B.A., University of Toronto, 1947.

The President White Fellowship in Physics: Henry Graham Jones, B.A., Cambridge, 1948.

The President White Fellowships in Political and Social Science: John Robert Moore, B.A., Colgate, 1949. Eleanor Tananbaum, A.B., A.M., Cornell, 1947, 1948.

The Sage Fellowship in Chemistry: Thomas B. Marshall, A.B., Princeton, 1942.

The Schuyler Fellowship in Animal Biology: John Clarke Martin, B.A., Queens University, 1948.

The Sibley Fellowship in Mechanical and Electrical Engineering: John Robert Anderson, B.S. in M.E., University of Washington, 1949.

The Sigma Xi Fellowship: Jean Hendry, B.S., Northwestern University, 1948.

The Simon Henry Gage Fellowship in Animal Biology: Fung Ying Cheng, B.S., National Sun Yat-Sen, 1938 (Spring Term).

The Susan Linn Sage Fellowships in Philosophy: William Kennick, B.S., Oberlin, 1945. John Ogden Nelson, A.B., Princeton, 1939. Marcus G. Singer, A.B., University of Illinois, 1948. Robert Paul Ziff, A.B., Cornell, 1949.

The Susan Linn Sage Fellowship in Psychology: Estelita Saldanha, B.S., M.A., University of Nebraska, 1947.

The University Fellowship in Agriculture: Jack Conrad Thompson, B.S. in Agr., M.S., University of Florida, 1948, 1949.

The University Fellowships in Architecture, Landscape Architecture, Fine Arts, and Regional and City Planning: Allen C. Atwell, B.F.A., Cornell, 1949. Lloyd Orton, Diploma of Architectural Design, University of Melbourne, 1946 (Fall Term).

The University Fellowships in Germanic Languages: Robert Bartman, B.S., New York State Teachers College, 1947. George J. Kunz, B.A., Albany State Teachers College, 1947. James Maurice Spillane, A.B., Hobart College, 1947.

The University Fellowship in Romance Languages: Mrs. Ethel G. B. Nichols, B.S., University of Minnesota, 1942.

SPECIAL TEMPORARY FELLOWS

Allied Chemical and Dye Fellowship in Chemistry: Jack Kwiatek, B.S., University of Illinois, 1944.

Allied Chemical and Dye Fellowship in Entomology and Plant Pathology: Mathias H. Weiden, B.S., Manhattan College, 1946.

American Cyanamid Scholarship in Mechanical Engineering: Robert W. Perry, Jr., B.M.E., M.M.E., Cornell University, 1943, 1947.

Cerophyl Fellowship: Charles H. Hill, B.S., Colorado State College, 1948; M. N.S., Cornell University, 1949.

du Pont Postgraduate Fellowship in Chemical Engineering: Harry A. Wistrich, Jr., B.Chem., Cornell University, 1944.

du Pont Postdoctoral Fellowship in Chemistry: Dr. Seymour Geller, A.B., Ph.D., Cornell University, 1941, 1949.

du Pont Postgraduate Fellowship in Mechanical Engineering: James Alan Fay, B.S., Webb Institute of Naval Architecture, 1944; M.S., Massachusetts Institute of Technology, 1947.

Foundation Seed Stocks Fellowship: Russell H. Bradley, B.S., Cornell University, 1942; M.S., Purdue University, 1948.

G. L. F. Poultry Fellowship: Harold Yacowitz, B.S., M.N.S., Cornell University, 1947, 1948.

Grumman Aircraft Engineering Fellowship: Laurence E. Fogarty, B.S. in E.E., Montana State College, 1940.

Lalor Foundation Fellowships in Entomology: John D. Hilchey, B.S., University of Massachusetts, 1947; Ann D. Anderson, B.S., Virginia Polytechnic Institute, 1949.

Radio Corporation of America Fellowship: David Fox Woods, B.M.E., Cornell University, 1948.

Republic Aviation Corporation Fellowship: James Q. Brantley, Jr., B.E.E., University of Florida, 1949.

S. C. Johnson and Son Fellowship: John C. Gebhard, B.S., Lehigh University, 1949.

Schering Fellowship: Ernest R. Knobil, B.S. in Agr., Cornell University, 1948.

Shell Fellowship in Geology: Wayne E. Moore, B.S., University of Illinois, 1946; M.S., Cornell University, 1948.

Shell Fellowship in Chemical Engineering: Joseph B. Farrell, B.S., University of Notre Dame, 1943; M.S. in Chem.E., Massachusetts Institute of Technology, 1947.

Standard Oil Company of Indiana Fellowship in Chemical Engineering: Ernest S. Cramer, B.S. in Chem.E., Bucknell University, 1938; M.S. in Chem.E., Syracuse University, 1940.

Standard Oil Company of Ohio Fellowship in Chemistry: Edward W. Heiderich, A.B., Cornell University, 1942.

Texas Company Fellowship in Chemical Engineering: Donald J. Coon, B. in Chem.E., University of Delaware, 1949.

U.S. Rubber Company Fellowship: Roderick A. Mundy, B.S., Hampden-Sydney College, 1943.

Westinghouse Fellowship in Mechanical Engineering: Donald T. Beecher, B.M.E., Cornell University, 1949.

SCHOLARS

The Comstock Graduate Scholarship in Nature Study: Harold Ewen, B.A., City College, of New York, 1940; M.S., Cornell, 1948.

The Graduate Scholarships in Animal Biology: Richard B. Fischer, B.S., Queens College, 1942; M.A., Teachers College, Columbia University, 1943. Martha Shirley Windnagle, B.S., Cornell, 1949 (Spring Term).

The Graduate Scholarships in Botany, Geology, and Physical Geography: Jrgen Benth Hansen, *Cand. mag.,* 1944. Charles R. Loose, B.S., University of Pittsburgh, 1949.

The Graduate Scholarship in Civil Engineering: Arthur LeRoy Straub, B.Sc. C.E., Bucknell University, 1944; M.Sc. C.E., Rutgers University, 1949.

The Graduate Scholarships in Greek and Latin: Gussie Hecht, B.A., Hunter College, 1949. Arthur Smith McDonald, A.B., University of Kansas, 1949.

The Graduate Scholarships in History: James Madison Coffee, A.B., Duke University, 1949. Freeman William Meyer, B.A., University of Kansas, 1942; M.A., University of Connecticut, 1949.

The Graduate Scholarship in Veterinary Medicine: Katharine Frizzell Blaisdell, B.S., University of New Hampshire, 1949.

The Phi Kappa Phi Scholarship: Ted Morell Levine, B.A., Cornell, 1949.

TUITION SCHOLARS

William Andrews, A.B., Cornell, 1949.

Benoit J. Begin, B.S., M.S. in Agriculture, Cornell, 1947, 1949.

Roshan Bharucha, B.Sc., University of Punjab, 1944; M.Sc., University of Punjab, 1945 (Fall Term).

Frances L. Burnett, A.B., Smith College, 1935; A.M., Cornell, 1948.

Wen-Han Chang, B.Sc., Tung-Chi University, 1937; M.S., Syracuse, 1949.

Hsien Kei Cheng, B.S., Chiao-Tung University, 1947.

William B. Clemens, B.S., M.S., Bucknell University, 1937, 1938.

Mary Lou Dappert, A.B., Cornell, 1943; M.A., Albany State Teachers College, 1948 (Fall Term).

Thomas E. Hampton, B.S.E.E., M.Ed., Louisiana State University, 1931, 1945.

Yu-Wen Han, B.A., National Peking University, 1938.

George A. Hazen, B.A., Cornell, 1949.

Alice Graham Ingram, A.B., Stanford University, 1945.

Bernard A. Kaplan, A.B., Cornell, 1949.

William G. Kemp, B.A., M.A., McMaster University, 1946, 1948.

Margaret Dean Kleyn, B.A., Elmira College, 1946.

Esther N. LaRose, A.B., Marshall College, 1943 (Spring Term).

Shao-Chi Lin, B.Sc., National Central University, 1946.

Si Chiu Lou, B.S.M.E., University of Arkansas, 1949.

Miguela Lugo-Lopez, B.S.A., University of Puerto Rico, 1943; M.S., Cornell, 1945.

Vera Malton, B.A., University of Alberta, 1941; M.A., Cornell, 1948.

Doret Meeker, B.A., Keuka College, 1947.

Pergrouhi Najjarian, B.A., American University, Beirut, 1948.

John William Pou, B.S., North Carolina State College of Agriculture and Engineering, 1938; M.S., University of Wisconsin, 1947.

Felix Martinez Roman, B.S. in Agriculture, University of Puerto Rico, 1936.

Edgar Rosenberg, A.B., Cornell, 1949.

Luis Benoit Tellez, Civil Engineer, University of Mexico, 1948.

Richard C. Wolgast, B.S.M.E., M. Aeronautical Engineering, Cornell, 1947, 1949.

ROSTER OF DEGREES

ADVANCED DEGREES CONFERRED IN 1948–1949

MASTERS OF ARTS

CONFERRED SEPTEMBER 21, 1948

Anne Chadeayne Boise, A.B., Social Studies.

Margaret Bridget Cahalan, A.B., English.

John Robert Carruth, A.B., Musicology, German Literature. Thesis: The Organ Works of Sperindio Bertoldo.

Frank Herman Clark, B.S. in Ed., Public Speaking and Dramatics.

Lloyd Newton Clum, B.A., Biological Sciences.

Jerome Cohen, B.S., Psychobiology, Psychology. Thesis: Observations on Simultaneous Conditioned Reflexes in Goats and Sheep.

Sidney Thurber Cox, A.B., Musical Composition, History of Music. Thesis: I. The Autogenetic Principle in the Melodic Writing of Roy Harris. II. A Composition for Full Orchestra: "Field Day."

Edward Ray Day, A.B., Speech and Drama.

Byron Kenneth Field, Jr., A.B., English Literature since 1700, Nineteenth-Century Literature. Thesis: Mark Rutherford, Novelist of Dissent.

Harold Vernon Gould, B.A., Speech and Drama.

Robert Henry Hethmon, Jr., A.B., Drama and the Theatre, Dramatic Literature. Thesis: The Dramatic Theory of William Butler Yeats.

Edward Arthur Hungerford, B.A., Nineteenth-Century Literature, The Classical Period. Thesis: The Influence of Thomas Carlyle on the Social Novels of Disraeli, Dickens, and Kingsley (1840–1855).

Carl Keul, B.S., Foreign Languages.

Leonard Ross Klein, B.A., Spanish-American Literature, International Law and Relations. Thesis: Machado de Assis, Humorist.

Peter Kuchmy, A.B., Dramatic Production, Dramatic Literature. Thesis: A Study of Playwriting with a Play, *The Time is Now.*

Alan Marcus Levy, A.B., Neurology, Psychobiology. Thesis: A Comparative Study of the Nucleus Profundus Mesencephali of Vertebrates including Man.

Muriel Jean Lynch, A.B., English.

Ruth Keppie Lynn, A.B., Social Studies.

Norma Betty McBath, B. Ed., Social Studies.

Lois Jean Meek, A.B., Social Studies.

Nilanjana Mehta, B.A., Speech and Drama.

Vivian Elisabeth Nicander, B.A., English. Thesis: Will Rogers Wrote; An Analysis of the Literary Humor of Will Rogers.

Elizabeth Ofrazia, A.B., Foreign Languages.

Roy Pierce, A.B., Comparative European Government, Constitutional Law. Thesis: The French Communist Party and the Constitution of April 1946.

Mary Evelyn Poe, A.B., English.

Felix Rackow, B.S., Constitutional Law, Political Theory. Thesis: Democracy at Work: Combating Discrimination in Employment in New York State.

Nancy Ellen Ryther, A.B., English.

Frederick Church Sanderson, A.B., English.

