

# OFFICIAL PUBLICATIONS OF CORNELL UNIVERSITY

VOLUME III

NUMBER 14

## NEW YORK STATE COLLEGE OF AGRICULTURE ANNOUNCEMENT 1912-13

AUGUST 1, 1912  
PUBLISHED BY CORNELL UNIVERSITY  
ITHACA, N. Y.

## CALENDAR

### First Term, 1912-13

Sept. 13,	Friday,	University entrance examinations begin.
Sept. 23,	Monday,	Academic year begins. Registration of new students.
		All special students in the College of Agriculture must first present themselves at the Office of the Secretary, Main Building 122, unless permission to register has previously been sent to them by the Registrar.
Sept. 24,	Tuesday,	Registration of new students.
Sept. 25,	Wednesday,	Registration of old students.
Sept. 26,	Thursday,	Instruction begins. President's annual address to the students, 12 m.
Sept. 28,	Saturday,	Registration, Graduate School.
Oct. 15,	Tuesday,	Last day for payment of tuition.
Nov. 19,	Tuesday,	Registration for the Winter Courses, beginning at 8 a. m. at the Office of the Secretary.
Nov. 20,	Wednesday,	Instruction begins in the Winter Courses.
Nov.	Thursday-Friday,	Thanksgiving Recess.
Dec. 23,	Monday,	Instruction ends in regular and special work. Christmas Recess.
Jan. 6,	Monday,	Instruction resumed.
Jan. 11,	Saturday,	Founder's Day. Holiday.
Jan. 27,	Monday,	Term examinations begin.

### Second Term, 1912-13

Feb. 8,	Saturday,	Registration, undergraduates.
Feb. 10,	Monday,	Registration, Graduate School.
Feb. 10,	Monday,	Instruction begins.
Feb. 12,	(week of),	Farmers' Week.
Feb. 14,	Friday,	Instruction ends in the Winter Courses.
Feb. 28,	Friday,	Last day for payment of tuition.
April 2,	Wednesday,	Instruction ends. Spring Recess.
April 8,	Tuesday,	Instruction resumed.
May 31,	Saturday,	Navy Day.
June 2,	Monday,	Term examinations begin.
June		Forty-fifth Annual Commencement.

### University Summer Session, 1913

July 7,	Monday,	Summer Session begins.
Aug. 15,	Friday,	Summer Session ends.

### Summer School in Agriculture, 1913

July 7,	Monday,	Summer School begins.
Aug. 15,	Friday,	Summer School ends.

### First Term, 1913-14

Sept. 12,	Friday,	Entrance examinations begin.
Sept. 22-23,	Monday-Tuesday,	Registration of new students.
Sept. 24,	Wednesday,	Registration of old students.
Sept. 25,	Thursday,	Instruction begins.



# NEW YORK STATE COLLEGE OF AGRICULTURE

## FACULTY

- Jacob Gould Schurman, A.M., D.Sc., LL.D., President of the University.  
Liberty Hyde Bailey, M.S., LL.D., Director of the College of Agriculture and Dean of the Faculty.  
Isaac Phillips Roberts, M.Agr., Professor of Agriculture, Emeritus.  
John Henry Comstock, B.S., Professor of Entomology and General Invertebrate Zoology.  
Henry Hiram Wing, M.S. in Agr., Professor of Animal Husbandry.  
John Craig, M.S. in Agr., Professor of Horticulture.  
Thomas Lyttleton Lyon, Ph.D., Professor of Soil Technology.  
Herbert John Webber, M.A., Ph.D., Professor of Plant Breeding.  
John Lemuel Stone, B.Agr., Professor of Farm Practice and Farm Crops.  
James Edward Rice, B.S.A., Professor of Poultry Husbandry.  
George Walter Cavanaugh, B.S., Professor of Chemistry in its Relations with Agriculture.  
George Nieman Lauman, B.S.A., Professor of Rural Economy.  
Herbert Hice Whetzel, A.B., M.A., Professor of Plant Pathology.  
Elmer O. Fippin, B.S.A., Professor of Soil Technology.  
George Frederick Warren, Ph.D., Professor of Farm Management.  
William Alonzo Stocking, jr., M.S.A., Professor of Dairy Industry.  
Charles Scoon Wilson, A.B., M.S.A., Professor of Pomology.  
Charles Henry Tuck, A.B., Professor of Extension Teaching.  
Albert Russell Mann, B.S.A., Secretary to the College of Agriculture, Registrar, and Professor of Agricultural Editing.  
Wilford Murray Wilson, M.D., Professor of Meteorology.  
Walter Mulford, B.S.A., F.E., Professor of Forestry.  
James George Needham, Ph.D., Professor of General Biology, Limnology, and Nature Study.  
Bryant Fleming, B.S.A., Professor of Landscape Art.  
Harry Houser Love, Ph.D., Professor of Plant Breeding Investigations.  
Arthur Witter Gilbert, Ph.D., Professor of Plant Breeding.  
Donald Reddick, Ph.D., Professor of Plant Pathology.  
Edward Gerrard Montgomery, M.A., Professor of Farm Crops.  
———, Professor of Rural Education.  
Flora Rose, B.S., M.A., Professor of Home Economics.  
Martha Van Rensselaer, A.B., Professor of Home Economics.  
William Albert Riley, Ph.D., Professor of Insect Morphology and Parasitology.  
James Adrian Bizzell, Ph.D., Professor of Soil Technology.  
Glenn Washington Herrick, B.S.A., Professor of Economic Entomology.  
Howard Wait Riley, M.E., Professor of Farm Mechanics.  
Harold Ellis Ross, M.S.A., Professor of Dairy Industry.  
Hugh Charles Troy, B.S.A., Professor of Dairy Industry.



- , Professor of Pomology.
- Samuel Newman Spring, B.A., M.F., Professor of Forestry.
- Merritt Wesley Harper, M.S., Assistant Professor of Animal Husbandry.
- William Charles Baker, B.S.A., Assistant Professor of Drawing.
- Clarence Arthur Rogers, M.S.A., Assistant Professor of Poultry Husbandry.
- Cyrus Richard Crosby, A.B., Assistant Professor of Entomological Investigations.
- Elmer Seth Savage, M.S.A., Ph.D., Assistant Professor of Animal Husbandry.
- Lewis Knudson, B.S.A., Ph.D., Assistant Professor of Plant Physiology.
- Kenneth Carter Livermore, B.S. in Agr., Assistant Professor of Farm Management.
- Alvin Casey Beal, Ph.D., Assistant Professor of Floriculture.
- Mortier Franklin Barrus, A.B., Ph.D., Assistant Professor of Plant Pathology.
- James Chester Bradley, Ph.D., Assistant Professor of Systematic Entomology.
- E. Gorton Davis, B.S., Assistant Professor of Landscape Art.
- Edward Russell Minns, B.S. in Agr., Assistant Professor in Extension Work in Farm Crops.
- John Bentley, jr., B.S., M.F., Assistant Professor of Forestry.
- , Assistant Professor of Forestry.
- Lewis Josephus Cross, B.A., Ph.D., Assistant Professor of Agricultural Chemistry.
- Robert Matheson, M.S. in Agr., Ph.D., Assistant Professor of Biology.
- George C. Embody, Ph.D., Assistant Professor of Aquiculture.
- Clyde Hadley Myers, M.S., Ph.D., Assistant Professor of Plant Breeding.
- Harry O. Buckman, M.S.A., Ph. D., Assistant Professor of Soil Technology.
- Mrs. Helen Binkerd Young, B.Arch., Assistant Professor of Home Economics.
- Alice Gertrude McCloskey, A.B., Associate in Rural Education.
- Charles Cleveland Hedges, A.B., Ph.D., Instructor in Agricultural Chemistry.
- George Walter Tailby, jr., B.S.A., Instructor in Animal Husbandry and Superintendent of Live Stock.
- Edward Sewall Guthrie, M.S. in Agr., Instructor and Investigator in Dairy Industry.
- Paul Work, B.S., A.B., Instructor and Investigator in Olericulture.
- Ralph Hicks Wheeler, Instructor in Extension Teaching.
- Roy David Anthony, B.S. in Agr., Instructor in Pomology.
- Lee Briggs Cook, M.S. in Agr., Instructor in Dairy Industry.
- Harry M. Fitzpatrick, A.B., Instructor in Plant Pathology.
- Arthur Lee Thompson, M.S. in Agr., Instructor and Investigator in Farm Management.
- Byron Burnett Robb, B.S. in Agr., Instructor in Farm Mechanics.
- Ray Eugene Deuel, B.S. in Agr., Instructor in Animal Husbandry.
- Earl Whitney Benjamin, M.S. in Agr., Instructor in Poultry Husbandry.
- Harvey Lyon Ayres, Extension Instructor in Dairy Industry.
- , Instructor in Plant Physiology.
- Charles Truman Gregory, B.S. in Agr., Instructor in Plant Pathology.
- Walter Warner Fisk, M.S. in Agr., Instructor in Dairy Industry.
- Thomas Joseph McInerney, M.S. in Agr., Instructor in Dairy Industry.
- Horace Mann Pickerill, B.S. in Agr., Instructor in Dairy Industry.
- Edward Mowbray Tuttle, B.S.A., Instructor in Rural Education.
- Rhett Youmans Winters, M.S., Ph.D., Instructor in Plant Breeding.



