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SUMMER SCHOOL IN AGRICULTURE
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1913

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This announcement is intended to give detailed information to prospective students in the Summer School in Agriculture at Cornell University.

For general information concerning the University and the work in its various colleges during the academic year, the requirements for admission, etc., the General Circular of Information should be consulted. This and the other Official Publications of Cornell University are listed on the last page of the cover of this pamphlet. Any one of the informational publications there mentioned will be sent gratis and post-free on application to the Secretary of Cornell University, Ithaca, New York.

CALENDAR

SUMMER SCHOOL IN AGRICULTURE 1913

In order to get the full number of exercises announced for the Summer School, it is necessary that all work begin promptly on Monday morning, July 7th. Students are therefore urged to reach Ithaca in time to be present at the first exercise in each class. If possible, they should register on Saturday, July 5th; if not, they should register on Monday during the hours not occupied in class work.

July 5, Saturday,	9 a.m. to 5 p.m. Registration first at office of Registrar, Morrill Hall, and then with the Secretary, College of Agriculture, Main Building, Room 122.
July 7, Monday,	Instruction begins at times and places announced under each course. Registration continued.
July 8, Tuesday evening, and following Tuesdays,	Musical recital, Sage Chapel. The Director of the University Summer Session will make a brief address.
July 9, Wednesday evening, and following Wednesdays,	Country-life addresses and assemblies of Summer School students as announced in weekly calendar.
July 10, Thursday evening, and following Thursdays,	Musical recital, Sage Chapel.
July 12, Saturday, before 1 p. m.,	Last day for the payment of fees at the Treasurer's Office, 1 Morrill Hall.
July 14, Monday evening,	First lecture in Monday evening course. Continued on following Mondays. Rockefeller Hall.
August 14, 15, Thursday and Friday,	New York State Examinations for Teachers' Certificates; examination in agriculture for district superintendents.
August 15, Friday,	Summer School closes.

A weekly calendar is published by the University. During the Summer School it will be mailed to any address on receipt of twenty-five cents at the Secretary's Office.

A School for Leadership in Country Life will be held at the College of Agriculture, June 24 to July 4, 1913, inclusive. See page 22.

CALENDAR

ACADEMIC YEAR 1913-14

September 12, Friday,	Entrance examinations begin.
September 22, Monday,	Academic year begins. Registration of new students. Scholarship examinations begin.
September 23, Tuesday,	Registration of new students.
September 24, Wednesday,	Registration of old students.
September 25, Thursday,	Instruction begins. President's annual address to the students.



CORNELL UNIVERSITY SUMMER SCHOOL IN AGRICULTURE, 1913

OFFICERS

Thomas Frederick Crane, Litt.D., Acting President of the University.
Liberty Hyde Bailey, LL.D., Director of the College of Agriculture.
George Prentice Bristol, A.M., Director of the University Summer Session.
David Fletcher Hoy, M.S., Registrar of the University.
Albert Russell Mann, B.S.A., Secretary to the College of Agriculture.

FACULTY

Roy David Anthony, B.S. in Agr., Instructor in Pomology.
Earl Whitney Benjamin, M.S. in Agr., Instructor in Poultry Husbandry.
Bertha Betts, Assistant in Home Economics.
Clara Browning, B.S., Instructor in Home Economics.
Harry Oliver Buckman, M.S.A., Ph.D., Assistant Professor of Soil Technology.
George Walter Cavanaugh, B.S., Professor of Chemistry in its relations with
Agriculture.
Charles Chupp, A.B., Assistant in Plant Pathology.
Anna Botsford Comstock, B.S., Lecturer in Nature Study.
George C. Embody, Ph.D., Assistant Professor of Aquiculture.
Walter Warner Fisk, M.S. in Agr., Instructor in Dairy Industry.
Harry M. Fitzpatrick, A.B., Instructor in Plant Pathology.
Merritt Wesley Harper, M.S., Assistant Professor of Animal Husbandry.
George R. Hill, jr., Ph.D., Research Assistant in Plant Physiology, Missouri
Botanical Gardens.
Charles Edward Hunn, Foreman of Grounds.
Oskar Augustus Johannsen, Ph.D., Assistant Professor of Biology.
Olney Brown Kent, Assistant in Poultry Husbandry.
Millard Alschuler Klein, B.Sc., Assistant in Soil Technology.
Helen Knowlton, A.B., Assistant in Home Economics.
Lewis Knudson, B.S.A., Ph.D., Assistant Professor of Plant Physiology.
Alice Gertrude McCloskey, A.B., Associate in Rural Education.
Thomas Joseph McInerney, M.S. in Agr., Instructor in Dairy Industry.
Edward Gerrard Montgomery, M.A., Professor of Farm Crops.
Walter Mulford, B.S.A., F.E., Professor of Forestry.
Horace Mann Pickerill, B.S. in Agr., Instructor in Dairy Industry.
Frank E. Rice, A.B., Instructor in Agricultural Chemistry.
James Edward Rice, B.S.A., Professor of Poultry Husbandry.
William Albert Riley, Ph.D., Professor of Insect Morphology and Parasitology.
Clarence Arthur Rogers, M.S.A., Assistant Professor of Poultry Husbandry.
Flora Rose, B.S., M.A., Professor of Home Economics.

Harold Ellis Ross, M.S.A., Professor of Dairy Industry.
Elmer Seth Savage, M.S.A., Ph.D., Assistant Professor of Animal Husbandry.
William Alonzo Stocking, jr., M.S.A., Professor of Dairy Industry.
Anna Clegg Stryke, A.B., Artist and Instructor in Entomology.
Hugh Charles Troy, B.S.A., Professor of Dairy Industry.
Edward Mowbray Tuttle, B.S.A., Instructor in Rural Education.
Martha Van Rensselaer, A.B., Professor of Home Economics.
George Frederick Warren, Ph.D., Professor of Farm Management.
Charles Scoon Wilson, A.B., M.S.A., Professor of Pomology.
Paul Work, B.S., A.B., Instructor and Investigator in Olericulture.