Warren Crawford Shaver, B.A., Social Studies.

Herman Dennis Sherk, B.A., Dramatic Production, Dramatic Literature. Thesis: Dramatic Production in the Liberal Arts Curriculum.

John Webster Smith, A.B., Speech and Drama.

Eugene Streicher, A.B., Comparative Physiology, Neurology. Thesis: Sleep and Fatigue.

Eleanor Tananbaum, A.B., Political Theory, International Law and Relations. Thesis: Luigi Sturzo's Christian Democratic State.

John DeVere Williamson, B.A., German Literature, Spanish Literature. Thesis: Aspects of the German Booktrade in Philadelphia Between 1780 and 1800.

John Willis Young, A.B., Dramatic Production, Dramatic Literature. Thesis: A Comparison of Film and Theatre.

CONFERRED FEBRUARY 2, 1949

William Allan Blodgett, A.B., Social Studies.

Eleanor Hinds Bosworth, B.A., Social Studies.

Jack Ervin Conklin, A.B., Experimental Psychology, Applied Psychology. Thesis: Factors Affecting the General Level of Electrical Skin Resistance: Activity, Temperature, and Adaptation.

John Wilson Copeland, B.A., Ethics, History of Philosophy. Thesis: Subjectivism in Emotive Theories of Ethics.

Rowena Evelyn Fairchild, B.A., Speech and Drama.

Charles Robert Freitag, B.S. in Agr., Plant Taxonomy, The English Renaissance. Thesis: The Genus *Hepatica* in North America.

Ronald Alan Cameron Goodison, B.A., Foreign Languages.

Dorothy Evelyn Elizabeth Grosser, A.B., Latin Language and Literature, Greek Literature. Thesis: Thomas Waleys' *De Modo Componendi Sermones*—Rendered into English.

Dora Franz Sherman, A.B., Experimental Physics, Theoretical Physics. Thesis: Oxygen Bands of the First Negative System and Forbidden Nitrogen Lines in the Spectrum of the Polar Aurora.

Kathleen Mary Taggart, B.H.Sc., Home Economics.

Joseph Tanenhaus, A.B., Constitutional Law, Political Theory. Thesis: The Protection of Racial and Religious Groups through the Law of Defamation.

CONFERRED JUNE 13, 1949

John Percy Bond, A.B., Dramatic Production, Speech Training and Phonetics. Thesis: Advice to Actors.

Clarissa Spencer Bostelmann, B.Sc. in Ed., French Literature, French Linguistics. Thesis: Crevecoeur's "Voyage dans la haute Pensylvanie et dans l'Etat de New-York": A Translation of Ten Chapters, with Introduction.

Alice Agnes Bubriski, B.S., in Ed., Social Studies.

Alice Chialing Bumgardner, B.Com., Sociology, Cultural Anthropology. Thesis: Emphasis on Scholarship as One of the Most Important Factors Underlying China's Backwardness in Economic Life.

Charles Joseph Burkhart, A.B., English Literature since 1700; English Poetry. Thesis: The Novels of Compton-Burnett.

Fern Joy Cramer, B.A., Psychology.

Jerry Frank DeWitt, A.B., Modern European History, Medieval History. Thesis: Guizot's Ministry of Public Instruction.

John Franklin Doss, A.B., American Literature.

Ronald Farinton Drew, B.A., Modern European History, Political Theory. Thesis: A Comparative Study of the Economic Programs of Peter I and Ivan Pososhkov.

Refik Erduran, B.A., Dramatic Literature, Dramatic Production. Thesis: The Turkish Popular Drama: A Historical Explanation and an Original Illustration.

Richard Edward Flight, A.B., Psychology.

Emily Virginia Howes, B.A., Literature.

Robert Craig Howes, A.B. Modern Languages.

David Erle Huyler, A.B., Social Studies.

Kingston Johns, Jr., B.A., B.A., Education.

Isabel Kellers, B.A., Biological Sciences.

Carl Edward Kern, B.A., The Restoration and the Eighteenth Century, Creative Writing. Thesis: The Rhetoric of Jonathan Swift.

Lila Anita Leichtling, B.A., English.

Irwin Chester Lieb, B.A., Metaphysics and Epistemology, Logic. Thesis: Charles S. Peirce's Views on Induction.

Leonard Marsak, B.S., Literature.

Caterina Edda Elena Martinez, B.A., Sociology, Cultural Anthropology. Thesis: The Influence of Italian-Americans on the 1948 Elections in Italy. A Study of Immigrant Pressures upon the Homeland.

Allan James McCurry, A.B., American History, Modern European History. Thesis: The Struggle for Independence: A Study of the Party Divisions within the Second Continental Congress on the Question of Independence.

Ann Dorothy Muchleck, A.B., Biological Sciences.

Frank James Nieder, A.B., Foreign Languages.

Jerome Stanley Ozer, B.S.(Soc. Sc.), History of Science, Medieval History. Thesis: The Role of the Franklin Institute during Its Early Years.

Robert Brainard Pearsall, B.A., The Restoration and the Eighteenth Century, The English Renaissance to 1660. Thesis: Joseph Ritson and Sir Walter Scott.

Frank Powdermaker, Jr., A.B., Prose Fiction, English Poetry. Thesis: Divesti-ture by Rarefaction.

Eunice Adele Raimon, B.A., Prose Fiction, Nineteenth-Century Literature. Thesis: Deception and Compensation: A Study of the Letters and Novels of Jane Austen.

Thomas Gordon Reed, B.A., Monetary Economics, Public Finance. Thesis: The Growth and Burden of Governmental Debts in Canada.

Elizabeth Rodewald, A.B., Dramatic Production, Dramatic Literature. Thesis: The Development of the Director in America.

Arthur Seymour Samuels, A.B., Psychobiology, Applied Psychology. Thesis: Experimental Studies in the Instrumental Avoidance Conditioning of the Sheep and Goat.

Thomas Arthur Schottman, B.S. in Agr., Education.

Ralph Gordon Selfridge, B.S., Mathematical Analysis, Astronomy. Thesis: A Study of Some Old Methods of Evaluating Definite Integrals.

Janet Doris Sepersky, B.A., Speech and Phonetics, Educational Psychology. Thesis: Psychogenic Speech Disorders and Their Personality Concomitants.

Hilda Snorradottir, B.A., Biological Sciences.

Maroin Ladru Stone, B.A., Literature.

Edward Robert Szetela, B.A., Social Studies.

Elizabeth Barden Terwilliger, B.A., Dramatic Literature, American Literature. Thesis: A Study of the Comedic Philosophy of Compromise in the Plays of S. N. Behrman.

Josephine Rita Wilson, B.S. in Ed., English.

Hsin-min Wu, B.A., English.

MASTERS OF SCIENCE

CONFERRED SEPTEMBER 21, 1948

Evelyn Mabel Aldridge, B.S., Institutional Management, Economics of the Household. Thesis: A Job Breakdown Approach to the Improvement of Work Methods and Work Areas in Large Scale Vegetable Preparation.

Dilip Kumar Banerjee, B.Sc., B.S., Soils, Plant Physiology. Thesis: The Effect of Liming on the Availability of Phosphates in Soils.

Judith May Banton, B.S., Foods and Nutrition, Animal Physiology. Thesis: Ascorbic Acid Retention during the Home Cooking of Frozen Lima Beans, and Thiamine and Riboflavin Retention during the Large-Scale Cooking of Broccoli and Cabbage.

Thomas Wilson Barrett, B.S., Technical Agriculture. Thesis: A Review of the Manufacture, Chemistry and Uses of Cyanamid.

Sherwood Olman Berg, B.S., Land Economics and Agricultural Geography, Farm Finance. Thesis: An Application of Some New Techniques in the Economic Classification of Land.

Blossom Siegel Branton, B.A., Bacteriology, Biochemistry. Thesis: The Effect of Diet upon the Bacterial Numbers at the Various Levels of the Chicks' Digestive Tract.

Clayton Emerson Brower, B.S., Agricultural Engineering, Farm Equipment. Thesis: Suggested Course of Instruction in Farm Water Supply.

Virginia Verlena Carpenter, A.B. in Ed., Home Economics.

Dorothy Keng-pin Chuan, B.A., Home Economics.

Kenneth Putnam Coffin, A.B., Physical Chemistry, Physics. Thesis: Apparatus for the Determination of Rapid Rates of Association and Dissociation of Molecular Addition Compounds.

Mary Elizabeth Curtis, B.S., Home Economics.

Fidelia Durfee Davol, A.B., Technical Agriculture.

Wanda Elaine Deutsch, B.S. in Bus. Adm., Education.

Helen Irene Douty, B.S.(H.Ec.), Textiles and Clothing, History of Art. Thesis: Evolution of Dress Designs: Sources, Approaches, Methods.

Harold Ewen, B.A., Education (Nature Study).

Mildred Jane Flanagan, B.S.H.E., Home Economics.

Hector Garcia-Cabrera, B.A. in Ed., Social Studies.

Cleone Lyle Hansen Geddes, B.S., Technical Agriculture.

James Henry Hayes, B.S., Mathematics.

James Watt Herron, B.S. in Ed., Economic Botany, Zoology. Thesis: Effect of Ammonium Sulfamate Applied to Stumps of Some Woody Plants.

Catherine Theresa Hogan, B.S.(H.Ec.), Home Economics.

Cecil Edgar Howes, B.S., Animal Breeding, Histology and Embryology. Thesis: Breed Resistance to Nutritional Encephalomalacia in the Domestic Fowl.

William Kirby Jordan, B.S., Dairy Science, Physical Chemistry. Thesis: The Determination of Holding Time in Short-Time High-Temperature Pasteurizing Units.

Alfred Herman Krebs, B.S., Agricultural Education, Soils. Thesis: The Soil Testing Service in New York State Conducted by Teachers of Vocational Agriculture and County Agricultural Agents.

Mary Lawson Lewis, B.A., B.S., M.A., Home Economics.

Jack Long, B.S., Poultry Husbandry, Animal Breeding. Thesis: A Morphological Study and Comparison of the Pectoral Muscle Group and Their Underlying Skeletal Support in the Broad-Breasted and Standard Bronze Turkeys.

Herminio Lugo-Lugo, A.B., Biological Sciences. Thesis: 2,4–Dichlorphenoxyacetic Acid, A Selective Herbicide (A Review of Literature).

Dorothy Grace Lutz, B.S., Home Economics.

Cortland Rose Mapes, B.S., Veterinary Parasitology, Invertebrate Zoology. Thesis: Notes on the Biology of *Muellerius minutissimus* Megnin, 1878, and a Report on Therapy with 1–Diethylcarbamyl–4–methylpiperazine Hydrochloride (Caricide) in Sheep.

Robert Marshall McClung, A.B., Education (Nature Study).

Ward Burdett Moose, B.S. in Ed., Biological Sciences.

Barbara Jane Palmer, B.S.(H.E.), Home Economics.

Kay Louise Johnson Raymond, B.S., Institutional Management, Foods. Thesis: The Development of Audio-Visual Aids for Teaching Quantity Food Production and Service.

Harris Rosenkrantz, B.A., M.S., Physiology, Biochemistry. Thesis: Infra-Red Absorption Spectra of Tocopherols and Related Structures.

Hazel Manoranjan Sadoc, B.A., Diploma in Teaching, Child Development and Family Relationships, Child Guidance. Thesis: The Application of Current Trends in Preschool and Parent Education in the United States to Conditions in the United Provinces in India.

Alice Cecilia Sanderson, B.S., Educational Psychology, Guidance and Personnel Administration. Thesis: Stability of Value Patterns of Selected Students during Four Years at the New York State College of Home Economics at Cornell University.

George Sawada, B.S.(Orn.Hort.), Plant Breeding, Floriculture and Ornamental Horticulture. Thesis: A Review and Study of Some of the Breeding Aspects of *Camellia japonica*.