Royal Gilkey, B.S.A., Instructor in Extension Teaching, and Supervisor of Mailing Division and Reading Courses.  
Juan Estevan Reyna, E.E., Instructor in Drawing.  
Martin John Prucha, Ph.B., M.S., Instructor in Plant Physiology.  
Charles Piper Smith, B.S., A.M., Instructor in Plant Pathology.  
William Howard Rankin, A.B., Instructor in Plant Pathology.  
Carl Edwin Ladd, B.S. in Agr., Instructor in Farm Management, in cooperation with the United States Department of Agriculture.  
Clara Browning, B.S., Instructor in Home Economics.  
Asa Carlton King, B.S.A., Instructor in Extension Teaching.  
Halsey B. Knapp, B.S., Instructor in Pomology.  
Anna Clegg Stryke, A.B., Artist and Instructor in Entomology.

#### Other Officers of Instruction and Administration

Anna Botsford Comstock, B.S., Lecturer in Nature Study.  
Mrs. Ida Schwedler Harrington, Extension Lecturer in Home Economics.  
John Walton Spencer, Agent in Extension Work.  
G. Clayton Dutton, Assistant in Cheese Making.  
Charles Herbert Van Auken, Assistant in Animal Husbandry.  
Ada Eljiva Georgia, Assistant in Nature Study.  
Emmons William Leland, B.S.A., Assistant in Soil Technology.  
John Thomas Lloyd, A.B., Assistant in Limnology.  
Walter Stanley Lyon, Assistant in Poultry Husbandry.  
Lewis Merwin Hurd, Assistant in Poultry Husbandry.  
Robert Palmer Trask, Assistant in Poultry Husbandry.  
Frank Elmore Rice, A.B., Assistant in Agricultural Chemistry.  
David Ely Fink, B.S.A., Assistant in Economic Entomology.  
Carl Ilg, Curator in Entomology.  
Jacobus Christian Faure, B.S., Assistant in Entomology.  
Otis F. Curtis, M.S., Assistant in The Farm Course.  
David A. Crawford, M.S., Assistant in Biology.  
Mary A. Lyon, B.A., Assistant in Biology.  
Blanche E. Stafford, M.S., Assistant in Biology.  
Willis Robert Fischer, Laboratory Assistant in Plant Pathology.  
Irvin Torrance Francis, Assistant in Plant Pathology.  
Charles Chupp, Assistant in Plant Pathology.  
Clyde Evert Leighty, A.B., Ph.D., Assistant in Plant Breeding.  
Tryggve Emil Schreiner, Assistant in Poultry Husbandry.  
Eugene Davis Montillon, Assistant in Landscape Art.  
William J. Robbins, A.B., Assistant in Plant Physiology.  
James Kenneth Wilson, B.S., Assistant in Plant Physiology.  
Ralph Simpson Nanz, B.S., Assistant in Plant Physiology.  
Delmont Westervelt, Mechanic to Department of Farm Mechanics.  
Lucy Harriet Ashton, Assistant Registrar.  
Louis H. Moulton, Superintendent of the Farms.  
Thomas Wolcott, Foreman of Pomology Grounds.  
George Walter Tailby, Foreman of the Farms.

Charles Edward Hunn, Foreman of Grounds.

Arthur Bradford Cornelius, Assistant Gardener.

Walter Gernet Krum, Superintendent of Poultry Plant.

Andrew Jackson Lamoureux, Librarian.

Herbert W. Teeter, Superintendent of Plant-Breeding Garden.

Edwin S. DeLany, Clerk.

Laura McLallen Van Auken, Clerk in Department of Dairy Industry.

Gilbert Arthur Renney, Superintendent of Mailing Rooms.



## THE COLLEGE OF AGRICULTURE

By act of the Legislature of the State of New York, approved May 9, 1904, an appropriation of \$250,000 was made for buildings for the College of Agriculture; and the act authorized Cornell University to purchase the dairy building erected by the State some years before, and to add the purchasing price (\$40,000) to the appropriation, thereby making a building fund of \$290,000. The act also established the College as "The New York State College of Agriculture at Cornell University". These buildings were first occupied in June, 1907. They consist of a group of three buildings connected by covered loggias, and a detached building occupied by the Department of Animal Husbandry. The main group, with a frontage to the south of four hundred and eighty-four feet, occupies a site to the east of the original University Campus. All the buildings are of brick. The Main Building, central in the group of three, has in the basement mailing and storage rooms for the publications of the College, the office of The Cornell Countryman, an extension office, a large lavatory with baths and lockers, and a students' room. The heating plant for the building is beneath this basement. A completely inclosed passageway leads to the basement of the Dairy Building on the east and to the Agronomy Building on the west.

The first floor of the Main Building contains the offices of administration, including the offices of the Director and of the Secretary, and the business office, to the west of the main entrance. To the east are the office for extension teaching, the library, editorial office, and the offices of the departments of Landscape Art and Rural Economy. Between these two groups of rooms is the auditorium, seating about six hundred. The loggias on this floor are open at the sides, but covered above.

The second floor is occupied by the Departments of Horticulture and Pomology, with lecture rooms, two laboratories, and offices for the staff. Here is also provided a women's rest room and lavatory.

The Department of Entomology, Biology, and Nature Study occupies the third and fourth floors, which include the museum and the offices of the staff. The laboratories are especially well lighted. Quarters are provided for the work in limnology.

In the center of the fourth floor is a suite of rooms occupied by the Central Station, New York Section, of the Weather Bureau of the United States Department of Agriculture. To the west are the nature study offices.

The Dairy Building, to the east of the Main Building and connected with it by passageways on three floors, is in two sections. The three-story part has, in the basement, locker rooms and lavatory with bath, rooms for instruction and practice in dairy mechanics, a laboratory for the State Chemist, and a steam laundry; on the main floor, the general offices of the Department of Dairy Industry, large laboratories for dairy bacteriology with the necessary incubator room, and a special reading room, which also serves in part as a museum; on the second floor, the large lecture room seating two hundred and fifty, with its preparation room, and a smaller lecture room. The large milk-testing laboratory is also provided with a preparation room. In the attic is given the instruction in drawing required in the various courses in the College. Connected with this three-story



part is the section containing the manufacturing rooms. The milk-receiving room adjoins the separator room, the cheese-making room, and a can-cleaning room. Between the separator room and the churn room are the cream-ripening room and the refrigerator for butter. Beyond the cheese-making room are a series of three curing rooms, the starter room, and a room for farm-dairy practice. Adjoining the main Dairy Building are the rooms for handling market milk, including a receiving room, bottling room, sterilizing and refrigerating rooms, and a bottle washroom; and below these in the basement are large storage and refrigerator rooms. On the same side as the rooms for cheese making and in the basement, are the rooms for making fancy cheese, with additional curing rooms and a room for casein making. A boiler-and-engine room, with the necessary storage, complete the general features of the Dairy Building.

To the west of the Main Building and connected with it, like the Dairy Building, by passageways on three floors, is the Agronomy Building. The basement is used for instruction in plant physiology and in soil technology. The first floor contains a number of offices and a laboratory for plant physiology; on the second floor is the large laboratory for the study of farm crops and farm management. The Experiment Station also has on this floor a large laboratory for the study of problems in fertility. On the top floor are the departments of Plant Pathology and Plant Breeding.

To the northeast of the main buildings is the separate building for the Department of Animal Husbandry, with its large judging pavilion, offices, library, and lecture and laboratory rooms. East of it is the low frame building for farm mechanics.

North of the Agronomy Building stands the new building for home economics, and to the east, beyond the glasshouses, is the new building for poultry husbandry. These two buildings are described on succeeding pages under the respective departments.

To the west of the Agronomy Building is a modern rural schoolhouse, in which the work in rural education is conducted. To the northeast of the Animal Husbandry Building lie the school gardens.

The poultry houses used in instruction are in the rear of the Main Building. The new barns provided by act of the Legislature are on the farms to the eastward.

The new glasshouses are just east of the agricultural group.

The farms and experimental plats, comprising about eight hundred and fifty acres, are adjacent.

The Agricultural Experiment Station is a department of the New York State College of Agriculture. Students may get incidental instruction from observing and discussing the experiments that are being conducted.

The publications of the Agricultural Experiment Station include to date twenty-four annual reports and three hundred and fifteen bulletins. Such of these publications as are available are, as far as the means of the Station will permit, distributed free to residents of the State who apply for them.



## EQUIPMENT OF THE DEPARTMENTS

**Agricultural Chemistry**

The instruction in agricultural chemistry is given in Morse Hall. Here ample facilities are provided for laboratory work, which is made an important part of the instruction. The laboratories are well lighted and provided with gas, electric light, distilled water, and compressed air. Each student is provided with complete apparatus for quantitative analysis. The work is arranged to familiarize the student with the composition and properties of the more important agricultural chemicals.

For the advanced courses there is a special laboratory accommodating twenty-four students.

The lecture rooms are provided with electric projection lanterns for illustrating the lectures, and have large, well-equipped lecture tables. There are also a chemical museum and a reading room.