OBJECT AND SCOPE OF THE SUMMER SCHOOL IN AGRICULTURE

The primary object of the Summer School in Agriculture is to further agricultural education by aiding those engaged in it. The courses are arranged to meet the needs of the following classes:

(1) Persons who desire to teach agriculture, nature study, and home economics, or who desire to fit themselves to supervise such instruction.

The announcements of the several groups and departments show a wide range of instruction. This instruction is adapted to the needs of teachers who desire to supplement their present knowledge of agriculture or to start in a new field. In addition to the instruction in the classroom, the University Library, the College and departmental libraries, the laboratories, greenhouses, gardens, and farms are available for use.

(2) Persons who desire to pursue investigations in agriculture. Some of the courses are advanced, and therefore suited for specialists who wish to pursue their individual study. The facilities of the College are at the disposal of persons desiring to engage in special investigations.

(3) College students in Cornell and other universities who wish to use part of the summer vacation for additional study. In the case of graduates some of the work may be counted toward an advanced degree. Undergraduates may anticipate work and thereby shorten their course, or may make up existing deficiencies. The conditions for receiving credit, and the amount that may be obtained, are stated on page 9.

(4) Students entering the University who desire to secure surplus credits at entrance, and thereby to shorten their course.

To meet these several needs the courses have been arranged in the following three groups:

I. For teachers and others engaged in elementary school work. In this group is offered lecture, recitation, conference, laboratory, and field work in nature study, elementary agriculture, school gardening, and school methods. While the courses are not restricted to the requirements of the New York State Syllabus for Elementary Schools, these requirements will be included and covered. See pages 12-13.

II. For teachers and others engaged in high school work. In this group will be given the subject matter in agriculture required in high schools and by the State Syllabus, together with special attention to methods of presentation. Conferences are provided for the discussion of classroom problems. The courses are intended especially for those wishing to start in this field and desiring acquaintance with the general field of agriculture. High school teachers having considerable preparation in agriculture may find it more advantageous to take the more specialized courses in Group III; and teachers registering in Group II will have time for some additional work in Groups I and III. See pages 13-14.

III. For teachers desiring specialized instruction, for college students, and for those desiring to pursue investigations. Courses are offered in agri-

cultural chemistry, household chemistry, soils, biology, botany, farm crops, fruit-growing, plant pathology, plant physiology, entomology, forestry, dairy industry, animal husbandry, poultry husbandry, home economics, and meteorology. See pages 14-22.

ADMISSION, ATTENDANCE, REGISTRATION

There is no examination for admission to the Summer School in Agriculture, but applicants should have completed a high school course or the equivalent. Each person must satisfy the instructor in charge of any course that he is qualified to pursue the work of the course. Any duly registered student in the Summer School in Agriculture may visit other classes in this school than those for which he is specifically registered; but admission to the classroom is restricted to students who are duly registered in the Summer School.

All students are required to register first at the office of the University Registrar in Morrill Hall. They may register on Saturday, July 5th, between 9 a.m. and 5 p.m., or on the day of their arrival, if they reach Ithaca later than July 5th. Registration on July 5th is urged. Class exercises begin at 8 a.m., Monday, July 7th. The Registrar's Office is open from 9 a.m. to 4 p.m. every day except Saturday, when it is closed at noon. Students will report at the office of the Secretary, College of Agriculture, Room 122, Main Building, immediately after registering with the Registrar of the University.

Correspondence concerning admission and other matters relating to the Summer School should be addressed to A. R. Mann, Secretary, College of Agriculture, Cornell University, Ithaca, New York.

TUITION FEE

Tuition in the Summer School in Agriculture is free to residents of New York State and to students registered in the Graduate School in Cornell University for postgraduate work in agriculture only. Non-residents will be charged a tuition fee of \$30, whether one subject or more be taken. This must be paid at the office of the Treasurer, Room 1, Morrill Hall, within five days after registration day. In case of withdrawal within five days from the first registration day, for reasons satisfactory to the Treasurer and to the Registrar, the tuition paid may be refunded and the charge cancelled. In case of withdrawal within two weeks after the first registration day, one-half the tuition may be refunded. In case of registration after the first three weeks of the session students must pay two-thirds of the full tuition fee.

LABORATORY FEES

Fees to cover the cost of materials used will be charged in a few courses and are announced in connection with those courses. Fee cards must be procured at the first class-period in each of the courses concerned. The receipted fee cards must be returned to the instructor in charge of the course within five days after the beginning of the course.

ACADEMIC CREDIT FOR WORK

In the College of Agriculture. The requirements for the degree of Bachelor of Science are residence for eight terms (four years), and the completion of one hundred and twenty hours ("points") of elective work. A student who has satisfied the entrance requirements of the College and has afterward completed in two or more summer sessions, either in the Summer School in Agriculture or in the University Summer Session, at least twelve hours of work in courses approved by the departments concerned, may be regarded as having thus satisfied one term of residence. Work done in summer sessions shall not be accepted as the equivalent of more than two terms of residence. The maximum amount of credit toward the degree of Bachelor of Science that is allowed for the work of any one summer session is seven hours.

In the Graduate School. Graduate work at Cornell University is not expressed in terms of courses or hours. A graduate of any college whose requirements for a first degree are substantially equivalent to those for the first degree at Cornell may be admitted to resident study in the Graduate School. He may be admitted to candidacy for an advanced degree upon the recommendation of the professors under whom he proposes to work. The conferring of the degree itself does not depend primarily on the completion of any prescribed number of courses or of a fixed term of residence. It involves the writing of a thesis and the passing of a special final examination. The minimum period of residence for the Master's degree is one academic year or its equivalent, and for the Doctor's degree three years.

Not all work done by a graduate student is graduate work in the strict sense of the term. Graduate work, in order to be considered as work for a degree, must be of advanced character in some field or department of knowledge.

Graduate work toward an advanced degree may be done during the Summer School under the following conditions: It must be done under the direction of a member of the Faculty of the Graduate School, after the student has entered the Graduate School, and is admitted by the Dean of the School as a candidate for an advanced degree. The residence requirement for the Master's degree may be satisfied by study during five sessions of the Summer School, or by study during one-half the academic year and in three sessions of the Summer School.

The graduate work offered in the summer of 1913 may be learned from the departmental announcements. Not all departments offer graduate work.