Mary Margaret Scofield, B.A., Agricultural Economics.

John Daley Shaul, A.B., Technical Agriculture.

Dorothy Fawcett Smith, B.S., Pathogenic Bacteriology, Biochemistry. Thesis: Serological Relationships within the Genus *Erwinia:* Soft-rot Group.

Jeanette Beulah Snyder, B.S., Bacteriology, Biochemistry. Thesis: Factors Affecting the Lag Phase in Bacterial Growth.

Camilla Roberta Stinson, B.S., Home Economics.

Alice Mary Stoll, A.B., Physiology and Biophysics, Biochemistry. Thesis: Direct Experimental Comparison of Several Surface Temperature-Measuring Devices.

Luis Amauri Suarez-Vazquez, B.S. in Agr., Rural Sociology, Rural Education. Thesis: Membership Relationships in the Puerto Rico Coffee Growers Cooperative Marketing Association.

Jackson Johnson Taylor, B.S., Experimental Physics, Theoretical Physics. Thesis: The Evaporation of Chlorine Atoms from Silver Chlorine.

Earl David Uber, B.S. in Ed., Biological Sciences.

Dorothy Kutschbach Udall, B.S., Housing and Design, Painting. Thesis: The Selection of Decorative Fabrics for the Home.

Marilyn Vanderwarf, B.S.(H.Ec.), Home Economics.

Leonard Ray Webber, B.S.(Agr.), Technical Agriculture. Thesis: Hillside Seepage.

Raymond Albert Winthrop, A.B., Education.

Harold Young, B.S., Dairy Science, Business Management. Thesis: Some Studies with Regard to the Accuracy of the Babcock Test.

Hsiu-li Yui, A.B., Social Studies (Rural Sociology).

Leonidas Antonios Xydes, Graduate of Science, Technical Agriculture.

CONFERRED FEBRUARY 2, 1949

Felix Harrison Arostegui, B.S. in Agr., Technical Agriculture.

Pat Smith Barrow, A.B., Biological Sciences.

Maurice Edwin Becker, B.S. in Agr., Bacteriology, Biochemistry. Thesis: Growth Studies on *Bacillus Thermoacidurans* Berry.

Allen Haydon Benton, B.S., Biological Sciences.

Emma Dorcas Washington Bonner, B.S., Home Economics.

Harold Dixon Fox, B.S., Structural Geology, Stratigraphy. Thesis: Structure and Origin of Two Windows Exposed on the Nittany Arch at Birmingham, Pennsylvania.

Paul Eugene Grayson, S.B., Ph.M., Marketing, Land Economics. Thesis: A Technique for Analyzing Causally Related Factors Affecting Price.

Matthew Henry Hohn, B.S. in Ed., Economic Botany, Plant Breeding. Thesis: A Study of the Diatoms (Bacillarieae) of Bergen Swamp, New York.

Wayne Lamoyne Howe, B.S., Economic Entomology, Insect Toxicology. Thesis: The Squash Borer, *Melittia cucurbitae* (Harris), with Particular Reference to Its Biology and Host Plant Resistance.

Shih-Chi Hu, B.Law., Diploma, Graduate Institute of International Studies, Business Management, Rural Sociology. Thesis: A Study of the Farmers' Cooperatives in China.

Roy Harold Karlson, A.B., Organic Chemistry, Inorganic Chemistry. Thesis: I. The Structure and Chemistry of Yohimbine. II. Studies Relating to the Gabriel Rearrangement.

Andrew Colin McGlung, B.S., Soils, Pomology. Thesis: Some Nutrient Solution Studies on the Relationship of Moisture Potential to the Boron Status of Sunflowers.

Kenneth Eugene Mowrey, B.S. in Ed., Education (Nature Study).

Joseph Constantine Podany, B.S. in Agr., Marketing, Prices and Statistics. Thesis: Development and Operation of Leading Fruit Advertising Organizations and Application to New York Conditions.

Mary Elizabeth Purchase, A.B., Physical Chemistry, Physics. Thesis: The Hydrolysis of Beta-Propiolactone in Dilute Aqueous Solutions.

Robert Leonard Raimon, B.S.(Bus.), Collective Bargaining, Mediation and Arbitration, Industrial and Labor Legislation and Social Security. Thesis: Labor-Management Cooperation through the Operation of a Labor-Management Committee. A Case Study. I. B. Kleinert Rubber Company and the American Federation of Rubber Workers, Local 20499.

Nelly Eva Reitlinger, B.A., Experimental Physics, Theoretical Physics. Thesis: A Study of the Secondary Emission of Electrons of a Nickel Target in the Region of the Curie Point.

Clyde Rich Richards, B.S., Dairy Husbandry, Animal Nutrition. Thesis: The Relative Nutritive Values of Alfalfa, Mixed Clover and Timothy and Timothy Hay for Dairy Calves.

Annamay Topkins Sheppard, B.S. in I.L.R., Education.

Charles Robert Francis Smith, B.S., Inorganic Chemistry, Organic Chemistry. Thesis: A Study of the Addition Compound Di-Phosphorous Oxychloride-Stannic Chloride.

Hubert Landon Thomas, A.B., Organic Chemistry, Physical Chemistry. Thesis: Relative Configuration of Alpha-Phenylethyl Amine and Alpha-Phenylpropionic Acid. The Hofmann Rearrangement.

James Clifton Wright, A.B., Economic Geology, Structural Geology. Thesis: Genesis of the Iron Ore Deposits at Benson Mines, St. Lawrence County, New York.

Helen Katherine Yianilos, B.S. in Ed., Home Economics.

CONFERRED JUNE 13, 1949

James Hanno Barrett, B.S.(Hotel), Hotel Accounting, Prices and Statistics. Thesis: An Accounting System for the Small Resort Hotel.

Martin Roy Bates, A.B., Mathematical Analysis, Applied Mathematics. Thesis: Numerical Approximations to Definite Integrals.

Molly Beall, B.A., Home Economics.

Helen Dorothy Boettcher, B.S., Home Economics.

Mary Elsie Border, B.Sc. in H.E., M.A., Education.

Harlan Brown Brumsted, B.A., Zoological Science.

Marguerite Mary Burke, A.B., Physical Chemistry, Physics. Thesis: A Study of the Cobaltous and Cobaltic Complex Ions of Ethylene Diamine Tetra Acetic Acid.

Lee Johnson Burland, B.Ed., General Science.

Edna Elizabeth Busekist, B.S. in Home Ec., Education.

Stewart Lamonte Dallyn, B.S. in Agr., Vegetable Crops, Plant Breeding. Thesis: Field and Storage Performance of Onions and Carrots Sprayed with Growth Substances during the Growing Season.

Georgiana Mae Day, B.S in Ed., Home Economics.

Algirdas Michael Devenis, B.S., Biological Sciences.

Dorothy Dietrich, B.S., Home Economics.

Ruth Ellen Fenton, B.S. in H.Ec., Home Economics.

Stuart Flack, A.B., Biological Sciences.

John Allan Fleming, D.V.M., Veterinary Surgery, Pathogenic Bacteriology. Thesis: A Brief Review of Local Anaesthetic Techniques in the Dog, and Observations on Anaesthesia of the Forelimb by Brachial Block.

Isobel Victoria Gibson, B.S.(H.Ec.), Institution Management, Economics of the Household. Thesis: An Analysis of Food Costs at the George Junior Republic, Freeville, New York.

James Bernard Gollop, B.A., Zoological Sciences.

Louise Florence Gray, A.B., M.S. in P.E., Animal Nutrition, Biochemistry. Thesis: Some Interrelationships of Copper, Molybdenum, Zinc and Lead in the Nutrition of the Rat.

Marion Green, B.S., Biological Sciences.

George Edward Grube, B.S., Zoological Science.

William Bailey Hill, B.S. in Agr., Education.

Ruth Ann Hodgson, B.S.(H.Ec.), Foods and Nutrition, Economics of the Household. Thesis: Effect of Manipulation on Some Physical Properties of Batters and Cakes Prepared from a Home-Made Low-Sugar-Ratio Cake Mix.

Mary Virginia Howse, B.S.(H.Ec.), Institutional Management, Foods. Thesis: 1. A Review of Literature on Institution Food Service Procedures for Holding Certain Vegetables after Cooking with Reference to Ascorbic Acid Retention. 2. A Study on the Ascorbic Acid Retention and Palatability in Holding Cooked Frozen Broccoli.

Tsui-Fun Huang, B.S., Biological Sciences.

Harry McClure Johnson, B.S., Biological Sciences.

Elizabeth Marguerite Kaiser, B.A., Institution Management, Food and Nutrition. Thesis: An Analysis of the Distribution of Food Expenditures in a Hospital with Reference to the Nutritional Adequacy of the Dietary and to the Effect of Changes in the Price Level.

Alice Kelly, B.S., Housing and Design.

Anton Miles Kofranek, B.S., Floriculture and Ornamental Horticulture, Plant Physiology. Thesis: Growth Responses of *Chrysanthemum Morifolium* Following Applications of Nutrient Solutions to the Rooting Medium.

Dharm Vir Kohli, B. Sc. in Agr., Economic Entomology, Plant Pathology. Thesis: Detection of Weevil Injury by Staining Technique in Farm Stored Wheat in New York State.

Ardath Evelyn Krueger, B.S. in Ed., Home Economics.

Jessie Margaret Gwendolyn Lambden, B.A., Home Economics.

Mary Lee Leary, A.B., Bacteriology.

Lela-Lillian Lones, B.A., Home Economics.

Florence Wilkinson Low, B.S., Home Economics.

William Mackenzie, B.Sc., B.Letters, Farm Management, Land Economics and Agricultural Geography. Thesis: Trends in the Development and Use of Migrant Labour in Agriculture in New York State.

Georgia Evelin McGowan MacNeil, B.S., General Science.

Sarah Lydia Manning, B.S. in Ed., Home Economics.

Elizabeth Anita Morris, B.S., Textiles and Clothing, Housing and Design. Thesis: An Experiment in Visual Education in Dress Design and Selection: The Development of Slides for Use in Adult Extension Activities.

Jose Muratti, B.S. in Agr., Botany, Plant Morphology. Thesis: An Anatomical Study of Foliage Modification of Red Kidney Bean Plants as a Result of Treatment of the Pods of the Preceding Generation, and of Mature Seeds, with 2,4–D.

Claire Marie Naughton, B.S., Home Economics.

Francena Lounsbery Nolan, B.S., Economics of the Household, Child Development and Family Life. Thesis: Work Simplification in Selected Home Activities for a Five Year Old Child.

Theodore George Northrop, B.S., Biological Sciences.

Ruth Elizabeth Pierce, B.S.(H.Ec.), Economics of Household and Household Management, Home Economics Education. Thesis: The Need for Financial Education at the Secondary School Level.

Ethel Selma Quinn, B.S., Textiles and Clothing, Guidance and Personnel Administration, Home Economics Education. Thesis: An Introductory Study of the Development and Present Status of Federal Legislation Pertaining to the Labeling of Textiles and Textile Products in the United States (1902–1949).

Laurine Elizabeth Raiber, B.S., Home Economics.

Robert Lee Reddish, B.S.(Agr.), Animal Husbandry, Veterinary Physiology. Thesis: A Study of Personalized and Standardized Methods of Meat Cutting for Locker Plants in New York State.

Richard Alexander Ryan, A.B., Zoological Science.

Senol Vuslat Sagmanli, B.S., Organic Chemistry, Analytical Chemistry. Thesis: A Study of Reactions of Some Diazonium Salts.

Elmer Marshall Sharp, A.B., Experimental Physics, Theoretical Physics. Thesis: A Superregenerative Nuclear Induction Magnetometer.

Helen Elizabeth Sharp, B.S., General Science.