**Animal Husbandry**

The equipment in animal husbandry available for purposes of instruction is as follows:

1. **The College Herds and Flocks.** A herd of about one hundred and twenty-five head of cattle is maintained. Aside from a carload of steers fed for market each year, it is essentially a dairy herd, to a large extent bred and developed by the College itself. It at present contains representative specimens of Holsteins, Jerseys, Guernseys, Ayrshires, and Shorthorns.

The College maintains an imported Percheron stallion and a pure-bred Hackney stallion. Four pure-bred Percheron mares are used primarily for breeding purposes. The farm teams illustrate grade draft horses of several types.

A flock of about seventy-five sheep includes representative specimens of Dorsets, Shropshires, Hampshires, Southdowns, Delaines, Rambouillets, and Cheviots and is kept mainly for the production of winter, or hothouse, lambs. About ten brood sows of the Cheshire breed—"the New York Farmer's Hog"—are kept to utilize waste dairy products and to illustrate a profitable early maturing butcher's hog of a semi-bacon type.

2. **Herd Books and Flock Books.** The library of herd books and flock books is large, comprising more than 1,000 volumes and including complete sets dealing with all the more important breeds and with many of the lesser ones.

A fairly complete collection of lantern slides, illustrating breed types, and skeletons of the horse and the ox, add to the material available for classroom purposes.

The Animal Husbandry Building, detached from the main group but adjacent, is sixty by ninety feet in size.

**Dairy Industry**

The Department of Dairy Industry occupies the building east of the main agricultural building. A covered loggia connects the two. The classrooms, bacteriological and testing laboratories, locker rooms, reading room, offices, and dairy mechanics rooms occupy a part of the building, fifty by one hundred feet in



size and three stories high. All manufacturing work is conducted in the remaining part of the building, sixty by one hundred and sixty feet in size and one story high. The manufacturing rooms are thoroughly sanitary, fully equipped, and well-adapted for instruction and for commercial work. In the winter about 15,000 pounds of milk are handled daily, and in the summer the milk received at the Dairy Building and the cream received from four skimming stations represent about 30,000 pounds of milk daily. The skimming stations are located at short distances north of Ithaca and are equipped and conducted like stations operated exclusively for commercial purposes.

Instruction is given by lectures and recitations, supplemented by practice in laboratories and manufacturing rooms. The practice is of seven kinds.

1. **Testing Milk and Milk Products for their Quality.** The testing laboratory is equipped with lockers for students, the leading styles of turbine and hand centrifugal Babcock testers, one Russian Babcock tester, one Gerber tester, casein testers, moisture and acid testing apparatus, lactometers, and all necessary glassware.

2. **Dairy Bacteriology.** This division is provided with two large and well-lighted laboratories, individual desks and lockers for students, full equipment for making media, hot air and steam sterilizers, incubators for maintaining constant temperatures, high-speed centrifuges for determining dirt and bacterial content of milk, high-power microscopes, and all glassware necessary for bacteriological work.

3. **Butter Making.** This work is conducted in several separate rooms. The farm dairy rooms contain leading kinds of hand-power separators and churns, and various apparatus used in a dairy where butter is made in small quantities. Creamery methods are taught chiefly in a large separator room, provided with several types of power separators, milk heaters, and pasteurizers, and in a churning room provided with different kinds of power churns and workers. There are special rooms for ripening cream and for holding butter in cold storage. There is also a boiler room with thirty-horsepower boiler, engine, and necessary pumps.

4. **Cheddar-Cheese Making.** The room for this work is equipped with vats for making cheese in small or large quantities, one horizontal continuous pressure press, one upright press, hoops for making cheese in four sizes, rennet tests, acid tests, curd mills, and other small apparatus. Four insulated curing rooms adjoin the manufacturing room.

The milk-receiving room and the can-washing room are convenient to the creamery and cheese rooms. These are provided with scales, composite sample outfit, and a power can washer and rinser.

5. **Fancy-Cheese and Ice-Cream Making.** Making rooms and curing rooms with necessary equipment are provided for the manufacture of a few varieties of fancy cheese. Both hand and power equipment is used for ice-cream work.

6. **Market-Milk Handling.** For this work there are four rooms, including a special refrigerator, a sterilizer, and a receiving room. In their arrangement, the principles governing the proper management of any commercial sanitary milk plant have been considered. The equipment includes a rotary washer, a rinser, several styles of milk coolers, and bottle-filling apparatus. The college operates a market-milk route for the disposal of milk produced by the college herd, and all records are kept in the same manner as in any commercial dairy.



7. **Dairy Mechanics.** This instruction is given in the Department of Farm Mechanics. The equipment includes steam engines, gasoline engines, shafting, various sizes of pulleys, belts, different types of separators, and tools for pipe fitting, soldering, and plain carpenter work, a number of tools somewhat larger than would be found in many well-conducted dairy manufacturing plants.

A deposit is required to cover the value of apparatus loaned to students. When the apparatus is returned in good order, the deposit is returned, less a charge of twenty-five cents to apply on losses of general equipment. Clean white suits are required for all practice work in this department. These suits may be purchased by the student, or rented from the department at fifty cents a term. Lockers for these suits, as well as for equipment used by individual students in the laboratories, are provided without charge.

### Entomology

The entomological laboratories are well equipped for all phases of entomological study. There is a good supply of microscopes and accessories, including equipment for photomicrographic work. In addition, there is a very full outfit for insect photography. Ample facilities, such as microtomes, paraffin ovens, and reagents, are provided for work in insect morphology and embryology, and an extensive collection of prepared slides is at the disposal of students.

The insect collections, developed as an adjunct to the work of instruction, are especially rich in biological and illustrative material. In addition to many exotic species, they contain specimens of a large number of the more common species of the United States. These have been determined by specialists and are accessible for comparison.

The lecture room is provided with a synoptic collection of insects, sets of the Leuckart and the Pfurtscheller diagrams, models, projection lanterns, and complete means for the projection of microscopic objects.

Adjacent to the laboratories is an insectary, which, together with the insectary of the Agricultural Experiment Station, affords to advanced students exceptional opportunities for special investigation in life histories, and for experiments in applied entomology.

For study of the life histories, biology, and economic importance of aquatic forms, unrivalled facilities are afforded by the field laboratory, located in the midst of the Renwick marshes and fully provided with breeding cages, running water, and aquaria, and by a hatching station on the University grounds in the gorge of Cascadilla Creek.

### Farm Management

Farms adjacent to Ithaca furnish laboratory materials for the study of farm management. Ithaca is specially well situated for the study of farm management, because there is a great diversity of conditions. Some of the best and some of the poorest farms of the State are within easy reach of Ithaca. Excursions are also made to a few farms in other parts of the State for the study of field crops and farm management. The results of the agricultural survey are useful in this study.

### Farm Mechanics

This department is housed in the Farm Mechanics Building, a temporary one-story structure forty by ninety-six feet, with laboratory space forty by eighty feet



and offices and stock room forty by sixteen feet. A wash room occupies one corner of the laboratory, but this space is compensated for by two small galleries, each six by thirty-two feet. The equipment includes a traction engine, a small steam engine, several gasoline engines, pumps of various kinds, hydraulic rams, water-supply systems, a windmill, a threshing machine complete with all modern improvements, a grain binder, several binder attachments, plows, cultivators, and planters. The "sprayograph" for testing spray nozzles was designed and built by the department and is used in class exercises and for research. A recording traction dynamometer is used for testing purposes.

For the work in farm engineering, the department has eight farm levels, two transits and leveling rods, tapes, etc. Models of septic tanks are provided for the work in sewage disposal.

### **Farm Practice and Farm Crops**

Instruction in farm crops is given by means of lectures, recitations, and field and indoor laboratory work. The department is provided with a lecture room and a large, well-lighted laboratory, equipped with specially designed desks for ninety-two students, with gas and water and ample locker space. Farm crop materials are procured for use in indoor laboratory work. Bulletins of the various experiment stations constitute a part of the laboratory equipment. The farms and experimental plots are used for laboratory work in the field.

### **Forestry**

The Department of Forestry has a large laboratory and offices in the Home Economics Building. The State has appropriated \$100,000 for a forestry building, which it is expected will be ready for occupancy by the fall of 1913. The department has charge of a farm of thirty-eight acres, part of which is open land suitable for experimental plantations, the remainder being wooded; it also has eight other wood lots, including stands of white pine, hardwoods, and hemlock. All of these lands are within two miles of the University Campus. The department has planted 35,000 trees in experimental and demonstration plantations and has a forest nursery. A good forestry library, including extensive files of forestry periodicals, is housed in the University Library. There is an ample collection of forestry instruments and lantern slides.

### **Home Economics**

The Department of Home Economics in the New York State College of Agriculture was organized in the fall of 1907. Since that time, the work has been conducted on the fourth floor of the Main Building of the College. In the fall of 1912, the department will begin work in the new Home Economics Building, which has been constructed under State appropriation as one of the group of buildings of the New York State College of Agriculture. The building comprises offices, classrooms, a library, laboratories for practical study of the problems of food, clothing, and shelter, a small audience room, an apartment in which the principles of family housekeeping will be taught, a commodious basement dining



room and kitchen in which students will have practice in the commercial feeding of large numbers on the cafeteria plan, and a smaller practice dining room connected with one of the food laboratories. The department is constantly increasing its equipment of reference books, lantern slides, illustrative material, and labor-saving devices.