Any person wishing to become a candidate for an advanced degree and to study during the Summer School should write to the professor whose work he expects to take, and also to the Dean of the Graduate School, asking for a blank form of application for admission to the Graduate School. It is much better to make these arrangements before coming to Ithaca, thus avoiding delay and interruption of study after the Summer School has begun.

Certificates for work. Students in the Summer School who are not matriculated in the University may receive certificates of attendance and of work satisfactorily performed. Application for such certificate must be made before August 15th, and the applicant must leave at the office of the University Registrar a large envelope stamped and bearing his home address. The certificate will then be forwarded by mail.

COST OF LIVING

The cost of board and furnished room in Ithaca during the Summer School runs from \$5.50 a week upward. In some cases the cost has been reduced to \$5, or even \$4.50, but it is not safe to count on less than \$5.

The price of a single furnished room may be as low as \$1 a week. The prices advance with the size and location of the rooms.

Rooms are engaged with the understanding that they will be occupied for the entire session, unless otherwise agreed on by both parties. Table board is usually engaged by the week, or, if so stated, by the day.

The price of table board runs from \$4 and \$4.50 in boarding houses, to \$7 and \$10 at the hotels.

The University has one residence hall, the Sage College. This will, as heretofore, be opened for women throughout the Summer School. As the great majority of the persons living in this building are attending the University for serious work, it is necessary that the rooms and halls should be quiet during the hours of rest. Persons unwilling to conform to reasonable regulations for securing this quiet are not wanted in the building. The price of rooms in Sage College is \$1.25 to \$5.50 a week, according to location, and the price of table board is \$5. The capacity of the building is usually engaged in advance, and early application is therefore advisable.

Application should be made to the Manager of Sage College, Ithaca, New York. Every application for a room to be reserved must be accompanied by a deposit of \$5, otherwise the application is not registered. The amount of this deposit is deducted from the rent if the room assigned be occupied by the applicant; it may be refunded if the applicant gives formal notice to the manager on or before June 15th that she desires for good reasons to withdraw the application altogether.

Without permission from the Director of the University Summer Session no one will be allowed to room in Sage College during the summer unless registered in the Summer School in Agriculture or the University Summer Session. Persons desiring assistance in engaging comfortable rooming and boarding places outside of Sage College will, on application to the Secretary, College of Agriculture, after June 15th, be furnished with a list of approved places.

The whole expense of attendance at the Summer School, not including laboratory fees, may be estimated at \$65 to \$85.

THE LIBRARIES

The University Library is open on week days from 9 a.m. to 10 p.m., except Saturday, when it closes at 1 p.m. In this are housed the main library, containing about four hundred thousand volumes, and most of the seminary and special libraries. The main reading room affords accommodations for over two hundred readers and contains a selected library of over eight thousand volumes of reference works. Adjacent to it is the periodical room, in which are kept the current numbers of about five hundred journals in various fields of knowledge. These rooms are open to all students. Students properly qualified are allowed the use of the seminary rooms and of the books in them. The main collection is primarily a library of reference for use in the building. Students are allowed, however,

to a limited extent to take out books for home use. Persons wishing this privilege must make a deposit of \$5, which will be refunded on the return of all books taken out.

The Library of the College of Agriculture, on the first floor of the main building, is open on week days from 9 a.m. to 5 p.m., except Saturday, when it closes at 1 p.m. In it will be found a large collection of bulletins and reports of experiment stations, reference books on agriculture and country life, agricultural periodicals, and the like. The entomological library, housed in the Department of Entomology on the fourth floor of the main building, is one of the most complete of its kind in the United States. Nearly all the departments in which instruction is given have well-selected departmental libraries.

LECTURES, MUSICAL RECITALS, EXCURSIONS

In addition to the regular classroom work there will be public lectures on topics of general interest on Monday evenings. Besides these there are weekly lectures of general interest in connection with the various departments. Notice of these will be given in the University Calendar each week.

Musical recitals will be given on Tuesday and Thursday evenings in the Sage Chapel.

On Wednesday evenings special lectures on agricultural or country-life subjects, or informal assemblies of all students registered in the Summer School in Agriculture, will be arranged. Notice of these will be given from week to week.

In connection with the work of several departments, excursions are made to points of interest. Most of these are open to members of the Summer School. Notice of them is given from week to week.

An informal reception of all summer students will be held on some evening at the beginning of the summer session. This, it is hoped, will assist students in the Summer Session and the Summer School in becoming acquainted with the members of the staff of instruction and with one another.

THE CITY AND THE UNIVERSITY

Ithaca is situated in Tompkins County at the head of Cayuga Lake. It is a city of about fifteen thousand inhabitants. Cornell University stands on a plateau about four hundred feet above the lake. The officers of instruction and administration of the University number about 700. The campus and farms cover nearly 1200 acres.

The main buildings of the University are over thirty in number, providing quarters for the several colleges of the University. These are the Graduate School and the colleges of Arts and Sciences, Law, Medicine, Agriculture, Veterinary Medicine, Architecture, Civil Engineering, and Mechanical Engineering.

The New York State College of Agriculture at Cornell University occupies new buildings erected by the State. These buildings are large and well equipped, and afford an attractive and comfortable home for the College.

RAILROAD ROUTES AND RATES

Ithaca is reached by either the Lehigh Valley or the Lackawanna Railroad. A branch of the latter leaves the main line at Owego. Through trains run

from New York and Buffalo on the Lehigh, and through sleeping cars run daily from New York on both roads. From Philadelphia, Baltimore, Washington, and the South, via the Baltimore & Ohio, the Philadelphia & Reading connects with the Lehigh at Bethlehem. On the Lehigh, through trains for Ithaca connect with the New York Central at Auburn, and with the Pennsylvania (Northern Central) and the Erie at Elmira.

From nearly all important points in the Middle and Atlantic Coast States summer excursion tickets may be purchased to Ithaca. From Central and Western States it is generally possible to buy excursion tickets to Niagara Falls, in case an excursion rate to Ithaca is not available.