Lawrence Browning Sheffield, Jr., B.A., Biological Sciences.

Frances Marion Spratt, B.S. (H.Ec.), Home Economics.

Rose Elizabeth Steidl, B.S.(H.Ec), Economics of the Household and Household Management, Housing and Design. Thesis: The Relationship of the Work Areas as a Criterion for Functional Kitchen Design.

Robert Leonard Stier, B.S., Pomology, Plant Physiology. Thesis: Effect of Climate on the Keeping Quality of the Apple.

Stephen Swetek, B.S. in Ed., Biological Sciences.

Isabelle Elaine Trefethen, B.S. (H.Ec.), Foods, Animal Nutrition. Thesis: The Effect of Four Cooking Pressures on the Retention of Palatability and Vitamins in Broccoli and in Frozen Peas.

Willard James Visek, B.S. in Agr., Animal Nutrition, Animal Breeding. Thesis: Study of the Effect of a Special Fat Supplement on Lactation Performance.

Richard Raymond Wason, B.A., General Science.

Elizabeth Wiegand, B.S., Economics of the Home and Farm.

Ralph Work, B.S., Soils, Vegetable Crops. Thesis: Some Effects of 2,4–D and DDT on Nitrification and Related Changes in the Soil.

MASTERS OF SCIENCE IN AGRICULTURE

CONFERRED SEPTEMBER 21, 1948

John Paul Beardsley, B.S., Animal Breeding, Genetics. Thesis: The Repeatability of Proved Sires and the Curvilinearity of Heritability of Butterfat Production.

Robert Frank Bender, B.S., Technical Agriculture.

Almon Dewey Bond, B.S. in Agr., Marketing, Pomology. Thesis: An Economic Study of the Maple Syrup Industry in New York.

Solomon Cook, B.S., Vegetable Crops, Economic Botany, Agricultural Engineering. Thesis: Weed Control in Potatoes by Cultivation, Flame and Various Chemicals.

Hollis Rexford Davis, B.S., Agricultural Engineering, Farm Equipment. Thesis: Electric Wiring for the Farm.

Lawrence Bryan Embry, B.S. in Agr., Animal Husbandry, Veterinary Physiology. Thesis: Performance of Feeder Lambs Fed Different Levels of Protein and Various Amounts of Alfalfa Hay and Corn Silage, with and without Cobalt-Copper Supplementation.

Wendell Marion Fairbanks, B.S., Agricultural Engineering, Agricultural Education. Thesis: The Selection and Use of Tractors for Gardens and Small Acreages.

Edwin Elward Goodwin, B.S., Animal Husbandry, Animal Physiology. Thesis: Vitamin and Trace Mineral Supplements in Rations Containing Soybean Oil Meal as the Only High-Protein Feed for Growing and Fattening Fall Pigs in Dry Lot.

David Hans Huntington, B.S., Education.

Riley Harrison Kirby, B.S., Land Economics, Soils, Thesis: Population of the United States: Trends and Characteristics.

Edgar Rothwell Lemon, B.S. in Agr., Soils, Pomology. Thesis: The Effect on Plant Growth of Manganous and Ferrous Ions as Related to Soil Aeration.

Donald Victor MacDonald, B.A., B.S. in Agr., Agricultural Education, Agricultural Economics. Thesis: The Place of Individual Instruction and Planning in Vocational Education in Agriculture.

Robert Marshall Moseley, B.S., Marketing, Land Economics and Agricultural Geography. Thesis: An Economic Study of Milk Standardization.

Charles Lynn Nearing, B.S., Technical Agriculture.

Maurice Jerome Pickler, B.S. (Agr.Ec.), Farm Management, Prices and Statistics. Thesis: An Economic Analysis of the Rearing Enterprise on New York Commercial Poultry Farms.

Nicolas Duron Sanchez, Ing. Agron., Technical Agriculture.

James Howard Starr, B.S., Agricultural Engineering, Farm Equipment. Thesis: A Method of Mechanically Supplying Mash to Poultry.

Donald Augustine Van Waes, B.S., Marketing, Farm Management. Thesis: Retail Distribution of and Consumer-Demand for Fresh Peaches in Syracuse, New York.

Merrill Harmon Werts, B.S. (Agr.), Land Economics and Agricultural Geography, International Economics. Thesis: An Analysis of the Effects of Beef and Veal Tariffs upon the Meat Packing Industry.

William Arnold Williams, B.S., Technical Agriculture.

CONFERRED FEBRUARY 2, 1949

Haraldur Arnason, B.S., Agricultural Engineering, Vegetable Crops. Thesis: A Study of Precision Planting of Pelleted Vegetable Seeds.

Kermit Hogan Buckley, B.S., Vegetable Crops, Marketing. Thesis: A Study of the Growth of the Radish *(Rhaphanus sativus* L.) from Fresh and Aged Seed.

Richard Brian How, B.Sc.(Agr.), Marketing, Prices and Statistics. Thesis: Status and Activity of New York State Farmers' Cooperatives 1945–1946.

Charles Dilworth McGrew, B.S. in Agr., Technical Agriculture.

CONFERRED JUNE 13, 1949

Sydney Alden Anderson, B.S., Technical Agriculture.

Benoit Joseph Begin, B.S., Floriculture and Ornamental Horticulture, Painting. Thesis: A Neighborhood Development.

Tsai Chang Chen, B.A., M.S., Prices and Statistics, Economic Theory and Its History. Thesis: Wartime Prices in China.

Richard Davis Chumney, B.S., Animal Nutrition.

Stuart Tarble Couch, B.S., Education.

Emerson Medlock Evans, B.S. in Agr., Soils, Field Crop Production. Thesis: Organic Phosphorus in Soils.

May Kitazawa, A.B., Technical Agriculture.

Bruce McKay Lansdale, B.S., Rural Sociology.

Allen Howard Maunder, B.Sc., Diploma in Agr. Ec., Farm Management, Land Economics and Agricultural Geography. Thesis: Farm Economic Advisory Work in New York State.

Jean Corwin Miller, B.S. in Ag., Pomology, Agricultural Economics. Thesis: The Factors Affecting the Fruitfulness of the Avocado *Persea americana* Miller.

Arthur Ross Milner, B.Sc. in Agr., Agricultural Economics.

Samuel Thomas Slack, B.S. in Agr., Dairy Husbandry, Animal Nutrition. Thesis: The Nutritive Value of Distillers' Dried Solubles in the Dairy Calf Ration.

Julius Franklin Thomas, B.S. (Agr.), Education.

MASTERS OF ARCHITECTURE

CONFERRED SEPTEMBER 21, 1948

Santiago Juan Agurto-Calvo, Arquitectos Constructores, Architectural Design, Drawing. Thesis: Apartment House Group, Lima, Peru. (Degree Conferred as of June, 1947.)

CONFERRED FEBRUARY 2, 1949

Chiu-Fu Li, B.S., Architectural Design, Architectural Construction. Thesis: A Central Hospital for Nanking, China.

John Gardiner Richards, IV, B.S., Architectural Design, Architectural Construction. Thesis: A Long Range Plan for Oneida County Airport, Oneida County, New York.

CONFERRED JUNE 13, 1949

Paul Kuan Yao Chen, B.S. in Arch., Architectural Design, City Planning. Thesis: Office Building Research.

Togrul Zaim Mustafa Devres, Arch. Certificate, Architectural Design, City Planning. Thesis: A Movie Palace for Istanbul.

Ronald Albert Dick, Diplome d'Architecte, Architectural Design, Regional and City Planning. Thesis: The Planning of an Elementary School.

MASTER OF FINE ARTS

CONFERRED SEPTEMBER 21, 1948

Janet Lista Lauderdale, B.A., Painting, History of Art. Thesis: The Presentation of Four Easel Paintings.

MASTERS OF REGIONAL PLANNING

CONFERRED SEPTEMBER 21, 1948

Herbert Harris Smith, B.S. in Arch., City Planning, Regional Planning. Thesis: A General Plan for the Town of Vestal, New York.

CONFERRED FEBRUARY 2, 1949

Robert Capps Hoover, A.B., City Planning, American Government and Institutions. Thesis: A Social, Economic, Legal and Fiscal Planning Study for Vestal, New York.

CONFERRED JUNE 13, 1949

Mohamed Ahmed Ali, B.E., City Planning, Regional Planning. Thesis: Town Planning in India.

John Valentine Vatet, B.Arch., Regional Planning, City Planning. Thesis: A Planning Study for Hagerstown, Maryland.

MASTERS OF SCIENCE IN ENGINEERING

CONFERRED SEPTEMBER 21, 1948

Arlie George Capps, B.S., Engineering Physics, Industrial Engineering. Thesis: Liquid Propellants in Guns.

John Blount Davis, Jr., B.S., Engineering Physics, Industrial Engineering. Thesis: The Effect of Plasticizers on the Strength Properties of Nitrocellulose.

Peter Joseph Verna, B.S. in C.E., Sanitary Engineeering, Structural Engineering. Thesis: An Experimental Study of Sedimentation.

CONFERRED FEBRUARY 2, 1949

David Robert Friant, B.S.M.E., Mechanics, Mathematics. Thesis: Stability of Flow in a Rocket Motor.

Jerry Grey, B.M.E., Engineering Physics, Mathematics. Thesis: Theoretical Study of a Proposed High-Intensity Molecular Beam Source.

Stuart Hamilton, B.S. in Eng., Heat Power Engineering, Machine Design. Thesis: Reduction of Blowdown Losses in Free Piston Gas Generators.

Donald Dibble Stoltman, B.M.E., Automotive Engineering, Heat Power Engineering. Thesis: Economical Utilization of Fuel in Passenger Cars.

CONFERRED JUNE 13, 1949

David Maurice Jewett, B. (M.Eng.), Administrative Engineering, Industrial Engineering. Thesis: Control of Procedural Costs in Administrative Overhead.

David Randall Kent, Jr., B.S. (M.E.), Experimental Mechanical Engineering, Heat Power Engineering. Thesis: The Influence of Fuel Characteristics on Diesel Engine Combustion and Performance.

Chia-Huan Lee, B.S. in E.E., Electric Power Generation and Distribution, Electric Control and Relaying. Thesis: Solution of Problems Involving Two Simultaneous Faults in Power Networks.

Daniel Waldo Milburn, B.S. in M.E., Heat Power Engineering, Experimental Mechanical Engineering. Thesis: A Simplified Method of Determining Panel Surface and Room Air Temperatures for a Radiant Heating Installation.

Carl William Mortensen, B.S. in M.E., Experimental Mechanical Engineering, Mathematics. Thesis: Solid Fuel Injection in a Two-Stroke Cycle Spark Ignition Engine.

George Francis Pieper, Jr., B.A., Engineering Physics, Administrative Engineering. Thesis: The Measurement of the Moisture Content of Soil by the Slowing of Neutrons.

Walter August Sauter, B.S.(E.E.), Industrial Electronics, Industrial Engineering. Thesis: An Electronic Device for Microsecond Time Measurement.

Harry Ellsworth Skinner, B.S.(C.E.), Engineering Physics, Mathematics. Thesis: The Thermal Coefficient of Expansion of Beta Brass.

Williams Tardy, B.M.E., Heat Power Engineering, Machine Design. Thesis: A Discussion of Theories of Fluid Flow through Axial Flow Machinery.

MASTERS OF CHEMICAL ENGINEERING

CONFERRED FEBRUARY 2, 1949

Edward Richard Hayes, B.S. (Chem.Eng), Chemical Engineering, Administrative Engineering. Thesis: The Synthesis of Liquid Fuels from Coal by Coal-Hydrogenation.

CONFERRED JUNE 13, 1949

Frederick Edward Pederson, B.(Chem.Eng.), Chemical Engineering, Administrative Engineering. Thesis: The Production of Liquid Fuels from Coal by the Fischer-Tropsch Synthesis.