### Horticulture

The equipment is divided into two parts—that belonging to the classrooms and laboratories on the second floor of the main agricultural building, and that connected with the forcing houses and the grounds surrounding them and farther afield. The equipment is shared with the Department of Pomology.

**1. Classrooms and Laboratories.** Lectures and a major part of the laboratory work are given in the headquarters of the department, on the second floor of the Main Building. On this floor are lecture rooms, laboratories, and offices.

The larger lecture room is provided with a stereopticon, and has a seating capacity of one hundred and twenty; the smaller lecture room seats thirty-five, besides accommodating the herbarium. One laboratory is devoted to practical and systematic pomology and olericulture, and is equipped in the most approved manner for the practical and laboratory phases of horticultural and pomological work. It accommodates forty students. The other laboratory is for advanced students, where those who are working in the Graduate School or are engaged in research are provided with suitable appliances for their special needs. Space is here afforded for twenty students. The remainder of the floor is used as a museum and for offices for the instructing staff. Large display cases lining the corridor are filled with horticultural specimens, tools, and appliances.

**2. Forcing Houses and Orchards.** New glass structures for the study of forcing crops, such as flowers, vegetables, and fruits, covering an area of about 7,000 square feet, were recently completed and are used in connection with nearly all classes, more especially by those in floriculture and olericulture. One house is assigned to advanced students for the working out of special problems, and another is given over to the study of the variation of plants and the technique of plant breeding.

The land equipment comprises the vegetable and flower gardens near the campus, which furnish excellent demonstration material for lecture and laboratory.

Aside from ordinary equipment, the garden herbarium, with more than 12,000 sheets, is an important aid in the study of systematic pomology and plant variation. There is also an exceptionally fine collection of nearly 10,000 negatives illustrating all phases of the growing of fruits, flowers, and vegetables. This collection is being added to continually, and furnishes a useful source for lantern slides to illustrate recent methods in the management of fruit plantations, the construction of forcing houses, and the growing of vegetables and flowers in the field and under glass. The department has a collection of 2,000 lantern slides, to which additions are constantly being made.

### Plant Breeding

This department was organized in 1907, primarily for the experimental study of evolution. Its laboratory and offices are on the top floor of the Agronomy Building.



The demand for instruction in plant breeding by students in the College became so great that a teaching division was established in 1908. This division has charge of undergraduate instruction and directs graduate investigation. Graduate students engaged in research are closely associated with the experimental division and are allowed the advantages of its equipment. This equipment, including laboratory, greenhouses, and gardens, is designed primarily for investigation in experimental evolution.

The equipment of the teaching division is separate from that of the experimental division, except the plant breeding library and a small part of the plant breeding garden. It is designed to aid students in their study of variation, hybridization, and practical breeding. The teaching division has no classroom nor laboratory of its own, but adequate rooms are provided for its use.

The experimental laboratory is well supplied with suitable microscopes, microtomes, paraffin ovens, etc., for use in histological investigations. It has also a full photographic outfit and calculating machines for the statistical study of variations. An excellent library, dealing with plant breeding and experimental evolution, and an extensive card catalogue of plant breeding literature, form a part of the equipment. The private libraries of members of the staff, containing many valuable books and pamphlets, are placed at the disposal of graduate students. An herbarium of variations of plants is in process of formation. For conducting investigations during the winter, graduate students have the use of greenhouses provided with all necessary appliances for plant culture. For growing hybrids and other plants during the summer a garden of three acres is available. For more extensive plantings the department has the use of parts of the University farms.

### Plant Pathology

The Department of Plant Pathology, organized in 1907, is housed in the south end of the top floor of the Agronomy Building. The equipment consists of a large elementary laboratory, an advanced laboratory, a work room, a culture room, offices, and small research rooms for graduate and advanced students. This equipment includes furniture especially built for the work of the department, a complete set of microscopes, microtomes, sterilizers, electric incubators, etc., for teaching and investigation. There are also a rapidly growing pathological herbarium, numerous photographs, a department library, etc. Land and greenhouses are available for demonstration and experimental work as well as for teaching. The department is now in a position to offer facilities for practically every kind of work within its field.

### Plant Physiology

The Department of Plant Physiology is well equipped for instruction and research. The laboratory facilities include microscopes, microtomes, incubators, ovens, sterilizers, and other special physiological and bacteriological apparatus; precision instruments for the measurement of environmental conditions; chemical tables, titration stands, nitrogen still, balances, glassware, and other materials required in that part of the work dealing with biochemistry and fermentation.

The instruction is arranged with reference not merely to persons who are interested in various phases of plant industry, but also to those who may be preparing themselves as teachers, or as investigators in related lines. Special oppor-



tunities are offered to those properly trained in physiology, horticulture, and agronomy, to undertake fundamental investigations in the general field of plant response and behavior.

With the increased space which is now available an effort is made to differentiate sharply between the laboratories devoted, on the one hand, primarily to undergraduate instruction, and those utilized, on the other hand, for graduate work and research. The new greenhouses offer opportunities for class work and for individual investigation. Moreover, the University farms and grounds will supply, for those who may devote the growing season to their investigations, a variety of crops and ornamental plants needed for particular observation and experiment.

### **Pomology**

The Department of Pomology, organized in 1910, is well equipped for instruction. The classroom and the laboratory are on the second floor of the Main Building. There is also a fifty-acre field laboratory devoted to commercial and varietal orchards of the different fruits. Most of the plantings are young and offer excellent opportunities for practical work and demonstrations. On the grounds are also orchards of Paradise and Doucin stock, and a large collection of seedlings used for propagation.

The collection of spray machinery, including gas engines, traction outfits, and the like, is nearly complete, permitting thorough instruction in the practical methods of controlling orchard enemies.

Exceptional facilities are available for studying fruit varieties and packing. Each year a large assortment of fruit, which is used for purposes of instruction, is brought together at the College. The department is equipped with a large number of new packing tables and presses.

The aim of the instruction is to train students for practical work, for experimental work, and for teaching. The courses cover in detail the preparation for all of these fields.

### **Poultry Husbandry**

The Department of Poultry Husbandry is located in the new Poultry Building, east of the greenhouses, and also at the plant, north of the main agricultural college buildings. The area occupied is about six acres. Approximately one mile distant is the poultry farm, a tract of some fifty acres. The buildings consist of a main building one hundred and thirty-two feet by forty-eight feet, three stories and basement; and houses for seventy-two flocks, accommodating about twenty-four hundred fowls, ducks, and geese. These houses include thirty-four New York State gasoline-heated colony brooder-houses and summer houses for rearing forty-five hundred or more chickens annually, and a laying house two hundred and seventy-six feet long containing twenty-three pens. The old main building at the plant contains an incubator room, an egg room, a killing room, a carpenter shop, lockers for fifty students, and a dormitory. The new Poultry Building contains a killing room; an egg grading, testing, and marketing room; cold storage facilities for commercial and experimental purposes; a lecture room seating three hundred students; three laboratories for instruction and research; two recitation rooms;



a seminary room; a photographic room; a library; an educational-exhibit room; a general office; private offices and private laboratories; and lockers for three hundred students.

The lectures and recitations and the laboratory, seminary, reading, and drawing courses are all given in the new Poultry Building.

Instruction is divided about equally between lectures, recitations, textbook study and required reading, and the practice courses.

1. **Lectures.** For the lecture courses there are a large number of charts and models, eight hundred and twelve lantern slides, and two thousand five hundred and forty-five negatives with blue prints.

2. **Systematic Reading.** Students have easy access to the library and reading room of the Agricultural College and Experiment Station. In addition to this there are the poultry alcoves in the University Library, and the poultry library, where the principal poultry books are kept and where one hundred or more poultry papers are on file. There is also a large subject card index of poultry literature.

3. **Laboratory, Shop, Plant, and Field Practice.** These four kinds of practice are given in the afternoons to supplement the lectures and recitations. For the shop work there is a commodious shop with a good collection of carpenter's tools.

For the laboratory and field practice, there are available several sets of caponizing instruments of different makes, anatomical and drawing instruments, a model of a turkey and of an egg during incubation, a collection of eggs of many varieties of poultry, twenty-five enlargements of different varieties of poultry from the American Standard of Perfection, cameras, balances and scales, models of poultry buildings and of trap nests, killing instruments and appliances, a collection of packages for marketing poultry products, and samples of seventy kinds of poultry feeds.

4. **Feeding and Management.** For this course thirty pens are available. These contain fifteen to thirty birds each, including thirteen leading varieties of fowls, four varieties of ducks, and one variety of geese. There is a fattening house, twelve by thirty feet, fitted with suitable appliances. Record sheets are supplied by which the students show at the end of the course a complete history of the method of feeding and care, value of products, profit and loss, etc. Fattening crates and three styles of cramming machines are provided; also five makes of bone cutters, including a large power cutter; a six-horsepower gasoline engine with a power feed mill; a clover cutter; a root slicer, etc.