At the time this pamphlet goes to press it is not possible to give specific rates. Persons interested should, some time in advance of their departure, make inquiry of the railroad agent at their home town. If full information cannot be obtained in this way, inquiries may be addressed to the Secretary of the College of Agriculture.

COURSES OF INSTRUCTION

The courses of instruction have been arranged in the following three groups as a matter of convenience and to serve in some measure as a guide to students in arranging schedules of studies best adapted to their individual needs. Students may elect from any or all of the groups courses that they are qualified to pursue.

GROUP I. COURSES PRIMARILY FOR TEACHERS IN ELEMENTARY SCHOOLS

The following courses are designed particularly to meet the needs of teachers and supervisors of nature study, school gardening, and agriculture in the grades:

A. General Nature Study. Credit, two hours. Lectures, M W, 9. Main 302. Field and laboratory observations, T Th S, 10-12.30. Main 302. Mrs. COMSTOCK and Assistant Professor EMBODY.

The field and laboratory work will include individual observations concerning the life-histories and habits of various types of wild and domesticated animals and plants. Special attention will be given to the honeybee and other garden insects, together with their relations to the common garden plants.

The lectures, in addition to supplementing and elucidating the field and laboratory work, will present methods for the construction and maintenance of breeding-cages and aquaria, and the literature of nature study.

B. Natural History of the Farm. Credit, one hour. Lecture, F, 9. Dairy 222. Field work, sec. A, T Th, 2-5; sec. B, W F, 2-5. Assistant Professor EMBODY.

This is primarily a field course, treating principally of the wild inhabitants of the fields, woods, marshes, and streams of the farm. Wild organisms will be compared with domesticated or cultivated ones and the availability of certain wild forms for cultivation will be pointed out.

The following topics, among others, will be studied: wild fruits, wild roots, wild cereals, deciduous trees, evergreens, pasture plants and their fitness for

pasture conditions, wild birds, wild mammals, and fishes and other inhabitants of the farm stream.

Each student will be required to do a considerable part of the work individually. Field reports must be handed in weekly and these will be carefully graded.

C. Agriculture for Elementary Schools. Credit, two hours. Open to teachers; other persons must obtain special permission before registering for the course. Lectures, T Th, 9. Poultry Auditorium 375. Laboratory, M W, 10-12.30. Seminar, F, 10-12.30. Farm Management Laboratory, Poultry Building. Professor WARREN, Mr. ———, and Mr. ———.

Lectures, laboratory practice, and discussions on subject matter of agriculture for elementary schools, methods of teaching, and correlation of agriculture with other subjects.

D. The School Garden. Credit, one hour. Lectures, M W, 9. Conference, F, 9. Rural Schoolhouse. Miss McCLOSKEY and Mr. HUNN.

This course is designed for teachers in elementary grades. Some of the educational possibilities in gardening will be presented and methods given for conducting the work in rural, village, and city schools. There will be discussions of garden plans and methods in connection with a garden prepared for the demonstration of desirable school work in this subject. Home gardens, experimental gardens, window boxes, and simple plant study will be considered.

E. Practical Gardening for Teachers. Credit, one hour. Lecture, F, 8. Main 232. Laboratory, F, 2-4.30, S, 8-10.30. Main 232 and the field. Mr. WORK and Mr. HUNN.

Lectures, laboratories, and conferences dealing with the school garden. The site, the equipment, the soil and its improvement, planning the garden, seed and seed sowing, other methods of plant propagation, plants and plant growing, transplanting, cultivating, watering, pests and pest control, harvesting. The plants of the garden, their habits, requirements, and culture. In the laboratory work, attention will be given to methods of teaching garden operations as well as to the operations themselves.

F. The School. Credit, two hours. Lectures and conferences, daily except S, 8; repeated, daily except S, 11, if registration requires it. Rural Schoolhouse. Miss McCLOSKEY and Mr. TUTTLE.

This course will suggest methods of instruction in elementary agriculture and nature study, taking as a basis the work outlined in the New York State Syllabus for 1913-14. Simple apparatus to be used in teaching country-life subjects will be shown and discussed. Other subjects for lectures and discussions will be as follows: field work; natural history collections; neighborhood studies; the school and the home; agricultural contests; the county fair; small school exhibits; additions to the school library; the school grounds; Arbor Day; Corn Day; and similar topics of interest to grade teachers, training-class teachers, district superintendents, and all persons interested in introducing country-life subjects into schools.

GROUP II. COURSES PRIMARILY FOR TEACHERS IN HIGH SCHOOLS

In this group are given general introductory courses for persons desiring to engage in the teaching of agriculture in the high school. More advanced and

specialized courses are offered in Group III; but it is recommended that persons having little knowledge of agriculture take courses in Group II the first year. Persons taking any of the courses in this group may elect additional courses from either Group I or Group III.

B. Agriculture for High Schools. Credit, three hours. Open to teachers; other persons must obtain special permission before registering. Lectures, M W F, 9. Poultry Auditorium 375. Laboratory and seminar, sec. A, daily except S, 2-4.30; sec. B, daily except S, 2-4.30. A third section will be formed if necessary. Farm Management Laboratory, Poultry Building. One of the laboratory periods each week will be a seminar. Professor WARREN, Mr. ———, and Mr. ———.

Lectures, laboratory practice, and discussions on agriculture for high schools. Four of the laboratory periods will ordinarily be devoted to the study of some of the more important principles of agriculture. One laboratory period will be devoted to a seminar for discussion of problems that arise in teaching agriculture. Throughout the course, methods of instruction will be considered along with subject matter.

Owing to the fact that there will be some duplication of work for which credit has already been received, juniors and seniors in the College of Agriculture who complete the work of this course will be given only two hours credit.

A. General Biology. See page 15.

A. Structural and Physiological Botany. See page 20.

B. Identification of Mushrooms and Disease-Inducing Fungi. See page 20.

B. Dairy Industry. See page 16.

B. Forests and Forestry. See page 17.

A. General Fruit-Growing. See page 20.

C. Soils. See page 22.

Home Economics. See page 18.

Education. The following courses in education, description of which will be found in the announcement of the University Summer Session, are open to students registered in the Summer School in Agriculture on the payment of thirty dollars tuition charge: A, Principles of Education; B, History of Education; C, Educational Psychology; E, Mental and Physical Tests of School Children; F, Elementary Education; G, School Organization, Administration, Supervision, and Management; H, Industrial Education.