MASTERS OF CIVIL ENGINEERING

CONFERRED FEBRUARY 2, 1949

Robert Sin-Min Lee, B.S.(C.E.), Highway Engineering, Management Engineering. Thesis: Highway Equipment.

Frederick John Malkmus, B.C.E., Structural Engineering, Mechanics. Thesis: The Longitudinal Distribution of Stresses in Reinforcing Bars.

Robert Bruce McCalley, Jr., B.S. in C.E., Structural Engineering, Mechanics. Thesis: An Analysis of a Circular Tank.

Cyril J. Morris, B.A., B.Sc. (C.E.), Railroad Engineering, Structural Engineering. Thesis: Conversion by Railroads to Diesel-Electric Motive Power.

CONFERRED JUNE 13, 1949

Robert Ting Chuck, B.S., Structural Engineering, Highway Engineering. Thesis: Fire-Resistive Design.

Bruce Ross Laverty, B.S. in C.E., Hydraulic Engineering, Management Engineering. Thesis: Redevelopment of Hydro-Electric Power at Cornell University Plant No. 1.

Oscar Carlos Rohrmoser, B.C.E., Structural Engineering, Management Engineering. Thesis: Reinforced Concrete Spandrel Beams.

Chwin-Jen Peter Sih, Diploma, Structural Engineering, City Planning. Thesis: Measured Bond Stress Distribution near a Crack in Reinforced Concrete Beams.

MASTERS OF ELECTRICAL ENGINEERING

CONFERRED SEPTEMBER 21, 1948

Seymour Blair Hammond, B.S. in E.E., Industrial Electronics, Radio and Communications. Thesis: Geiger Counters and the Design of a Counting Rate Meter.

Philip Coe Kennedy, B.E.E., High Voltage Engineering, Administrative Engineering. Thesis: Effective 60 Cycle Resistance and Reactance of ACSR Conductors for 500 KV Tidd Project.

Robert Lee Scrafford, B.E.E., Radio and Communications, Industrial Electronics. Thesis: High Speed Frequency Blocking Oscillator Counters.

CONFERRED FEBRUARY 2, 1949

Walter Milburn Keenan, Jr., B.E.E., Electric Power Utilization, Physics. Thesis: General Considerations in the Design of an Atomic Power Plant.

CONFERRED JUNE 13, 1949

Philip William Barnhart, B.S. in E.E., Application and Control Engineering, Industrial Electronics. Thesis: The Application of Magnetic Amplifiers to a Positional Servomechanism.

Nelson Howard Bryant, E.E., Radio and Communications, Physics. Thesis: A Mercury-Vapor Amplifier Triode.

Simpson Linke, B.S. in E.E., Electric Power Generation, High Voltage and Distribution Technique. Thesis: The Design, Construction and Operation of a 10,000 Cycle Power Network Analyzer Board.

Joseph Carl Logue, B.E.E., Electrical Communications, Physics. Thesis: Analysis of the Ratio Detector.

Henry Stockwell McGaughan, B.S.E. (Phys.), Communications Systems Engineering, Mathematics. Thesis: Design Considerations for Radiometer Amplifiers.

Benjamin Nichols, B.E.E., Radio and Communications, Physics. Thesis: An Investigation of the Use of the Transistor as a Linear Circuit Element.

Yorgo Dimitri Tavukcuoglu, B.S. (E.E.), Electrical Power, Generation and Distribution; Industrial Electronics. Thesis: Study and Design Details of a Reluctance Generator.

Gordon James Watt, B.S., Industrial Electronics, Physics. Thesis: A Mathematical Study of Induction Heating Principles.

Francis Anthony Wilcox, B.E.E., Radio and Communication Engineering, Servomechanism. Thesis: Investigative Design of a Variable Delay Unit for a High Speed Synchroscope.

MASTERS OF MECHANICAL ENGINEERING

CONFERRED SEPTEMBER 21, 1948

John David Melvin Cameron, B.M.E., Mechanics, Machine Design. Thesis: The Application of a Non-Linear Equation for the Design of a Machinery Mounting Suitable for the Shock Isolation of Punch Presses.

CONFERRED FEBRUARY 2, 1949

Alfred Herbert Silver, B.M.E., Heat Power Engineering, Foods. Thesis: Engineering Applications in Food Preservation.

CONFERRED JUNE 13, 1949

Elmer Sylvester Monroe, Jr., B.S., Experimental Mechanical Engineering, Heat Power Engineering. Thesis: Flow of Saturated Boiler Water through Knife Edged Orifices in Series.

Arne Normann, B.S. in M.E., Machine Design, Heat Power Engineering. Thesis: Shaft Design by Graphical Methods and Related Problems in Fatigue and Stress Concentration.

William Kerr Stamets, Jr., B.M.E., Machine Design, Mechanics. Thesis: Dynamic Loading of Chain Drives.

MASTERS OF EDUCATION

CONFERRED JUNE 13, 1949

Nancy Hall Kane, A.B.

Joseph John Komaromi, A.B.

Irving Miller, B.S. (Soc. Sc.).

MASTERS OF SCIENCE IN EDUCATION

CONFERRED SEPTEMBER 21, 1948

Ernest Edward AuClair, Jr., B.S. in Ed.

William Brenner, A.B.

Earl George Canfield, B.S. in Ed.

Ellen Ingeborg Delfs, B.S.

Hahala Edna Dobbie, B.S.

Alexander Chalmers Ducat, B.S. in E.E. Thesis: A Study of the Ratings of the Class of 1943 at Edison Technical and Industrial High School, Rochester, New York.

Martin James Faragher, B.S.

Earle William Helmer, B.S.

Helen Paine Hoefer, B.S.

Arnold Hamlin Lamont, B.S. in Ed.

Charles Edward Kaufman, A.B.

William DeVoll Kilby, B.S. in E.E.

Peter Nevaldine, B.S. in E.E.

Robert Newton Orcutt, B.A.

Leon A. Philp, B.S. (Ed.).

Raymond Matheis Radtke, B.S. in Ed.

Edward Albert Reynolds, A.B.

E. Elizabeth Rutledge, B.A. Thesis: A Study of the Relationship between the Occupations of Father and Son.

Donald Merl Shutts, Certificate.

Marian Elizabeth Stevenson, B.S. (H.Ec.)

Paul Raymond Warnick, B.S.

Howard Eugene Weaver, B.S. (Forestry).

Herman Weisman, B.S. Thesis: A Study of the General Electric Science Fellowship for Teachers.

James Smythe Wittman, Jr., B.S. Thesis: The Relationship of the High School Curriculum to the Vocational Choice of Graduates of King Ferry Central School.

Kay Mya Yee, B.A., B.Ed.

CONFERRED JUNE 13, 1949

Maynard Boyce, B.S.

Harriet Herbrandson, B.S.

Esther Adelaide Jerald, B.S. in Ed.

Mary Helen Joint, A.B. Thesis: A Study of Men's Dormitory Accommodations and Residence Hall Counseling at Thirty-Four American Colleges and Universities.

Helen Byrne McDonald, A.B.

Dwight Campbell Moody, B.S.

Daisy Mae Wright Myles, B.S.

Kua Saligupta, B.S. in Ed.

Georgiana Hortense Sheldon, B.A.

James Cecil Simpson, A.B.

Donald Eugene Smith, A.B.

Paul William Toth, B.S. in Ed. Thesis: The Training of Central School Principals.

Walter Herbert Witham, B.S. in Ed.

MASTERS OF SCIENCE IN INDUSTRIAL AND LABOR RELATIONS

CONFERRED FEBRUARY 2, 1949

Ernest Roy Bulow, B.S., Collective Bargaining, Mediation, and Arbitration, Personnel Management. Thesis: The Employee-Management Joint Committee in the Machine Division of the Todd Company, Rochester, New York. A Case Study.

Jack Frederick Culley, A.B., Personnel Management, Industrial and Labor Legislation and Social Security. Thesis: A Consideration of Personnel Policy and Procedure in Connection with Labor Union Negotiations. A Case Study.

William George Hosking, B.A., Personnel Management, Labor Union History, Organization and Operation. Thesis: A Case Study of Labor Relations in a Small, Farm-Equipment Manufacturing Company.

Paul Yager, A.B., Collective Bargaining, Mediation and Arbitration, Labor Union History, Organization, and Operation. Thesis: A Study of the History of the Negotiations for a Health and Welfare Fund by the Bituminous-Coal Mine Operators and the United Mine Workers of America, between March 1945 and July 1948.

CONFERRED JUNE 13, 1949

Robert William Connolly, B.S. in Bus. Adm., Personnel Management, Collective Bargaining, Mediation and Arbitration. Thesis: The Recruitment and Training of College Graduates.

Harvey Machaver, B.S., Personnel Management, Human Relations in Industry. Thesis: The Utilization of the Older Worker in Industry. A Case Study of the Older Worker at the Ithaca Gun Company.

Frank Barton Miller, Jr., B.A., Human Relations in Industry, Personnel Management. Thesis: Three Approaches to Human Relations in Industry.

Edward Leo Phillips, B.S., Collective Bargaining, Mediation, and Arbitration; Industrial and Labor Legislation and Social Security. Thesis: Collective Bargaining in the Textile Industry of Fall River, Massachusetts.

Horace Earl Sheldon, B. of Ad.E., Collective Bargaining, Mediation and Arbitration; Labor Union History, Organization and Operation. Thesis: The Application of the Union Security Features of the Taft-Hartley Act in the Buffalo Area.

Herbert Ira Weinberg, B.S. in Ad.Eng., Personnel Management, Human Relations in Industry. Thesis: The Human Relations of a Wage Incentive System.

DOCTORS OF PHILOSOPHY

CONFERRED SEPTEMBER 21, 1948

Richard William Baker, B.S., Inorganic Chemistry, Organic Chemistry, Chemical Microscopy. Thesis: A Study of the Chemical Properties and Physical Constants of Phenyl Boron Dichloride.

Ward W. Bauder, B.Sc. in Agr., M.Sc., Rural Sociology, Agricultural Economics, Social Psychology. Thesis: A Critical Analysis of Health Data for New York Counties.

Shubael Treadwell Beasley, Jr., B.A., A.M., German Literature, Germanic Philology, Spanish-American Literature. Thesis: Christian Friedrich von Blankenburg's (1744–1796) Relation to the English Language and Literature.

Francis Jameson Bell, B.S.A., M.S., Plant Breeding, Cytology, Field Crop Production. Thesis: A Study of the Thiamine and Crude Protein Contents of Certain Varieties and Selections of Oats.

Philip Frederic Bonhag, B.S., M.S., Insect Morphology and Histology, Medical Entomology, Vertebrate Zoology. Thesis: The Thoracic Mechanism of the Adult Horsefly (Diptera: Tabanidae).

Edward Charles Broge, A.B., Inorganic Chemistry, Physical Chemistry, Organic Chemistry. Thesis: Addition Compounds of Boron Trifluoride with Pyridine and Pyridine-oxide.

Robert Walter Broge, S.B., Physical Chemistry, Organic Chemistry, Physics. Thesis: I. An Investigation of the Structure of C_8 F_{12} II. A Study of the X-ray Background Scattering from Carbon Tetrabromide.

Charles Albert Brown, A.B., Inorganic Chemistry, Physical Chemistry, Organic Chemistry. Thesis: A Study of the Compound B-Trichloroborazole.

Nelson Gardiner Bump, B.S., M. in Forestry, Ornithology, Rural Education, Forestry. Thesis: Wildlife Habitat Changes on the Connecticut Hill Game Management Area over a Twenty-Year Period and Their Effect on Certain Species of Wildlife.

William Hollis Burkitt, B.S., M.S. in Agr., Animal Husbandry, Animal Nutrition, Veterinary Physiology. Thesis: Growth, Nitrogen Balance, and Protein Utilization of Lambs Fed Individually on Different Levels of Protein.