5. **Incubator Practice.** For the course in incubator practice there are thirty incubators, including several of each of the leading kinds, a thirty-six-hundred-egg mammoth machine, and one or more of a large number of makes which have been sent to the College for inspection and use. The incubator cellar is provided with electric lights for reading the thermometers and testing the eggs. Record sheets show the method of operation of the machine each day. There are hygrometers and thermographs for recording moisture and temperature.

6. **Brooder Practice.** A pipe-system brooder-house forty-five feet long by twelve feet wide, and five types of brooders, including the gasoline-heated colony brooders, are used.

7. **Research.** Many of the flocks of the plant are available for investigational work. Several private laboratories offer excellent facilities for many types of research. Special facilities are offered for work in cooperation with other departments of the College and University.



### Soil Technology

The courses in soil technology are designed to afford the student in general agriculture an understanding of the fundamental principles of soil management for crop production, and also to offer opportunity for special study of important aspects of the subject, both general and specific. The former group includes a consideration of the processes of formation and classification of soils, their physical and chemical properties, and their modification by cultural operations. It is a summation of the general knowledge of soils. In the latter group, particular phases of the subject are taken up for advanced study, in lecture, research, and seminary.

The laboratory is equipped to accommodate one hundred and eighty students. The equipment includes apparatus for the study of the physical constitution of the soil, its capacity for retention and movement of water, its relation to the circulation of air, to heat, and to amount and effect of organic matter, and other important physical and chemical relations. Each student has the use of a desk and locker containing a stock equipment, and of balances, microscopes, thermometers, mechanical analysis outfits, and other apparatus.

Large quantities of typical New York soil are available for study, and in addition there is a collection of samples of important type soils from all parts of the United States. The study of the soils of the United States may be supplemented by detailed maps of all areas surveyed to date.

The great variety of soils and soil conditions in the vicinity of Ithaca is made use of for field excursions to study their classification, occurrence, treatment, and management. All necessary equipment for the preparation of soil and drainage maps is provided to supplement the work in soil survey and land drainage. A collection of soil-working implements is available for study with reference to their efficiency of operation in soils of different characters and conditions.

For advanced study and investigation, special apparatus and special facilities are available, according to the subject under consideration.

### EXPENSES, FELLOWSHIPS, SCHOLARSHIPS, AND PRIZES

Tuition in the College of Agriculture is free to both graduate and undergraduate students who for a year or more immediately preceding admission have been residents of the State of New York. The annual tuition fee of regular students from outside the State is \$100, and of special students from outside the State, \$125.

The tuition for regular students is payable in two instalments, \$55 at the beginning of the first term and \$45 at the beginning of the second term; the tuition for special students is payable similarly in instalments of \$70 and \$55. A limited number of free scholarships have been established in the College of Agriculture for students from outside the State of New York. Other fees, required of all students, are as follows:

Matriculation fee .....	\$5.00
Infirmity fee .....	3.00
Fee for baccalaureate degree .....	10.00

Deposit fees are required in various laboratory courses; about these inquiry should be made before registration. Students are liable to a special charge for



breakage or damage resulting from their own carelessness. Attention is called to the expenses of excursions required in various courses.

The expense for textbooks, instruments, etc., varies from \$10 to \$75 a year.

The cost of living in Ithaca, including board, room, heat, and lights, varies from \$5.50 to \$10 a week.

The cost of board, rent of furnished room, fuel, and lights, in Sage College or Sage Cottage, which are exclusively for women, varies from \$225 to \$300 per year. Both buildings are warmed by steam and lighted by electricity. The responsibility for the conduct of the students living in Sage College and Sage Cottage rests with the Adviser of Women in the University. Inquiry regarding board and rooms at Sage College and Sage Cottage should be addressed to the Business Manager of Sage College, Ithaca, N. Y.

### Scholarships and Fellowships in Agriculture

#### For Regular and Special Students

The Roberts scholarship fund, a gift of the late Dr. Charles H. Roberts of Oakes, Ulster County, N. Y., provides five scholarships, each tenable for one year. As expressed by the founder, the purpose of these scholarships is to furnish financial assistance to students in the College of Agriculture who are of good moral character, who show native ability, tact, and application, and who are in need of such assistance, especially students who come from rural districts. The award is made after the end of the first term of each year. Application blanks and copies of the regulations may be had at the office of the Secretary to the College of Agriculture. All applications must be on the official blanks, which, with all other information, must be filed with the Secretary before February 1, 1913. The value of each scholarship is \$240.

Eighteen University Undergraduate Scholarships, continuing for two years and of an annual value of \$200 each, are offered each year to members of the incoming freshman class. The award is made on the basis of a special competitive examination held in Ithaca in September between the period of the entrance examinations and the opening of the University. For a full description of these scholarships and examinations, see the General Circular of Information which may be obtained from the Registrar of Cornell University.

A few free scholarships in agriculture are open to nonresidents of New York State. Information concerning them may be had on application to the Secretary, College of Agriculture.

A graduate fellowship of the value of \$500 is annually awarded in Agriculture and Veterinary Science.

A number of industrial fellowships are established for a limited period, usually two years, by growers, companies, etc., that wish to cooperate with the College of Agriculture in the solution of agricultural problems. These fellowships are given to men who from their training and experience are deemed competent to undertake the work.



### **For Winter Course Students**

At its annual meeting, held February, 1912, the New York State Grange adopted a resolution whereby \$600 is to be given to members of the order in the form of twelve scholarships in the winter courses in agriculture at Cornell University. The scholarships are each of a value of \$50, to be awarded to men or women who attain the highest standing in competitive examination. The candidate should apply to the Master of the Pomona Grange in his home county, or to the Deputy in counties that have no Pomona.

Mr. H. L. Beatty has offered, for the year 1912-13, a similar scholarship of a value of \$75, "open to any farmer who resides in Bainbridge, N. Y., or to any boy over 16, who shall have attended the Bainbridge High School for one full term".

### **The Eastman Prize for Public Speaking**

With the object of developing qualities of personal leadership in rural affairs, Mr. A. R. Eastman of Waterville, N. Y., has established an annual prize of one hundred dollars for public speaking on country subjects in the College of Agriculture. This prize is designated as the Eastman Prize for Public Speaking. Competition is open to any regular or special student. The contest will take place in February.

### **HONOR SYSTEM**

With the consent of the faculty, examinations for agricultural students are conducted under the "honor system", which is administered by a Committee on Student Honor. New students are given an opportunity to signify their approval of the system and as long as a majority of the students approve, the system is binding on all students registered in the College of Agriculture.

Every new student should acquaint himself at once with the regulations imposed by the honor system, a copy of which is posted in the hall near the main entrance to the Main Building of the college group. The regulations are also printed in the Handbook of Information for Students in the College of Agriculture, copies of which are available at the Secretary's office.

### **GENERAL INFORMATION CONCERNING COURSES**

The regular instruction in the College of Agriculture constitutes a four-year course leading to the degree of Bachelor of Science. There is a combined course with the State Veterinary College comprising six years and leading to two baccalaureate degrees (page 24). There is a Summer School in Agriculture of six weeks in length, designed especially for teachers, school principals and superintendents, and college students. Aside from these there are winter courses, not leading to credits in the University, and opportunities for students to pursue special work. Circulars describing the winter courses and the summer school may be had on application to the Secretary.

Students may pursue agricultural subjects in the Graduate School of the University. For full information concerning graduate work and degrees, see the Announcement of the Graduate School.



### The Regular Four-Year Course

Men who are candidates for admission to the regular or four-year course must be at least sixteen years of age; women must be at least seventeen years of age. They must have certificates of good moral character, and students from other colleges or universities are required to furnish from those institutions certificates of honorable dismissal. Students are admitted on examination, or on presenting credentials of the Education Department of the State of New York, or on acceptable school certificates.

Prospective students who neither have lived on farms nor have had considerable practical experience in agriculture, are urged to spend at least one year on a well-managed farm to familiarize themselves with common farm affairs and operations before entering the College. This experience is imperative in order to pass the farm practice requirements (pages 22 and 37).

Candidates for admission must file their credentials and obtain permits for examination at the University Registrar's office, Morrill 10. The results of examination may be ascertained from the Registrar.

### Entrance Requirements of Four-Year Course

The subjects that may be offered for admission are named in the following list; the figure in parenthesis following each subject indicates its value in units and shows the maximum and minimum amount of credit allowed in the subject. A unit represents five recitations a week for one year in a study.