GROUP III. SPECIALIZED COLLEGE COURSES

ANIMAL HUSBANDRY

A. Principles and Practice of Feeding Animals. Credit, two hours. Lectures, M W F, 10. Practice, T Th, 10-12.30. Animal Husbandry Building. Assistant Professor SAVAGE.

The general principles of animal nutrition, based on Jordan's Principles of Human Nutrition as a text. The discussion of these principles will occupy most of the time given to lectures. The practice of feeding animals, based on Henry's Feeds and Feeding as a text. The discussion of the practice of feeding horses, cattle, sheep, and swine will occupy most of the time given to laboratory

work; the study of feeding standards; the study of about forty home-grown and commercial feeds; the formulation of rations, etc.

B. Principles of Animal Breeding, and Elementary Judging. Credit, three hours. Lectures, daily except S, 9. Laboratory, T Th, 2-4.30. Animal Husbandry Building. Assistant Professor HARPER.

A general discussion of the principles of heredity as applied to the breeding of animals, with a study of animal form; origin and formation of breeds; crossing and grading, with an outline of the methods of registration and the study of records and pedigrees. Demonstrations, essays, and reports will be required in addition to the lectures.

The laboratory work will give actual contact with animals, and methods of scoring and judging. Types and several breeds, particularly of dairy cattle, will be illustrated.

BIOLOGY

A. General Biology. Credit, three hours. Lectures, daily except S, 11, Main 392. Laboratory and field work, sec. A, M W F, 2-4.30; sec. B, T Th, 2-4.30, S, 8-10.30. Main 302. Assistant Professor JOHANNSEN and Mr. ———.

This is an elementary course designed to acquaint the general student and the prospective teacher with the principal ideas of biology through selected practical studies of the phenomena on which biological principles are based. The chief types of both the plant and animal series are studied in logical sequence, particular attention being paid in both lecture and laboratory to such topics as the interdependence of organisms, the simpler organisms, organization and phylogeny, heredity and variation, natural selection and adaptation, segregation and mutation, the life cycle, metamorphosis and regeneration, and the responsive life of organisms. Laboratory fee, \$2.50.

CHEMISTRY

A. Agricultural Chemistry. Credit, three hours. Prerequisite Chemistry 1, or its equivalent. Lectures, daily except S, 8. Morse Lecture Room 1. Recitations, M W F, 9. Morse Hall. Professor CAVANAUGH.

A general course treating of the relations of chemistry to agriculture. The following are among the subjects discussed: the chemical composition of agricultural plants and plant by-products; the chemical composition of soils; some chemical relations between the organic and the inorganic matter of soils; the sources, preparation, and manufacture of the materials used in fertilizers; the chemical relations of lime to soils; the chemistry of insecticides and fungicides.

B. Agricultural Chemistry. Credit, one or two hours. Prerequisite Chemistry 1 and 6, or the equivalent. By appointment, daily except S, 9-12 and 2-5. Quantitative Laboratory, Morse Hall. Professor CAVANAUGH and Mr. RICE.

A laboratory course designed to accompany course A. Laboratory deposit, \$10 or \$15, according to work taken.

C. Household Chemistry. Credit, two hours. Prerequisite Chemistry 1 and 6, or the equivalent. Lectures, daily except S, 10. Morse Lecture Room 3. Professor CAVANAUGH.

This course is designed especially for students in home economics. It treats of the chemistry of foods, beverages, baking chemicals, preservatives, and detergents.

D. Household Chemistry, Laboratory Course. Credit, two or three hours. By appointment, daily except S, 8-10 and 2-5. Quantitative Laboratory, Morse Hall. Professor CAVANAUGH and Mr. RICE.

This course is designed to accompany course C.

DAIRY INDUSTRY

A. Milk Composition and Tests. Credit, two hours. Lectures, M W F, 8. Dairy 222. Laboratory, M W F, 2-4.30. Dairy 232. Professor TROY and Mr. McINERNEY.

This is equivalent to course 1 of the regular university course. The topics considered are the secretion and composition of milk, sampling, the use of the lactometer, the Babcock test for fat in milk, cream, and other dairy products, acid tests, moisture test, salt test, tests for preservatives and adulterations. Laboratory deposit (\$3) part returnable.

B. Dairy Industry. Five hours. No university credit. Lectures, T Th, 8. Dairy 222. Laboratory, M W F, 10-1. Dairy 122. Professors STOCKING and ROSS; Messrs. FISK, McINERNEY, and PICKERILL.

This is a general course in dairy work covering the outline as given in the State Syllabus. This course should be of value to teachers of dairy work in high schools. The course includes lectures and laboratory work on the following topics: nature of bacteria and their relation to dairy products; sources of bacterial contamination of milk and methods of prevention; pasteurization; use of bacteria starters; the Babcock test for fat in milk and milk products; the lactometer and its use; acid test; sampling; composition of milk; milk preservatives and adulterations; standardization of milk; use of score cards for dairy farms and dairy products; dairy buildings, equipment, and utensils; handling of market milk; action of rennet; making of cottage cheese. Laboratory deposit (\$3) part returnable.

ENTOMOLOGY

The following courses will be continued throughout the six weeks of the Summer School. Students qualified to do advanced work will be granted the facilities of the laboratories, field stations, and library, after the close of the regular session. Members of the staff in residence during this period will be glad to consult with and aid such students.

Laboratory fees, will be charged in these courses, varying with the nature of materials required, from \$.50 to \$1.50 per hour of academic credit.

A. General Entomology. Credit, two or more hours. Lectures, daily except S, 9. Main 392. Laboratory and field work, to the extent of one or more hours, may be elected in course B. Hours by appointment. Main 391. Miss STRYKE.

An introductory course dealing with the biology, habits, economic importance, and relationships of insects.

B. Laboratory Course in the Morphology and Classification of Insects. Credit, two or more hours. Laboratory open daily except S, 8-5. Main 391. Professor W. A. RILEY and Miss STRYKE.