Jose Riley Campbell, B.S., M.S., Farm Management, Prices and Statistics, Economic Theory and Its History. Thesis: Costs and Returns in Producing Potatoes, Northern Steuben Area, New York, 1946.

Gerald Fuson Combs, B.S., Animal Nutrition, Biochemistry, Physiology. Thesis: Studies on an Unidentified Water-Soluble Factor, or Factors, Required for Growth and Hatchability of Chickens.

John Delaney, B.S., M.S., in Ed., Educational Supervision, Educational Administration, Educational Psychology. Thesis: Some Measures of the Resources for General Elementary School Supervision.

Eugene Albert Delwiche, B.S. in Agr., Bacteriology, Biochemistry, Organic Chemistry. Thesis: Mechanism of Propionic Acid Formation by Propionibacterium Pentosoceum.

Robert Jackson Dierlam, B.A., M.A., Drama and the Theatre, Dramatic Literature, Labor Union Organization and Operation. Thesis: The Volksbühne Movement: A Study of the Organized Audience.

Francis John DiVesta, B.S. in Ed., M.S in Agr., Educational Psychology, Sociology and Anthropology, Guidance, Agricultural Education. Thesis: The Role of Personal Values and Process Concepts in the Personal and Social Adjustment of Adolescents.

Leslie Wallace Dunbar, Grad., A.M., Political Theory, Constitutional Law, Economic Theory and Its History. Thesis: Freedom and the Community: An Examination of Green's Political Theory.

John Howard Ellison, B.S. (Agr.), Vegetable Crops, Plant Physiology, Plant Breeding. Thesis: Retarding Sprout Growth of Potato Tubers by Spraying Certain Hormones on the Plants during the Growing Season.

Joseph Garcia, B.C.E., M.C.E., Structural Engineering, Hydraulic Engineering, Soil Mechanics. Thesis: Distribution and Concentration of Stresses and Fatigue Behavior of Welded Double Butt-Strap Joints.

Norman Gustav Gunderson, A.B., A.M., Algebra, Geometry, Physics. Thesis: Derivation of Criteria for the First Case of Fermat's Last Theorem and the Combination of These Criteria to Produce a New Lower Bound for the Exponent.

Howard Leslie House, B.S.A., Insect Physiology, Animal Nutrition, Apiculture. Thesis: Some Essential Amino Acids for *Blattella germanica* (L.) under Aseptic Conditions.

George Willard Howe, A.B., M.S., Nature Study, Biology, Geology. Thesis: Educational Opportunities—Actual and Potential—Afforded by the State Parks of New York.

Edgar Andrew Hyer, B.S., M.S., Farm Management, Marketing, Economic Theory and Its History. Thesis: Readjustment in Type of Farming in the Finger Lakes Region of New York.

Arthur Leonard Isbit, B.S., Vegetable Crops, Plant Breeding, Plant Physiology. Thesis: Studies of Bulbing and Seedstalk Emphasis on Reducing the Time to Flowering.

Everett William Jameson, Jr., B.S., M.A., Vertebrate Zoology, Entomology, Botany. Thesis: Some Factors Influencing the Local Distribution of and Abundance of Woodland Small Mammals in Central New York.

Mario Leon Juncosa, A.B., M.S., Applied Mathematics, Mathematical Analysis, Physics. Thesis: On the Asymptotic Behavior of the Minimum in a Sequence of Random Variables.

Leonard James Kezer, A.B., M.S., Vertebrate Zoology, Botany, Endrocrinology. Thesis: The Chromosomes of Plenthodontid Salamanders with Special Reference to the Genera *Desmognathus* and *Plethodon*.

Frank Pickett King, B.S.A., M.S.A., Farm Equipment, Prices and Statistics, Marketing. Thesis: Types of Farming in Georgia.

Henry Alan Luke, B.S., M.S., Marketing, Land Economics, Economic Theory and Its History. Thesis: The Utilization and Pricing of Milk under the New York Milk Marketing Order.

Scott Harrison Lytle, A.B., Modern European History, Medieval History, American History. Thesis: Historical Materialism and the Social Myth: A Study of Georges Sorel's Conception of History.

Fred Dry Maurer, B.S. (Bus.), B.S., and D.V.M., Pathogenic Bacteriology, Animal Pathology, Biochemistry. Thesis: Protection of *Escherichia Coli* Against Bacteriophage with Citrus Pectin.

Esther Leib McCandless, B.S., M.S., Animal Physiology, Biochemistry, Neurology. Thesis: Species Differences in the Intermediary Metabolism of Alloxan Diabetes.

Robert Randal Meijer, A.B., Experimental Physics, Theoretical Physics, Physical Chemistry. Thesis: On the Absorption of Slow Neutrons by Rhodium.

Lawrence Arthur Minnich, Jr., A.B., M.A., Modern European History, English History, Political Theory. Thesis: Social Problems and Political Alignments in France, 1893–1898; Léon Bourgeois and Solidarity.

Moses Passer, B.S., Organic Chemistry, Physical Chemistry, Inorganic Chemistry. Thesis: Studies Relating to the Mechanism of the Reaction of Olefins with Formaldehyde.

Ming Lung Pei, B.S. in C.E., M.S. in Eng., Structural Engineering, Mechanics, Mathematics. Thesis: Hipped Plate Structures.

John Jacob Pratt, Jr., B.S., M.S., Insect Physiology, Insect Toxicology, Plant Pathology. Thesis: A Qualitative Analysis of the Free Amino Acids in Insect Blood.

Ruknuddin Ahmad Quraishi, B.A., M.A., Educational Administration, Educational Psychology, Educational Measurements. Thesis: An Application to Hyderabad State of Certain Principles and Practices in the Preparation and Certification of School Administrators in the United States.

Richard Craig Rover, B.A., M.Ed., Educational Psychology, Educational Administration, Sociology. Thesis: Developing an Educational Program Appropriate for a Central Rural School to Assist Mentally Retarded Pupils to Assume Self-Sustaining Occupational Roles in Society.

Leverett Saltonstall, Jr., A.B., M.S., Field Crop Production, Plant Breeding, Dairy Husbandry. Thesis: The Measurement of the Quantity and Quality of Pasture Herbage Consumed by Sheep. A Technique Study.

Daljit Singh Sarkaria, B.S., M.S., Insect Toxicology, Insect Ecology, Field Crop Production. Thesis: Factors in the Penetration of DDT through the Pulvilli of Several Insect Species.

Willard Reed Schmehl, B.S., Soils, Plant Physiology, Physical Chemistry. Thesis:

The Nature of Crop Responses to Liming and the Influence of Rate and Method of Application on the Yield and Chemical Composition of Plants.

William Gulliver Sheldon, B.A., M.S., Vertebrate Zoology, Forestry, Nature Study. Thesis: A Contribution to the Biology of Foxes in New York State.

Gursham Singh, B.Sc., M.Sc., Plant Breeding, Plant Physiology, Vegetable Crops. Thesis: Factors Affecting the Incidence of Smuts in Oats and Inheritance of Smuts in Certain Oat Hybrids.

Sardar Singh, B. S., Apiculture, Economic Entomology, Pomology. Thesis: The Behaviour of Honeybees in Gathering.

Betsy Patterson Smith, B.S., Biochemistry, Animal Nutrition, Bacteriology. Thesis: Changes in Transaminase in Germinating Seeds and Its Relation to Protein Synthesis.

Richard Crain Snyder, A.B., A.M., Comparative Anatomy, Vertebrate Zoology, Animal Physiology. Thesis: Cursorial Adaptations of Three Species of Iguanid Lizards.

Theodore Lionel Sourkes, B.Sc., M.Sc., Biochemistry, Animal Nutrition, Organic Chemistry. Thesis: Some in Vitro Studies on the Transmethylation of Suanidoacetic Acid by Methionine.

Earl Lewis Stone, Jr., B.S., M.S., Soils, Forest Conservation, Plant Morphology. Thesis: The Relation of Mycorrlizae to the Phosphorus Nutrition of Monterey Pine.

Nettie Florence Thomas, A.B., M.A., Vegetable Crops, Plant Physiology, Plant Breeding. Thesis: Studies of Cracking of Tomato Fruits with Emphasis on Method of Selecting Resistant Plants from Segregating Progenies.

Lowell Dohner Uhler, B.S. in Ed., M.S., Insect Ecology, Nature Study, Economic Entomology. Thesis: The Biology and Ecology of the Goldenrod Gall Fly *Eurosta solidaginis* (Fitch).

Noland Leroy VanDemark, B.Sc. in Agr., M.Sc., Animal Husbandry, Animal Nutrition, Animal Physiology. Thesis: The Relation of Spermatozoan Metabolism and Other Semen Characteristics to the Livability of Bovine Spermatozoa in Different Nutrient Diluters.

H. Grey Verner, B.S. in Chem., M. Chem. Eng., Chemical Engineering, Administrative Engineering, Physical Chemistry. Thesis: Continuous Nitration of Toluene.

Richard Hancorne Washburn, B.S., Economic Entomology, Insecticide Chemistry, Organic Chemistry. Thesis: A Comparison of Some Organic Insecticides and the Relationship of Particle Size and Toxicity of Cryolite and DDT to the Mexican Bean Beetle, *Epilachna varivestris* Mulsant.

Cornelius Anthony Welch, B.A., M.A., Supervision, Educational Administration, Educational Psychology. Thesis: The Growth of and Opportunity for Teacher Education in the Catholic Liberal Arts College.

James Eugene White, B.A. in Soc., M.S., Sociology, Rural Sociology, Agricultural Economics. Thesis: Leadership and Social Structure in a New York Rural Community.

Willie Garland Woltz, B.S., Soils, Plant Physiology, Chemistry. Thesis: Effects of Some Fertilizer Ingredients upon Yield, Value and Chemical Composition of Flue-Cured Tobacco.

LeRoy Brough Yeatts, Jr., B.S.in Chem., M.S., Inorganic Chemistry, Physical Chemistry, Analytical Chemistry. Thesis: The Kinetics of the Ozone-Chloride Ion Reaction in Acid Solution.

CONFERRED FEBRUARY 2, 1949

Lewis Whitaker Adams, B.S., Finance, Economic Theory, Constitutional Law. Thesis: The World Bank: An Experiment in International Lending.

Edward William Anacker, B.S., Physical Chemistry, Inorganic Chemistry, Physics. Thesis: A Study of Soap Solutions by Light Scattering.

Roger William Barbour, B.S. in Ed., M.S., Vertebrate Zoology, Ornithology, Nature Study. Thesis: A Study of the Mammals, Reptiles, and Amphibians of Big Black Mountain, Harlan County, Kentucky.

Harry James Brown, A.B., A.M., American History, Constitutional Law, Economic History. Thesis: The National Association of Wool Manufacturers, 1864–1897.

James Rolland Carson, B.S., M.S., Animal Breeding, Animal Pathology, Animal Physiology. Thesis: The Genetic Response of Leucosis-Resistant and Leucosis-Susceptible Strains of Chickens to Exposure to Disease-Producing Agents.

Jowett Chou Chao, M.S., Economic Entomology, Insect Toxicology, Plant Pathology. Thesis: Fumigation and Seed Germination.

A. N. M. Mumtaz Uddin Choudhury, B.A., M.A., Bach. Teach., M.A., Rural Education, Educational Administration, Rural Sociolology. Thesis: A Plan of Adult Education for Eastern Pakistan.

William Hillick Clohessy, B.S., Theoretical Physics, Mathematics, Experimental Physics. Thesis: The Elastic Scattering of Fast Electrons by Heavy Nuclei.

Harryette Creasy, A.B., A.M., Rhetoric and Public Speaking, Personnel Administration, American Literature. Thesis: A Comprehensive Study of the Occupational Guidance and Placement Procedures for Students and Alumnae of Skidmore College.