1a. English A.....	(2)	8a. Ancient History.....	( $\frac{1}{2}$ -1)
1b. English B.....	(1)	8b. Modern History.....	( $\frac{1}{2}$ -1)
2a. First Year Greek.....	(1)	8c. Am. History, Civics.....	( $\frac{1}{2}$ -1)
2b. Second Year Greek.....	(1)	8d. English History.....	( $\frac{1}{2}$ -1)
2c. Third Year Greek.....	(1)	9a. Elementary Algebra.....	(1)
3a. First Year Latin.....	(1)	9b. Intermediate Algebra.....	( $\frac{1}{2}$ )
3b. Second Year Latin.....	(1)	9c. Advanced Algebra.....	( $\frac{1}{2}$ )
3c. Third Year Latin.....	(1)	9d. Plane Geometry.....	(1)
3d. Fourth Year Latin.....	(1)	9e. Solid Geometry.....	( $\frac{1}{2}$ )
4a. First Year German.....	(1)	9f. Plane Trigonometry.....	( $\frac{1}{2}$ )
4b. Second Year German.....	(1)	9g. Spher. Trigonometry.....	( $\frac{1}{2}$ )
4c. Third Year German.....	(1)	10. Physics.....	(1)
5a. First Year French.....	(1)	11. Chemistry.....	(1)
5b. Second Year French.....	(1)	12. Physical Geography.....	(1)
5c. Third Year French.....	(1)	13. Biology*.....	(1)
6a. First Year Spanish.....	(1)	14. Botany*.....	( $\frac{1}{2}$ -1)
6b. Second Year Spanish.....	(1)	15. Zoology*.....	( $\frac{1}{2}$ -1)
6c. Third Year Spanish.....	(1)	16. Agriculture.....	( $\frac{1}{2}$ -1)
7a. First Year Italian.....	(1)	17. Drawing.....	( $\frac{1}{2}$ -1)
7b. Second Year Italian.....	(1)	18. Manual Training.....	(1)
7c. Third Year Italian.....	(1)		

\*If an applicant has counted Biology (1) he may not also offer Botany ( $\frac{1}{2}$ ) or Zoology ( $\frac{1}{2}$ ).



For admission to the New York State College of Agriculture, an applicant must offer either A or B as below:

A. Fifteen units arranged as follows: English (3), history (1), elementary algebra A (1), plane geometry (1), foreign language \*\* (3), elective (6). Solid geometry and plane trigonometry are required of students entering for forestry or landscape art.

B. The Arts College Entrance Diploma or the Science College Entrance Diploma issued by the Education Department of the State of New York.

### Other Details of Admission

For other details as to subjects and methods of admission, see the General Circular of Information, which may be had on application to the Registrar, Cornell University, Ithaca, N. Y.

For admission to the freshman class and to advanced standing from other colleges and universities, all communications should be addressed to the Registrar of the University. See the General Circular of Information.

For admission as a special student, communications should be addressed to the Secretary, College of Agriculture, and attention is called to the paragraphs on pages 23 and 24 of the General Circular of Information.

For admission to graduate work and candidacy for advanced degrees, communications should be addressed to the Dean of the Graduate School.

### Requirements for the Degree of Bachelor of Science

The requirements for the degree of Bachelor of Science shall be residence for eight terms, and, in addition to the prescribed work in the departments of Physical Culture and of Military Science and Tactics, the completion of one hundred and twenty hours of required and elective work as outlined on pages 22-24.

Credit toward a degree for work done in a preparatory school upon subjects which may be offered for entrance to the University will be given to those students only who, in addition to satisfying all entrance requirements, pass separate examinations in the subjects for which they seek college credit. These examinations will cover substantially the same ground as the University courses in the subjects. An applicant desiring a college credit examination of this kind must apply to the Registrar as early as possible, and in no case later than September 10, 1912, or September 9, 1913, specifying which fifteen units he intends to offer in satisfaction of the entrance requirements, and upon what other entrance subjects he wishes to be examined for credit. In case he fails to satisfy the entrance requirements in any one or more of the units upon which he has proposed to enter, but passes the credit examination in any other subject or subjects, he may use the latter towards satisfying entrance requirements, but in that case he cannot also receive college credit for it. The college credit examinations will be held in September, on the dates set for the entrance examinations in the same subjects.

A student who receives at entrance twelve or more hours of entrance credit in addition to the requirements for admission, may be regarded as having satisfied

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\*\*French or German is recommended for entrance. For the Graduate School requirement with reference to a reading knowledge of French and German, see page 5 of the Announcement of the Graduate School.



one term of residence. Under no circumstances shall surplus entrance credit be accepted as the equivalent of more than one term.

A student who has satisfied the entrance requirements of this College, and has afterward completed in two or more summer schools or summer sessions in Cornell University at least twelve hours of work in courses approved by the departments concerned, may be regarded as having thus satisfied one term of residence. Under no circumstances shall work done in summer sessions be accepted as the equivalent of more than two terms of residence. The maximum amount of credit toward the B. S. degree which is allowed for the work of any one summer session is seven hours.

A student admitted to the College of Agriculture from another College in Cornell University or from any other institution of collegiate rank, will be regarded as having completed the number of terms and hours to which his records entitle him, and will receive all the privileges of students who have completed the same number of terms and hours by residence in the College. In order, however, to secure the degree of Bachelor of Science, he must have completed the prescribed subjects in the four-year course, and two-thirds of his elective work must have been taken in courses allowed as agricultural electives. He must also have been in residence in the College of Agriculture at least two consecutive terms and have completed not less than fifteen hours a term, of which two-thirds, at least, must be subjects taught by the staff of the College of Agriculture.

A student must register for at least 12 hours each term and no new student may register for more than 18 hours. Maximum registration by old students is determined on the basis of record.

All men students, except those whose record and registration at the beginning of the senior year show that they are specializing to the extent of fifteen hours in home economics, forestry, landscape art, entomology, or plant breeding, must fully satisfy, before the beginning of the senior year, the requirements in farm practice. All men students are required to report to the Department of Farm Practice within the first three weeks of the first term in the College.

At least two-thirds of the entire elective work of each year must be chosen from the agricultural subjects described on the following pages.

### The Course Leading to the Degree of Bachelor of Science\*

The following courses are required of students entering in September, 1912, and thereafter:

Freshman year	No. of course	Hours 1st term	Hours 2d term
English .....	1....	4....	4
Chemistry .....	1....	6....	—
Chemistry .....85 or 6....	—....	4 or 5	
Biology .....	1....	3....	3
The Farm.....	....	2....	—
Electives .....	....	0-3....	4-7
Total.....		15-18	15-18

\*The required courses given in other colleges than Agriculture are announced on pages 59-60.



Sophomore year	No. of course	Hours 1st term	Hours 2d term
Geology†	1	3	—
Chemistry‡	85, 85a	(2)	6
Physics	1	4	—
Physiology,§ one of the following:			
Physiology of domestic animals	12	—	3
Human physiology	3	—	3
Plant physiology	7 or 8	—	4
Botany or Zoology	1	5	—
Electives		3-6	6-12
Total		15-18	15-18

In addition to the above, the required work in military drill and physical training must be taken.

Political Science 51 may be taken during this year.

Junior year	No. of course	Hours 1st term	Hours 2d term
Political Science	51	3	3

Following is the schedule of required work for students who entered prior to September, 1912; but these students have the option between this schedule and the one preceding:

Freshman year	No. of course	Hours 1st term	Hours 2d term
English	1	4	4
Botany	1	3	1
Botany	2	—	2
Chemistry	1	6	—
Chemistry	85 or 6	—	4 or 5
Biology	1	3	3
Electives		0-2	1-4
Total		16-18	15-18

Sophomore year	No. of course	Hours 1st term	Hours 2d term
Geology †	1	3	3
Chemistry ‡	85, 85a	(2)	6
Physics	1	4	—
Physics	5	2	—
Physics	10	—	2
Physiology,§ one of the following:			
Physiology of domestic animals	12	—	3
Human physiology	3	—	3
Plant physiology	7 or 8	—	4
Electives		4-9	1-10
Total		15-18	15-18

In addition to the above, the required work in military drill and physical training must be taken.

†Optional for students taking a major in home economics.

‡Required of students taking Chemistry 6 in the freshman year. The laboratory work, 85a, may be taken during the first term, leaving the four-hour lecture course for the second term. Students who do not take Chemistry 6 may not take 85a.

§May be taken in junior or senior year by special permission.



Political Science 51 may be taken during this year.

	Junior year	No. of course	Hours 1st term	Hours 2d term
Political Science .....		51....	3....	3

The remainder of the work is made up of electives, at least two-thirds of which must be taken in the College of Agriculture under the following restrictions:

In selecting the subjects in the major group, the student must obtain the advice and approval of a professor or assistant professor having charge of a subject within the group and preferably within the department in which he expects to specialize, who shall be chosen by the student at the beginning of the sophomore year. Students expecting to specialize in forestry, landscape art, or home economics must take as their advisers professors or assistant professors in these departments.

All students must have passed before graduation at least fifteen hours of agricultural electives in one of the groups named below and at least three hours in each of three of the other groups:

Group A—Farm Crops

Horticulture

Pomology

Soil Technology

Group B—Animal Husbandry

Poultry Husbandry

Dairy Industry

Entomology

Group C—Agricultural Chemistry

Plant Physiology

Plant Breeding

Plant Pathology

Meteorology

Group D—Rural Economy

Farm Management

Extension

Farm Mechanics

Drawing

Group E—Forestry

Home Economics

Landscape Art

### Combined Course in Agriculture and Veterinary Medicine

A regular student who has satisfactorily completed all the required work of his course and who has a credit of at least ninety hours may, with the permission of the faculties concerned, be registered both in the College of Agriculture and in the New York State Veterinary College and, on the completion of thirty hours, of which not less than twelve hours shall be taught in the New York State College of Agriculture, may be recommended for his degree. On the completion of the remaining two years and meeting the requirements of the State Veterinary College he will then receive the degree of D.V.M.