Study of the external anatomy of typical insect forms; the collecting, mounting, and classifying of representatives of all the orders and the chief families of insects. While the systematic work will give a general survey of the field, each student may direct his energies toward the collecting of any group in which he is particularly interested.

C. Morphology and Development of Insects. Credit, two hours. Lectures, daily except S, 8. Main 392. Professor W. A. RILEY.

A lecture course designed for advanced students in entomology and those specializing in zoology.

D. Insects and Diseases. Credit, one hour. Lectures and demonstrations, M W F, 12. Main 392. Professor W. A. RILEY.

A consideration of insects and their allies as the cause, and more especially, as the conveyors and disseminators of diseases of man and the higher animals. The object of the course is to afford a general survey of the field and to put the student in touch with the discoveries and theories which in very recent years have become important factors in the fight for public health and in the case of certain diseases have completely revolutionized the methods of control. There will be abundant opportunity for laboratory work for those desiring special study along these lines.

E. Research. Opportunities will be offered for advanced work and research in various phases of entomology. Properly qualified students registered as candidates for advanced degrees may elect thesis work under any member of the Department who is in residence during the summer.

Seminary. The work of an entomological seminary is conducted by the Jugatae, an entomological club that meets for the discussion of current literature and of the results of investigations.

FARM CROPS

A. Farm Crops. Credit, three hours. Lectures, daily, 10. Laboratory, M W, 2-4.30. Agronomy 202. Professor MONTGOMERY and Mr. ———.

A course covering the principal cereal and forage crops. The subject matter presented will be selected especially to meet the needs of teachers of agriculture in high schools. Laboratory fee, \$2.

FORESTRY

A. Care of the Woodlot. Credit, two hours. Lectures, M W F, 9. Home Economics Building 100. Field work, M W, 2-4.30. Home Economics Building 370. Professor MULFORD.

A course dealing with the woodlot as deserving and repaying proper care such as is given the other crops on the farm. Topics to be considered include forest planting, sowing, and nursery work; reproducing the forest without planting or sowing; care of the crop during growth, including thinning, protection from fire and other enemies; measuring the amount of timber in the woodlot. Laboratory fee, \$.50.

B. Forests and Forestry. Credit, two hours. Lectures, M W F, 8. Home Economics Building 100. Seminar, T, 8. Home Economics Building 370. Field work, F, 2-4.30. Home Economics Building 370. Professor MULFORD.

A course designed primarily for teachers. The topics to be considered will include the aims and general methods of forestry; the usefulness of forests to the nation, including the influence exerted by forests on climate and stream-flow; brief description of the principal forest regions of the United States; the life-history of a forest; identification of the common trees occurring in the north-eastern United States; what is being done in forestry by the nation, by states, and by other agents; forestry in Europe. Laboratory fee, \$.50.

HOME ECONOMICS

The work is intended for persons desiring to teach, but is suited to others desiring to study the principles of home-making.

A. Foods. Credit, four hours. Lectures and recitations, daily except S, 11. Home Economics Building 100. Laboratory practice, daily except S, 2-5. Home Economics Laboratory 200. Written review for those wishing credit in this course, S, 11. Miss BROWNING, Miss KNOWLTON, and Miss BETTS.

A course for establishing a fundamental knowledge of foods. The lectures will include a discussion of the sources, composition, and characteristics of food-stuffs; principles governing the selection of foods and methods of preparing them; food preparation and preservation; table-setting and serving; comparative nutritive values and costs of various foods. The laboratory work will follow the lectures closely and will consist of experiments in determining the characteristics of foodstuffs as these relate to the preparation of food and to practical problems of cookery. Laboratory fee, \$5.

B. Human Nutrition. Credit, three hours. Lectures and recitations, daily except S, 12. Home Economics Building 100. Laboratory practice, M W F, 2-5. Home Economics Laboratory 300. Written review for those wishing credit in the course, S, 12. Professor ROSE and Miss BROWNING.

This course will include discussion of the fundamental principles of nutrition as these apply to the human being; the practical means of applying scientific principles in planning dietaries; special problems of nutrition, as the feeding of infants. The laboratory work will consist of exercises in determining the comparative cost and nutritive value of various foods; in planning and judging various types of dietaries; in preparing typical meals. Open only to students who have had course A or its equivalent. Laboratory fee, \$4.

C. Household Management. Credit, two hours. Lectures, M W F, 8. Home Economics Building 105. Laboratory, T Th, 8-11. Home Economics Laboratory 400. Written review for those desiring credit in the course, S, 8. Professor VAN RENSSLAER.

The course is both theoretical and practical. Lectures will be division of income, household accounts, factors in cost of living from the housekeeper's standpoint, domestic service, household equipment, and labor-saving. Laboratory practice will consist of experimental work in cleaning, use of equipment, and general management of the house. Laboratory fee, \$1.

D. Household Sanitation. Credit, one hour. Lectures and recitations, M W F, 10. Home Economics Building 100. Miss KNOWLTON.

Household bacteriology; cleanliness of soil, air, water, food; disposal of waste; insect pests, infection, immunity, methods of disinfection; good house-keeping in relation to public health; healthful living to promote efficiency; physical exercise and rest.

E. Extension in Home Economics. Credit, one hour. Lectures and laboratory, T Th, 2-5. Home Economics Building 250. Professor VAN RENSSLAER.

Principles of extension work with special reference to rural communities; organization; material to be presented; manner of presentation; speaking; writing. Practice problems in rural communities. Laboratory fee, \$2.

F. Sewing and Millinery. Credit, four hours. Lectures, daily except S, 10. Home Economics Building 305. Laboratory practice, daily except S, 8-10. Home Economics Laboratory 300.

A course designed for those who are to teach in the public schools. It involves a study of the economic standards for the production and selection of clothing; hygiene of clothing; principles of art in relation to dress; instruction in drafting, cutting, and plain and machine sewing. Laboratory fee (\$5), part returnable.

G. School Methods in Home Economics. Credit, one hour. Lectures and conferences, M W F, 9. Home Economics Building 105. Professors VAN RENSSLAER and ROSE; and Miss BROWNING.

Relation of home economics to education; place of home economics in the school curriculum; preparation for teaching; relation of home economics to physical and social sciences; art; literature of home economics; method of presentation; equipment; relation to life of the community.