Saxe Dobrin, B.Ch.E., Chemical Engineering, Physical Chemistry, Inorganic Chemistry. Thesis: The Moisture Transmission of Packaging Materials at Low Temperatures.

Ralph Francis Elliott, B.Sc. in Agr., M.S. in Agr., Animal Nutrition, Biochemistry, Dairy Husbandry. Thesis: Carotene Metabolism and Requirements in Young Dairy Calves.

Desire Marc Eny, B.S., Ing. (R.E.), Plant Physiology, Biochemistry, Pomology. Thesis: A Study of the Respiratory Mechanism of Chlorella.

John Woodward Fitzgerald, A.B., M.E., M.M.E., Industrial Engineering, Accounting, Economics. Thesis: Rationalization of the Electricity Supply in Great Britain; an Experiment in Economic and Engineering Planning on a National Scale.

Koert Gerzon, B.S., Organic Chemistry, Biochemistry, Inorganic Chemistry. Thesis: Studies Relating to the Phytosynthesis of Rubber.

Eleanor Jane Goltz, B.A., A.M., Ancient History, Modern European History, Classics. Thesis: The Political, Economic, and Religious Relations between the Roman Republic and Egypt.

William Lee Gragg, B.S., M.S. in Ed., Educational Administration, Public Administration and Finance, Rural Sociology. Thesis: A Study of Factors Related to the Persistence of Pupils in Public Secondary Schools.

Samuel Lowry Hood, B.A., Biochemistry, Physical Chemistry, Plant Physiology. Thesis: Glutamic Acid Decarboxylase of Higher Plants and Its Relation to the Role of Boron in Plants.

Cedric Albert Hornby, B.S. in Agr., M.S. in Agr., Vegetable Crops, Plant Physiology, Plant Breeding. Thesis: Growth and Fruiting Responses of Tomato

Plants to Time of Sowing Seed, Spacing of Seedlings and Application of Fertilizers to the Flat.

Mirza Nurul Huda, B.A., M.A., Land Economics and Agricultural Geography, Farm Finance, Prices and Statistics. Thesis: Agriculture in Eastern Pakistan: Problems and Policy.

Albert Aurel LaPlante, Jr., B.S., Economic Entomology, Plant Pathology, Insect Toxicology. Thesis: Contact and Oral Toxicity of Three Formulations of DDT to First Instar Oriental Fruit Moth Larvae.

Kumud Bondhu Majumder, B.A., Bach. of Teaching, Diploma in Ed., M.A., Educational Administration, Secondary Education, Rural Sociology. Thesis: The Development and the Adaptation to Bengal of American Methods and Techniques for Making a School Survey.

Milton Rafael Martinez-Delgado, B.S. in C.E., M.C.E., Structural Engineering, Hydraulic Engineering, Applied Mathematics. Thesis: Cracking in Reinforced Concrete.

Walter Samuel McAfee, B.S., M.Sc., Theoretical Physics, Mathematics, Experimental Physics. Thesis: On the Production of Mesons by Collisions of Nucleons Having Non-Relativistic Energies.

Herbert Tremble Peeler, B.S., Animal Nutrition, Biochemistry, Animal Physiology. Thesis: The Nature of Strepogenin Activity.

Norman Douglas Philbrick, A.B., A.M., Drama and Theatre, Dramatic Literature, Phonetics and Speech Training. Thesis: Democracy and Social Comedy in America from 1800 to 1833.

Gurdip Singh Randhawa, B.Sc. (Agr.), M.Sc. (Agr.), Vegetable Crops, Plant Breeding, Cytology. Thesis: The Effect of Application of Different Synthetic Hormones on Fruit Set in Tomatoes and Snap Beans.

Mohamed Sayed Sayed Sahab, B.Arch., M.S., Heat Power Engineering, Sanitary Engineering, Illumination Engineering. Thesis: Radiant Panel Heating and Cooling.

Steven Eli Schanes, A.B., International Law and Relations, Constitutional Law, Economic Theory and Its History. Thesis: International Co-operation in Civil Aviation, 1945–47.

Charles Schenker, B.S., M.S., Organic Chemistry, Inorganic Chemistry, Biochemistry. Thesis: An Investigation of the Reactivity of Halogenated Pteridines.

Elmer Newton Searls, B.S., M.S., Marketing, Business Management, Economic Theory and Its History. Thesis: An Economic Analysis of the Marketing of Dressed Chickens by New York Poultrymen, 1946–47.

Paul Byron Simpson, A.B., Economic Theory and Its History, Money, Banking, and International Finance, Mathematics. Thesis: Extension of Neo-Classical Economics.

Wilson Levering Smith, Jr., B.S., M.S., Plant Pathology, Plant Physiology, Bacteriology. Thesis: The Blackleg Disease of Potatoes and a Comparison of Its Causal Organism *Erwinia Atroseptica* (van Hall) Jenneson with *Erwinia Carotovora* (Jones) Holland.

Bernard Benedict Strangler, B.S., Floriculture and Ornamental Horticulture, Plant Morphology, Plant Physiology. Thesis: An Anatomical Study of the Origin and Development of Adventitious Roots in Stem Cuttings of *Chrysanthemum Morifolium* Bailey, *Dianthus Caryophyllus* L., and *Rosa Dilecta* Rehr.

Harold Nathaniel Taylor, B. of Eng., M. of Eng., Physical Chemistry, Mathematics, Physics. Thesis: Fractionation of Polystyrene by Adsorption.

William Parker VanEseltine, A.B., M.S., Bacteriology, Biochemistry, Plant Physiology. Thesis: The Effect of Temperature upon Bacteriostasis.

Maria Alice Weber, Licencie es Sciences Matematiques, Licencie es Sciences Physiques (M.A.), Applied Mathematics, Mathematical Analysis, Physics. Thesis: The Solution of a Linear Differential Equation of Parabolic Type.

Charles Edward Williamson, A.B., Plant Pathology, Plant Physiology, Plant Breeding. Thesis: Studies on *Diplocarpon rosae* Wolf with Special Reference to the Cause of Defoliation of the Rose.

E. Travis York, Jr., B.S. in Agr., M.S., Soils, Plant Breeding, Inorganic Chemistry. Thesis: Calcium-Potassium Interrelations in Soils and Their Influence upon the Yield and Cation Content of Certain Crops.

CONFERRED JUNE 13, 1949

Sundar Lal Aggarwal, B.S., M.S., Physical Chemistry, Physics, Chemical Engineering. Thesis: An Investigation of Copolymers and Terpolymers of 2–Vinyl Pyridine.

Arthur Dean Amadon, B.S., Ornithology, Comparative Anatomy, Vertebrate Zoology. Thesis: The Hawaiian Honeycreepers (Family Drepaniidae).

Herman D. Arbitman, A.B., M.A., Psychobiology, Psychology, Physiological Psychology. Thesis: An Investigation of Experimental Extinction of Conditioned Reflexes Using the Methods of Free-Activity and Pavlov-Type Restraint.

Jacques Lucien AuClair, B.S in Agr., M.Sc., Insect Physiology, Economic Entomology, Biochemistry. Thesis: Qualitative Studies on the Metabolism of Amino Acids in Insects.

Wallace Edward Barnes, B.A., M.S., Mathematical Analysis, Applied Mathematics, Industrial Electronics. Thesis: Abel Transforms and Partial Sums of Tauberian Series.

Marie Boas, A.B., A.M., History of Science, Medieval History, Astronomy. Thesis: Robert Boyle and the Corpuscular Philosophy. A Study of Theories of Matter in the Seventeenth Century.

George Hirst Bradley, B.S., Medical Entomology, Insect Ecology, Insect Morphology and Histology. Thesis: Studies on *Anopheles Quadrimaculatus* Say with Special Reference to Ecology of the Larvae (Diptera, Culicidae).

Glenn Otto Bressler, B.S., M.S., Farm Management, Marketing, Poultry Husbandry. Thesis: An Economic Analysis of Labor Saving Methods and Facilities on Poultry Farms in Pennsylvania.

Leland Ralph Brown, B.S., Economic Entomology, Insect Toxicology, Pomology. Thesis: Investigations with Certain Low and High Air Volume Insecticide Applicators by Wet Dusting and Mist Spraying of Apple Trees.

Chandra Mohan Chatterjee, B.A., M.A., Rural Sociology, Land Economics, Anthropology. Thesis: Relationship of Hindu Festivals to Rural Life in the United Provinces, India.

Tao-Hung Chen, B.Eng., M.S. in Eng., Theoretical Hydraulics, Highway Engineering, Hydraulic Engineering. Thesis: The Initial Stages of Bed-Load Movement.

Wilson Farnsworth Clark, A.B., Nature Study, Forestry, Plant Physiology. Thesis: National Parks Survey. The Interpretive Programs of the National Parks; Their Development, Present Status, and Reception by the Public.

George Gosson Cocks, B.S. in Chem. Tech., Chemical Microscopy, Analytical

Chemistry, Organic Chemistry. Thesis: Some Organic Reagents for Inorganic Microscopical Analysis.

Joseph Congress, B.A., French Literature, French Language, Nineteenth Century Literature. Thesis: Gustave Flaubert and the French Critics 1857–1906.

M. Esther Crew, B.Sc. in H.E., M.A., Economics of the Household and Household Management, Psychology, Home Economics Education. Thesis: Oxygen Consumed in Eight Selected Component Activities in Household Tasks.

Richard Floyd Darsie, Jr., A.B., M.S., Medical Entomology, Economic Entomology, Vertebrate Zoology. Thesis: Pupae of the Mosquitoes of Northeastern United States (Diptera, Culicidae).

Glenn Elmore Davis, B.Ed., Vegetable Crops, Plant Physiology, Cytology. Thesis: Physiological Studies of the Toxicity of 2,4–Dichlorophenoxyacetic Acid, with Special Attention Given to the Effects Obtained When the Plants Are Low in Carbohydrates.

Samuel Edward Duncan, Jr., A.B., A.M., Rural Secondary Education, Rural Sociology, Supervision. Thesis: The Utilization of Community Resources in the Instructional Program of the Secondary School.

Howard Spencer Dye, A.B., A.M., Money, Banking and International Finance; International Economics, Economic History. Thesis: Federal Banking Legislation from 1930 to 1938; Its History, Consequences and Related Issues.

Julius Fabricant, V.M.D., B.S., M.S., Poultry Diseases, Animal Pathology, Animal Nutrition. Thesis: Studies on the Diagnosis of Newcastle Disease and Infectious Bronchitis of Fowls.

Martha Fuchs Ferger, B.A., Biochemistry, Bacteriology, Physiology. Thesis: Studies on β–2–Thienylalanine and on Some Methyl Sulfonium Compounds Related to Betaine.

Henry Raymond Fortmann, B.S., M.S., Plant Breeding, Field Crop Production, Soils. Thesis: A Study of the Responses of Varieties of Bromegrass to Nitrogen Fertilization and Cutting Treatments.

Erika Eva Gaertner, B.S.A., M.S., Economic Botany, Plant Pathology, Plant Breeding. Thesis: Studies of Seed Germination, Seed Identification and Host Relationships in Dodders, *Cuscuta* Spp.

William Kelso Gealey, A.B., Structural Geology, Stratigraphy, Mineralogy and Petrology. Thesis: Geology of the Healdsburg Quadrangle, Sonoma County, California.

Seymour Geller, A.B., Physical Chemistry, Physics, Mathematics. Thesis: Structures of Some Molecular Addition Compounds. I. Monomethyl amine-boron trifluoride, $H_3CH_2N–BF_3$. II. Trimethyl amine-boron trifluoride, $(H_3C)_3N–BF_3$. III. Methyl cyanide-boron tribromide, $H_3CCN–BBr_3$.