## DEPARTMENTS OF INSTRUCTION

### WITH OUTLINES OF COURSES THAT MAY BE CHOSEN BY REGULAR OR SPECIAL STUDENTS AS AGRICULTURAL ELECTIVES

Subject to the restrictions already mentioned (pages 21-24), at least two-thirds of the elective work must be chosen from the courses described on the following pages.

#### ELECTIVE COURSES OPEN TO FRESHMEN

Chemistry 6 (see schedule of freshman year); Entomology 4, 5; Dairy Industry 1, 2, 3, 4, 6; Drawing 1, 2, 4; Farm Mechanics 3, 4, 20; Farm Practice 3; Horticulture 22, 29, 32; Meteorology 1; Rural Economy 1; Landscape Art 1, 2; Nature Study 1, 2; Forestry 1, 4.

Unless otherwise noted, all courses are given in the buildings of the College of Agriculture. Courses inclosed in brackets will not be given in 1912-13.

#### AGRICULTURAL CHEMISTRY

##### Instruction is given in Morse Hall

**85. Agricultural Chemistry.** Second term. Four hours. Prerequisite Chemistry 1. Lectures, T Th S, 11. Lecture Room 1. One recitation, M, W, or F, 8 or 9. Professor CAVANAUGH, Assistant Professor CROSS, and Messrs. HEDGES and RICE.

A general course treating of the relations of chemistry to agriculture and dealing with the composition and chemical properties of plants, soils, fertilizers, feeding stuffs, insecticides, and fungicides.

**85a. Agricultural Chemistry.** Either term. Two hours. Prerequisite Chemistry 1 and 6; required of those who have had 1 and 6 and are taking 85. Laboratory course, T Th, 2-4.30, or W F, 8-10.30. Morse Hall Quantitative Laboratory. Professor CAVANAUGH, and Messrs. HEDGES and RICE. Laboratory deposit, part returnable, \$15.

**86. Agricultural Chemistry.** First term. Two hours. Advanced course. Prerequisite Chemistry 85a. Lectures, T Th, 9. Lecture Room 4. Professor CAVANAUGH.

The methods of the Association of Official Agricultural Chemists are studied in the analysis of fertilizers, soils, and insecticides.

**87. Agricultural Chemistry.** First term. Three hours. Laboratory course, T Th, 2-5, and S, 9-12. Morse Hall Quantitative Laboratory. Professor CAVANAUGH and Assistant Professor CROSS.

This course is designed to accompany Chemistry 86. Laboratory deposit, part returnable, \$20.

**88. Agricultural Chemistry.** Second term. Three hours. Laboratory course, T Th, 2-5, and S, 9-12. Morse Hall Quantitative Laboratory. Professor CAVANAUGH and Assistant Professor CROSS.

This course is designed to accompany Chemistry 89. Laboratory deposit, part returnable, \$20.

**89. Agricultural Chemistry.** Second term. Two hours. Advanced course. Prerequisite Chemistry 85a. Lectures, T Th, 9. Lecture Room 4. Professor CAVANAUGH.

The methods of the Association of Official Agricultural Chemists are studied in the analysis of foods, feeding stuffs, sugars, and dairy products.



90. **Advanced Agricultural Analysis.** Either term. Prerequisite Chemistry 86 and 87 or Chemistry 88 and 89. Credit and hours by appointment. Professor CAVANAUGH.

This course is designed to meet the needs of those who wish to do research in agricultural chemistry.

91. **Elementary Agricultural Chemistry.** First term. No university credit. Open only to special students. Lectures, M W F, 8. Lecture Room 1. Professor CAVANAUGH, Assistant Professor CROSS, and Mr. ———.

92. **Household Chemistry.** First term. Two hours. Prerequisite Chemistry 1 and 6. Lectures, T Th, 11. Lecture Room 2. Professor CAVANAUGH.

This course is designed for students in Home Economics.

93. **Household Chemistry.** First term. Three hours. Laboratory course, T Th S, 8-10.30. Morse Hall Quantitative Laboratory. Professor CAVANAUGH and Mr. HEDGES.

This course is designed to accompany Chemistry 92. Laboratory deposit, part returnable, \$20.

### ANIMAL HUSBANDRY

1. **Principles and Practice of Feeding Animals.** First term. Repeated second term. Two hours. Lectures, S, 9. Practice, M, T, W, Th, or F, 2-3.30, by appointment. Animal Husbandry Building. Assistant Professor SAVAGE and assistants.

The general principles of animal nutrition, including the study of feeding standards, the common grain and commercial feeds, the formulation of rations, etc.

2. **Principles of Animal Breeding.** First term. Repeated second term. Two hours. Lectures, T Th, 9. Animal Husbandry Building. Professor WING and assistants.

A general outline 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, an outline of the methods of registration, and the study of records and pedigrees. Demonstrations, essays, and reports will be required as supplementary to the lectures.

5. **The Horse.** Second term. Four hours. Prerequisite courses 1 and 2. Lectures, M W F, 11. Practice, M T W Th, 3.30-5. Animal Husbandry Building. Assistant Professor HARPER and assistants.

History and characteristics of breeds, selection, judging, feeding, care, training, and development of the horse.

6. **Practical Horse Training.** First term. Two hours. Prerequisite course 5; registration limited, admission by permission only. Lectures, M, 11. Practice in sections by appointment. Animal Husbandry Building and barns. Assistant Professor HARPER and assistants.

A practical course in the feeding, training, and stable management of horses.

7. **Mechanics of the Horse.** First term. Three hours. Prerequisite course 5. Lectures and recitations, W F, 11. Practice, M, 3.30-5. Animal Husbandry Building. Assistant Professor HARPER.

Lectures on animal mechanics, animal proportions, and the relation of the latter to specific uses. Practice in measuring animals and in testing the value of given measurements for given purposes.

10. **Dairy Cattle.** First term. Four hours. Prerequisite courses 1 and 2. Lectures, M W, 9. Practice, M, T, W, Th, or F, 2-3.30, by appointment; also, daily attendance at the barns for practice in feeding and stable management for three weeks in groups as assigned. Animal Husbandry Building, barns, and stables. Professor WING, Mr. DEUEL, and assistants.



Origin, history, and development of the breeds of dairy cattle, production of milk, economy of feeding, care, management, and sanitation of the dairy herd; maintenance of the herd; raising calves, etc. Practice in judging, scoring, milking, and feeding.

**11. Beef Cattle, Sheep, and Swine.** First term. Three hours. Prerequisite courses 1 and 2. Lectures, T Th, 11. Practice in sections by appointment. Animal Husbandry Building. Professor WING, Assistant Professor HARPER, and assistants.

Origin, history, and development of the breeds of beef cattle, sheep, and swine. Methods of beef, mutton, and pork production, especially as based on the results of experiments. Practice in judging beef cattle, sheep, and swine. Reports on topics assigned will also be required.

**15. Advanced Course in Principles of Feeding.** Second term. Two hours. Prerequisite course 1. Will not be given unless elected by at least five students; for advanced and graduate students. Hours to be assigned. Assistant Professor SAVAGE.

**16. Advanced Course in Principles of Breeding.** Throughout the year. One to three hours a term. Prerequisite courses 5 and 10. Lectures, M, 10. Animal Husbandry Building. Professor WING and Assistant Professor HARPER.

Lectures, conferences, and reports, including statistical methods as applied to breeding animals. The work of the first term will consist in large part of practice in making reports on statistical problems. The work of the second term will be in large part individual and will afford opportunity for intimate and close study of the various breeds of improved stock.

**17. Advanced Stock Judging.** Throughout the year. One hour a term. Prerequisite course 10. Practice, S, 10.30-12.30. Animal Husbandry Building. Professor WING, Assistant Professors HARPER and SAVAGE, and Mr. DEUEL. Practice in scoring animals, including critical descriptions of animal form.

**Excursions and Inspection Trips.** The following excursions and inspection trips are scheduled for the year 1912-13: to the International Live Stock Show at Chicago, immediately after Thanksgiving Day; to breeders and herds in the vicinity of Syracuse, immediately preceding the spring vacation; to the stock-yards and slaughterhouses in Buffalo and to breeders in the vicinity, sometime in May. These excursions are elective.

Courses A and B in the Summer School will be considered equivalent to courses 1 and 2 for admission to other courses in animal husbandry.

## BOTANY

The course in botany required of regular students will not be offered in 1912-13. The following special course in forest botany will be given under the direction of Professor Mulford during the first term of the year 1912-13.

**10. Forest Botany.** First term. Three hours. Prerequisite Botany 1 and 2 or their equivalent; designed especially for juniors in forestry. Conference, T, 12. Practice, M, 2-4.30, Th, 8.30-11. Home Economics Building 360. Mr. RANKIN and Mr. FRANCIS.

A course in the identification of trees, shrubs, etc.

## DAIRY INDUSTRY

**1. Milk Composition and Tests.** Either term. Two hours. For regular students only. First term, lectures, T, 11. Dairy Building 222. Practice, T, 2-4.30, S, 8-10.30 or 10.30-1. Dairy Building 232. Second term, lectures, T, 11. Dairy Building 222. Practice, M or W, 2-4.30. Dairy Building 232. Professor TROY and Mr. McINERNEY.



The topics considered are secretion and composition of milk, samples, lactometer, Babcock fat-test, acid tests, moisture test, salt test, preservative tests. Laboratory deposit, part returnable, \$3.