Household Chemistry. See page 15.

METEOROLOGY AND CLIMATOLOGY

A. Meteorology and Climatology. Credit, one hour. Lectures and field observations, M W F, 11. Geological Lecture Room. Professor W. M. WILSON.

This course is designed to meet the needs of teachers of physical geography and other persons desiring a general knowledge of the subject. The course will offer suggestions as to subjects of meteorological study that come within the scope of facilities afforded by public schools, and where and how meteorological and climatological data may be obtained for school use; acquaint the student with the general circulation of the atmosphere; the development, progression, and conditions that attend cyclones, hurricanes, tornadoes, and special storms; the construction of weather maps and climatological charts; practical weather forecasting from weather maps and from local observations; use and care of meteorological instruments; general and special climatology and its relation to agriculture. Special attention will be given to the practical application of the principles of meteorology as exemplified by the work of the United States Weather Bureau and other similar organizations.

PLANT PATHOLOGY

A. Plant Pathology. Credit, three hours. Prerequisite elementary botany 5 or 6 hours. Recitations or lectures, M W F, 8. Agronomy 192. Laboratory, daily except S, 2-4.30. Agronomy 152. Dr. FITZPATRICK and Mr. CHUPP.

A fundamental course in plant pathology treating of the common diseases of cultivated plants; their nature, cause, and control. It is a prerequisite for all other courses in plant pathology. Laboratory fee, \$4.50, plus a breakage deposit of \$2.

B. Identification of Mushrooms and Disease-Inducing Fungi. Credit, one hour. Lecture, T, 8. Agronomy 302. Laboratory, T Th, 9-12. Agronomy 152. Dr. FITZPATRICK and Mr. CHUPP.

Especially designed for teachers who desire a working knowledge of the common mushrooms and disease-inducing fungi that occur in this region. This work will consist very largely of collecting trips for a part of the morning, followed by laboratory study and identification of the material collected. Teachers will find the facts and material thus collected of special service in nature study teaching and in the teaching of agriculture in high schools. Laboratory fee, \$1.50, plus a breakage deposit of \$2.

PLANT PHYSIOLOGY

A. Structural and Physiological Botany. Credit, two hours. Lectures, M W, 10. Agronomy 192. Laboratory, T Th S, 10-12.30. Agronomy 21. Assistant Professor KNUDSON and Dr. HILL.

A course primarily for teachers of agriculture. It will consider the external and internal structure of plants in relation to function. The topics include, among others, absorption, conduction, water loss, mineral nutrition, synthesis of food, digestion, respiration, growth and reproduction, and the organs and tissues concerned in the processes. Laboratory fee, \$3.

B. General Plant Physiology. Credit, four hours. Prerequisite all freshman work or its equivalent, and general botany. Lectures, daily except S, 9. Agronomy 192. Laboratory, daily except S, 10-12.30. Agronomy 21. Assistant Professor KNUDSON and Dr. HILL.

Lectures, recitations, laboratory work, reports, and occasional field studies. Topics include absorption, conduction, transpiration, metabolism, relation to environment, growth, reproduction, and propagative processes. Laboratory fee, \$5.

C. Special Problems in Plant Physiology. Special work in certain phases of physiology, including ecology and fermentation. Admission to work, and hours arranged only by appointment. Assistant Professor KNUDSON.

POMOLOGY

A. General Fruit-Growing. Credit, three hours. Prerequisite Botany 1 and 2, or the equivalent. Lectures, daily except S, 11. Recitations, T Th, 9. Main 292. Laboratory, S, 8-10.30. Main 202. Professor WILSON and Mr. ANTHONY.

A study of the methods of propagation and early care of commercial fruits, including the growing of seedlings, cuttings, and layers; the principles of budding, grafting, pruning, and planting; the soils, varieties, and planting plans for the orchard; the cultivation, cover-crops, fertilization, spraying, pruning, and thinning, as practiced in orchard management; the picking, grading, packing, storing, and marketing of fruit. This course considers the apple, pear, quince, cherry, plum, apricot, peach, and the nuts.

B. Small Fruits. Credit, one hour. Lectures, M W, 9. Recitation, F, 9. Main 292. Professor WILSON.

A course which considers the grape, raspberry, blackberry, dewberry, currant, gooseberry, and strawberry. The topics discussed are soils, varieties, propagation, planting, culture, picking, grading, packing, and marketing.

C. Advanced Pomology. Credit, one hour. Prerequisite Botany I and 2 and Pomology A, or the equivalent. Lectures, T Th, 10. Main 292. Laboratory, T, 2-4.30. Main 202. Mr. ANTHONY.

The course includes a comprehensive study of varieties; the judging of fruits; the preparation of planting and working plans; a study of the characters and botanical relationships of the fruits of the United States. Each student is required to collect and mount a number of varieties and species. A trip to Geneva will occupy one afternoon or a Saturday sometime during the course.

POULTRY HUSBANDRY

A. Poultry Care and Management. Credit, two hours. Lectures, daily except S, 12. Poultry Auditorium 375. Professor RICE.

Subjects to be discussed at the lectures include incubating and brooding, principles of poultry-breeding, the selection and business organization of the poultry farm.

B. Feeding Poultry. Credit, one hour. Lectures, M W, 10. Poultry Auditorium 375. Laboratory, M or W, 2-4.30. Poultry Laboratory 300. Professor RICE and Mr. KENT.

Subjects discussed at the lectures are anatomy, physiology of reproduction and digestion, principles and practice of feeding for egg-production, fattening, and rearing. The subjects to be presented in laboratories are anatomy of poultry, study of the egg, study of feeds, making rations, etc. Laboratory fee, \$1.

C. The Breeds, Judging, and Poultry-House Construction. Credit, one hour. Lectures, T Th, 10. Poultry Auditorium 375. Laboratory, T or Th, 2-4.30. Poultry Laboratory 300. Assistant Professor ROGERS and Mr. KENT.

A discussion of the general characteristics of the breeds of poultry; nomenclature; types; feather markings; judging for constitutional vigor, utility, and standard points; principles of poultry-house construction and design; building materials; building construction; laying out foundations; concrete construction; estimates; visits to poultry buildings.