Hans Peter Greenwood, A.B., M.A., Money, Banking, and International Finance; Economic Theory and Its History; Public Finance. Thesis: Forces of Adjustment in the Canadian Balance of International Payments, 1926–1938.

Paul Grun, B.A., Plant Breeding, Cytology, Plant Physiology. Thesis: Cytological Studies of Alfalfa.

William John Grupp, B.A., A.M., Spanish Literature, Spanish Linguistics, German Literature. Thesis: Dramatic Theory and Criticism in Spain during the Sixteenth, Seventeenth and Eighteenth Centuries.

Andrew Williams Halpin, B.S., A.M., Educational Psychology, Guidance and Personnel Administration, Psychology. Thesis: Sorting Test Performance of Six Year Old Children — A Study of "Abstract" and "Concrete" Behavior.

William Hansel, B.S., M.S. in Agr., Animal Breeding, Veterinary Physiology, Dairy Husbandry. Thesis: A Study of Metestrous Bleeding in Dairy Cattle.

Robert Earle Hardenburg, B.S., M.S., Vegetable Crops, Marketing, Plant Physiology. Thesis: Prepackaging Vegetables in Different Transparent Films with Special Attention Given to Shrinkage, Quality, Refrigeration and Gas Exchange.

Nelson Adelbert Hauer, B.S., M.S., Industrial Education, Human Relations in Industry, Personnel Management. Thesis: Comparative Analysis of Curriculum Patterns in the New York State Institutes of Applied Arts and Sciences.

John Ralph Havis, B.S. in Agr., M.S. in Agr., Vegetable Crops, Plant Physiology, Soils. Thesis: The Herbicidal Properties of Petroleum Hydrocarbons.

William Alan Hedlin, B.Sc. in Agr., Vegetable Crops, Plant Physiology, Plant Breeding. Thesis: The Use of Calcium Cyanamid and Potassium Cyanate for the Control of Weeds in Onions.

Charles Wickline Hill, B.S.Agr., M.A., Agricultural Education, Agricultural Engineering, Secondary Education. Thesis: Time Used for Professional Activities by Teachers of Vocational Agriculture in West Virginia.

Julius Romanoff Hoffman, B.A., M.S., Insect Toxicology, Economic Entomology, Floriculture and Ornamental Horticulture. Thesis: The Distribution and Phases of Parathion Aerosols.

Mildred Pixton Bowers Hunter, B.S., M.S., Foods and Nutrition, Animal Nutrition, Biochemistry. Thesis: The Effects of Formula, Temperature of Ingredients, Kind of Fat, and Method of Mixing on Batter Structure and Cake Quality.

Pauline Ina James, B.S., M.S., Nature Study, Ornithology, Forest Conservation. Thesis: The Role of Radio in Conservation Education.

Daniel Kading, B.A., M.A., Ethics, History of Philosophy, Economic Theory and Its History. Thesis: An Examination of Some Contemporary Subjective Ethical Theories.

Wolf Karo, A.B., Organic Chemistry, Inorganic Chemistry, Analytical Chemistry. Thesis: A Kinetic Study of the Thermal Decomposition of Substituted Dibenzoyl Peroxides in Solution.

Bennett Harvey Kindt, B.S., Analytical Chemistry, Physical Chemistry, Inorganic Chemistry. Thesis: A Photoelectric Titrimeter: Design and Applications.

William Lester Kraushaar, B.S. in E.P., Experimental Physics, Theoretical Physics, Biophysics. Thesis: Cosmic Ray Mesons near Sea Level.

Warner Lansing, B.C.E., M.C.E., Structural Engineering, Mechanics, Mathematics. Thesis: Stresses in Thin Walled Open Section Beams Due to Combined Torsion and Flexure.

Annabel Yuen-Wai Lee, B.S. in C.E., M.S. in Eng., Structural Engineering, City Planning, Mathematics. Thesis: A Study on Column Analysis.

Chung Yuan Li, B.S. in C.E., M.S. in Eng., Sanitary Engineering, Hydraulic Engineering, Regional and City Planning. Thesis: An Investigation of the Relationship between the Biochemical Oxygen Demand of a Sewage and the Relative Stabilities of Its Dilutions.

Bryce Dale Lyon, B.A., Medieval History, Ancient History, Political Theory. Thesis: The Money-Fief under the English Kings, 1066 to 1485.

Homer Wallace McCune, B.S., Inorganic Chemistry, Physical Chemistry, Physics. Thesis: A Hydrothermal Study of the System Chromium (III) Oxide-Water.

Delbert Grant McKercher, B.V.Sc., M.A., Veterinary Bacteriology, Biochemistry, Animal Physiology. Thesis: Immunization Studies in Cats against *Miyagawanella fellis.*

Arnold Robert Moore, B.S. in Chem., Experimental Physics, Theoretical Physics, Mathematics. Thesis: Electron Motion and Luminescence in Silver Chloride and Other Crystals.

John Clarence Murphy, B.S., M.S in Ed., Educational Administration, Education, Public Finance. Thesis: An Evaluation of Certain Factors Which Influence the Net Cost of School Bond Issues of Central School Districts in New York State.

Ray Aaron Murray, B.S. in Agr., M.S. in Agr., Farm Management, Land Economics and Agricultural Geography, Agricultural Education. Thesis: An Economic Study of Agriculture in Iowa County, Wisconsin, 1946.

C. K. Narayanan Nair, B.Sc., M.Sc., Soils, Plant Physiology, Biochemistry. Thesis: Studies on the Activity of Cupric Ions in Peat Soils and Organic Copper Complexes by Means of an Amalgam Electrode.

Jatinder Nath Nanda, B.A., B.Sc., M.Sc., Applied Physics, Theoretical Physics, Materials of Engineering. Thesis: Experiments on Photoconductivity and Allied Phenomena in Silver Chloride Crystals.

Arthur Hansen Nelson, B.S., Nature Study, Forest Conservation, Meteorology. Thesis: A Study of Conservation Education in the Junior Colleges of the United States.

Edward Lindsay Newcomb, A.B., Structural Geology, Economic Geology, Mineralogy and Petrology. Thesis: Structure and Petrography of the Greenwood Lake Quadrangle.

Fred Jouett Nisbet, B.S., Floriculture and Horticulture, Agricultural Economics, Plant Breeding. Thesis: An Economic Study of Selected Plant Nurseries in New York State.

Sellers Jerial Parker, B.S. in Agr., M.S. in Agr., Agricultural Education, Vegetable Crops, Agricultural Economics. Thesis: The Implications of Selected Problems in Teaching Vocational Agriculture for Placing Emphasis on the Content of the Teacher-Training Program at the Agricultural Mechanical and Normal College in Arkansas.

Chester W. H. Partridge, B.S., Biochemistry, Physiology, Bacteriology. Thesis: Studies on the Metabolism of Biotin and Related Compounds.

Albert Marchant Pearson, B.S., M.S., Animal Husbandry, Veterinary Physiology, Biochemistry. Thesis: The Influence of the Rate of Freezing and the Length of Freezer-Storage upon the Quality of Beef.

Preston Leonard Perlman, B.Sc. in Biology, Zoology, Biochemistry, Comparative Physiology. Thesis: Experimental Studies on the Chemical and Histochemical Distribution of Testes Cholesterol in the Rat.

Paul Bruce Pettit, A.B., A.M., Dramatic Production, Dramatic Literature, History of Painting and Sculpture. Thesis: The Important American Dramatic Types to 1900: A Study of the Yankee, Negro, Indian, and Frontiersman.

Farnham Gates Pope, B.S., M.S. in Ed., Educational Administration, Public Finance, Rural Sociology. Thesis: The Cost and the Quality of School Bus Transportation in Certain District-Owned and Contract Systems in the Central Schools of New York State.

Tulsa Ram, L.V.P., M.S. in Agr., Animal Genetics, Animal Nutrition, Animal Physiology. Thesis: The Relation of Body Temperature, Blood Cells, and Genetic Resistance to Salmonella Pullorum in the Fowl.

John Mansley Robinson, A.B., History of Philosophy, Metaphysics, History of Science. Thesis: The *Dine* in Presocratic Cosmology.

Murray Rosenblatt, B.S., M.S., Applied Mathematics, Mathematical Analysis, Physics. Thesis: On Distributions of Certain Wiener Functionals.

Mohammed Saied El Sabban, D.V.M., M.V.Sc., Veterinary Bacteriology, Veterinary Pathology, Poultry Diseases. Thesis: Studies on Pseudorabies Virus Cultivated in the Yolk Sac of the Developing Chick Embryo.

Doretta Marie Schlaphoff, B.Sc. in H.Ec., M.S., Nutrition, Biochemistry, Foods. Thesis: The Iron Requirement of Six Adolescent Girls.

Eugene Shelar, B.S., M.S., Nature Study, Vertebrate Zoology, Economic Botany. Thesis: A Study of the Use That Is Being Made of the Out-of-Doors in Teaching in the Public Schools and in the Teacher Training Schools.

William Epes Skelton, B.S., M.S. in Ed., Extension Education, Rural Sociology, Agricultural Economics. Thesis: The Status and Training of 4-H Club Leaders in Relation to Tenure.

Murray Ralph Spiegel, B.A., M.S., Applied Mathematics, Theoretical Physics, Mathematical Analysis. Thesis: On the Random Vibrations of Harmonically Bound Particles in a Viscous Medium.

Harriet Corinne Stull, B.A., M.A., Social Studies Education, Social Psychology, American History. Thesis: A Study of the Relation between Sympathetic Role Taking Behavior and Certain Aspects of Democratic Behavior of Sixth Grade Students.

Arthur Conrad Sucsy, B.S., A.M., Organic Chemistry, Analytical Chemistry, Inorganic Chemistry. Thesis: Syntheses of Unsaturated Compounds of the Cyclodecane.

Edward Curtis Taylor, Jr., A.B., Organic Chemistry, Biochemistry, Inorganic Chemistry. Thesis: An Investigation of Some Aspects of the Chemistry of the Pteridines.

Sterling Angus Taylor, B.S., Soils, Plant Physiology, Physics. Thesis: Soil Air-Plant Growth Relationships with Emphasis on Means of Characterizing Soil Aeration.

Dioscoro Lopez Umali, B.S. in Agr., Genetics, Cytology, Vegetable Crops. Thesis: Induction of Mutations in Maize with Nitrogen Mustards.

William Delany Walker, Jr., B.A., Experimental Physics, Theoretical Physics, Applied Mathematics. Thesis: A Study of Penetrating Showers.

Claude Kent Warner, B.S., M.S., Nature Study, Guidance and Personnel Administration, Insect Ecology. Thesis: Conservation and Science Education in Teacher Training Institutions.

Emery Lewis Will, A.B., M.S, Nature Study, Economic Botany, Vertebrate Zoology. Thesis: A Study of Conservation Education in the Secondary Schools of the United States.

Arthur Robert Williams, A.B., A.M., American Literature, The English Renaissance, Dramatic Literature. Thesis: The Irishman in American Humor: From 1647 to the Present.

Nelson Chester Wood, B.S., A.M. in Ed., Educational Administration, Supervision, Guidance and Personnel Administration. Thesis: The Place of the Village in the New-Type Intermediate School District of New York State.

William John Richard Woodley, B.A., M.A., Money, Banking and International Finance; Public Finance, Economic Theory and Its History. Thesis: Canada's Postwar Balance of Payments. A Case Study of Remedies for Balance of Payments Disequilibrium.

John Rowland Woodruff, A.B., M.A., Drama and the Theatre, Dramatic Literature, Dramatic Production. Thesis: The Theatrical Venture in Boston.

Richard Nicholas Work, A.B., M.S. in Eng., Applied Physics, Electrical Communications, Theoretical Physics. (Thesis Classified — Title Withheld.)

MEMBERS OF THE STAFF

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