D. Marketing Poultry and Poultry Products. Credit, one hour. Lectures, F, 10, S, 9. Poultry Auditorium 375. Laboratory, F, 2-4.30, or S, 10.30-1. Poultry Laboratory 300. Mr. BENJAMIN and Mr. KENT.

The subjects discussed at the lectures and applied at the laboratories are: cleaning, testing, grading, packing, and marketing eggs; killing, picking, packing, and marketing poultry; judging eggs and dressed poultry; preservation and storage of eggs and poultry; preparation of poultry for the table, including shap-
ing, drawing, trussing, deboning, and carving.

SOIL TECHNOLOGY

A. Principles of Soil Management. Credit, three hours. Prerequisite Chemistry 1 and Geology 1, or the equivalent. Lectures, daily except S, 12. Main 292. Laboratory, M W F, 2-4.30, or T Th, 2-4.30, and S, 8-10.30. Before choosing laboratory periods, Assistant Professor BUCKMAN must be consulted. Agronomy 42. Assistant Professor BUCKMAN and Mr. KLEIN.

A comprehensive course in soils, dealing with their fundamental physical, chemical, and biological properties. Particular attention is given to soil management in relation to crop production. The laboratory is supplemented and correlated with the lecture work by demonstrations and short lectures. Laboratory deposit, \$3.

B. Manures and Fertilizers. Credit, one hour. Prerequisite Soils 1 and Chemistry 85. Lectures, M W F, 8. Main 292. Assistant Professor BUCKMAN and Mr. KLEIN.

This course deals with the composition, handling, and use of barnyard and green manures, and the utilization of commercial fertilizers and soil amendments. A brief study of experimental work will be a phase of the lectures.

C. Soils. Three hours. No university credit. Lectures, T Th, 9. Round-table for discussion and demonstration, S, 9. Auditorium, Main Building. Assistant Professor BUCKMAN and Mr. KLEIN.

A practical, fundamental course in soils. The subject will be handled with special reference to the needs of those expecting to teach soils in secondary schools. The lectures will include a discussion of the formation and classification of soils, tilth, soil moisture, soil biology, soil amendments, manures and fertilizers, and practical soil management. The round-table once a week will give opportunity for questions and practical discussions as to methods of demonstration.

SCHOOL FOR LEADERSHIP IN COUNTRY LIFE

To be held at the New York State College of Agriculture, June 24 to July 4, 1913, inclusive.

A training school in rural social science open to all persons who are interested, and more especially to those who occupy positions of leadership and influence in the open country. Special invitation is given to rural school principals and teachers, rural pastors, secretaries of rural Young Men's and Young Women's Christian Associations, officers of men's brotherhoods, boy scout masters, editors, officers of granges, institute lecturers, and other active rural workers.

The courses are graded to meet the needs of former attendants on the School for Leadership and other persons having some preparation in this field.

(1) **Forenoon periods.** (a) For first-year students courses are offered in the rural mind; the study of human nature; the psychology of leadership; rural economic conditions; economic ideals of the countryman; principles of rural sociology; rural social conditions; and a special course in leadership for the farm woman and the farm girl.

(b) The second-year courses include a study of business organization and co-operation; economic thrift and wastefulness of the farmer and of rural social institutions; social function of rural institutions; cooperation and federation of rural social agencies; the pedagogy of leadership; group organization; rural health; rural play and recreation; rural personal ideals; the rural family; the farm woman; the rural survey; the community program; education extension work in agriculture.

(2) **The afternoon periods** are free from required work. Definite provision is made for play and games, field trips, tramps, inspection of campus, college, and farms, etc. Opportunity is provided for demonstrations in rural recreation, for informal group conferences, personal consultation with members of the staff, and the like. The members of the staff are available for consultation at all times during the School.

(3) **The evening periods** combine entertainment features with illustrated addresses on leading country-life questions and institutions.

Exhibits are a special feature; exhibits to illustrate the subject matter of the courses and other matters of general interest, as types of bulletins, reading and correspondence courses, farm journals, book-shelf, rural recreation equipment, survey forms, and the like.

Expenses. There is no registration fee. Persons in attendance will pay their own traveling and entertainment expenses.

Information. For complete programs and detailed information concerning the conference and arrangements for living, while at Ithaca, address A. R. Mann, Secretary, College of Agriculture, Cornell University, Ithaca, New York.

OFFICIAL PUBLICATIONS OF CORNELL UNIVERSITY

Issued at Ithaca, N. Y., monthly from July to November inclusive, and semi-monthly from December to June inclusive.

[Entered as second-class matter, August 31, 1910, at the post office at Ithaca, N. Y., under the Act of July 16, 1894.]

These publications include

Catalogue Number (containing lists of officers and students), price 25 cents,
Book of Views, price 25 cents,

Directory of Faculty and Students, Second Term, 1912-13, price 10 cents,
and the following informational publications, any one of which will be
sent gratis and post-free on request. The date of the last edition of
each publication is given after the title.

General Circular of Information for Prospective Students, December 15, 1912.

Announcement of the College of Arts and Sciences, June 15, 1912.

Announcement of the Sibley College of Mechanical Engineering and the
Mechanic Arts, January 1, 1913.

Announcement of the College of Civil Engineering, February 15, 1913.

Announcement of the College of Law, May 15, 1912.

Announcement of the College of Architecture, March 15, 1912.

Announcement of the New York State College of Agriculture, August 1,
1912.

Announcement of the Winter Courses in the College of Agriculture, Septem-
ber 1, 1912.

Announcement of the Summer School in Agriculture, July 1, 1912.

Announcement of the New York State Veterinary College, March 1, 1913.

Announcement of the Graduate School, January 15, 1913.

Announcement of the Summer Session, March 15, 1913.

Announcement of the Department of Forestry, November 1, 1912.

Annual Report of the President, December 1, 1912.

Pamphlets on scholarships, fellowships, and prizes, samples of entrance and
scholarship examination papers, special departmental announcements, etc.

Correspondence concerning the publications of the University should be
addressed to

The Secretary of Cornell University,
Ithaca, New York.