**2. Butter Making.** First term. Three hours. Must be preceded or accompanied by course 1, and should be preceded or accompanied by courses 4 and 8; for regular students only. Lectures, F, 11. Dairy Building 222. Practice in one five-hour period each week, T, 1-6, F, 1-6, or S, 8-1. Dairy Building. Messrs. GUTHRIE and SUPPLEE.

This course considers the principles and practice of butter making in farm dairies and creameries, cream separation, pasteurization, starters, cream ripening, churning, marketing, etc. Laboratory deposit, part returnable, \$2.

**3. Cheese Making.** First term. Three hours. Must be preceded by course 1; should be preceded or accompanied by course 8. Lectures and textbook, Th, 11. Dairy Building 222. Practice, one five-hour period each week, M, W, or Th, 1-6. Cheese Laboratory. Mr. FISK.

In this course are considered the principles and practice of cheddar-cheese making, starter making, buildings and equipment, factory bookkeeping, judging, and marketing. Laboratory deposit, part returnable, \$2.50.

**4. Elementary Bacteriology.** First term. Three hours. For regular students only, except by special permission. Lectures will be given in connection with the laboratory practice. M W F, 2-4.30. (If registration exceeds the capacity of the laboratory a second set of sections will be held, M, 10-1, W F, 8-11.) Dairy Building 122. Professor STOCKING, and Messrs. COOK and PICKERILL.

The purpose of this course is to familiarize the student with laboratory methods, preparation of culture media, sterilization, methods of studying bacteria, and morphology and cultural characteristics of bacteria. Laboratory deposit, part returnable, \$3.

**Dairy Mechanics.** See Farm Mechanics 4.

**6. Market Milk and Milk Inspection.** Second term. Two hours. Must be preceded or accompanied by course 1; should be preceded or accompanied by courses 4 and 8. Lectures, W, 12. Dairy Building 222. Practice, S, 8-10.30 or 10.30-1. Dairy Building. Professor ROSS and Mr. McINERNEY.

Attention is given to the production and control of market milk, with special reference to its improvement; milk as food; shipping stations; transportation and sale; pasteurizing; standardizing; certified milk; milk laws; duties of milk inspectors; apparatus and buildings. The practice includes also visits to dairies in the vicinity of Ithaca. A required two-day inspection trip in the neighboring counties will be arranged. Laboratory deposit, part returnable, \$3.

**7. Advanced Testing Laboratory Course.** Second term. Two hours. Pre-requisite course 1; not open to first and second year students except by special permission. Practice, T Th, 2-4.30. Dairy Building 232. Professor TROY and Mr. McINERNEY.

This course includes work in such subjects as the determination of moisture and dry matter in dairy products, commercial tests for casein, various tests for butter fat, commercial tests for butter and oleomargarine, preservatives and adulterations, milk modification. Laboratory deposit, part returnable, \$2.

**8. Dairy Bacteriology.** Second term. Four hours. Must be preceded or accompanied by course 1, and preceded by course 4 or its equivalent; open to regular students only. Lectures, Th, 11. Dairy Building 222. Practice, M W F, 2-4.30. Dairy Building 122. Professor STOCKING, and Messrs. COOK and PICKERILL.

This course deals with the sources of milk bacteria and methods of controlling their growth, bacteriological studies of market milk and other dairy products, different species of dairy bacteria, making of starters, effect of straining, separation, pasteurization, and temperature, bacteriological methods of city milk inspection. Laboratory deposit, part returnable, \$4.



9. **Advanced Butter-Making.** Second term. Three hours. Must be preceded by a good record in course 2. (In special cases students who have done exceptionally good work in course 18 may be admitted.) Lectures, M, 11. Dairy Building 222. Practice, one long period each week by appointment; the periods will begin at the opening of the creamery in the morning and will close at 12 o'clock. Dairy Building. Mr. GUTHRIE.

Attention will be given to creamery management, creamery records and accounts, organization, location, plans, and construction of creamery buildings. Outside reading will be required. The practice will consist of practical work in the creamery, where six hundred to one thousand pounds of butter are made daily. The work will include receiving and ripening cream, starter culture, manufacture of butter, wrapping butter, and judging. Laboratory deposit, part returnable, \$2.

10. **Fancy-Cheese and Ice-Cream Making.** Second term. Two hours. Must be preceded by courses 1 and 3. Practice, T, 1-6, or S, 8-1. Dairy Building. Professor STOCKING and Mr. FISK.

The manufacture of certain brands of fancy cheese and of ice cream is given attention in this course. Laboratory fee, part returnable, \$2.

12. **Seminary.** Either term. One hour. This course is for advanced students and is required of graduate students taking work in the Department of Dairy Industry. T, 4.30-5.30. Dairy Building. Professors STOCKING, ROSS, and TROY, and Messrs. GUTHRIE and FISK.

13. **Research.** Either term. One or two hours, by arrangement. For advanced students. Practice, by appointment. Dairy Building. Professors STOCKING, ROSS, and TROY, and Messrs. GUTHRIE and FISK.

Special problems in any line of dairy work can be taken up in this course according to the needs of the student. Facilities are provided for investigational work.

14. **General Agricultural Bacteriology.** First term. Three hours. This course is open to regular and special students who desire a general knowledge of bacteria in relation to agricultural problems, but who cannot spend time for the more thorough courses. Lectures, F, 10. Dairy Building 222. Practice, T Th, 2-4.30. (If registration exceeds the capacity of the laboratory a second set of sections will be held, T Th, 8-11.) Dairy Building 122. Professor STOCKING, and Messrs. COOK and PICKERILL.

The characteristics of bacteria, and the place of bacteria in nature; fermentations; bacteria in air, water, and sewage; the manure heap; soil bacteria; nitrogen fixation; relation of bacteria to the dairy and its products; the preservation of farm products, including fruits, vegetables, vinegar, silage, etc. Laboratory deposit, part returnable, \$3.

15. **Bacteriology for the Home.** Second term. Four hours. This course is intended for students in Home Economics. Lectures, F, 9. Dairy Building 222. Practice, T Th, 2-5, and S, 8-11. (If registration exceeds the capacity of the laboratory a second set of sections will be arranged.) Dairy Building 122. Professor STOCKING and Messrs. PICKERILL and COOK.

This course considers the nature of bacteria and methods of studying them; the relation of bacteria to air and water, milk, and other foods; canning and preserving; molds and yeasts in their relation to household problems; decay of fruits; house sanitation. Laboratory deposit, part returnable, \$4.

16. **Milk Composition and Tests.** Either term. Two hours, without credit. Similar to course 1; for special students only. First term, lectures, W, 11. Dairy Building 222. Practice, M, 2-4.30. Dairy Building 232. Second term, lectures, F, 12. Dairy Building 222. Practice, F, 2-4.30. Dairy Building 232. Professor TROY and Mr. MCINERNEY. Laboratory deposit, part returnable, \$3.

18. **Butter Making.** Second term. Three hours. Must be preceded or accompanied by courses 1 and 6; for special students only. Lectures, F, 11.



Dairy Building 222. Practice in one five-hour period each week, M, 1-6, F, 1-6, or S, 8-1. Dairy Building. Messrs. GUTHRIE and SUPPLEE. Laboratory deposit, part returnable, \$2.

19. **Advanced Cheddar-Cheese Making.** Second term. Two hours. Prerequisite a good record in course 3. Lectures and outside reading in connection with laboratory work. Practice, one long period each week, T or Th; each exercise will begin at 11 o'clock and close when the work is done. Cheese Laboratory. Mr. FISK.

This course considers some of the commercial and scientific problems of cheddar-cheese making, starter making, judging, and marketing. Laboratory deposit, part returnable, \$2.

21. **Dairying for the Farm Home.** Second term. Two hours. For Home Economics students only. Lectures, W, 10. Dairy Building 222. Laboratory, F, 2-4.30. Dairy Laboratories. Professor Ross and Mr. ———.

This course will include the testing, handling, care, and scoring of milk and cream, the scoring of dairies, and the manufacture of butter, cheese, and ice cream. Laboratory deposit, part returnable, \$2.

All lockers must be relinquished and all apparatus loaned to students must be returned and checked up not later than the last day of instruction. If lockers and apparatus are not accounted for at that time they will be checked up by the department and an extra fee of twenty-five cents will be charged the student.

## DRAWING

1. **Mechanical Drawing.** Either term. Two hours. Practice, M W, 2-4.30, or T Th, 2-4.30. Dairy Building 371. Assistant Professor BAKER and Mr. REYNA.

An elementary course to enable the student to make and read simple working drawings, plans, elevations, etc.

2. **Freehand Drawing.** Throughout the year. Two or more hours a term. Lectures during practice. Practice by appointment, at any time from 8 to 1 o'clock on T, W, Th, F, or S. Dairy Building 371. Assistant Professor BAKER.

An elementary course for the development of graphic expression applicable to scientific studies. Of especial value to those who expect to enter teaching, nature study, or biological research.

3. **Applied Drawing.** Either term or throughout the year. Two or more hours a term. Prerequisite course 2 or its equivalent. Lectures during practice. Practice by appointment. Dairy Building 371. Assistant Professor BAKER.

Personal instruction in problems of scientific drawing in pencil, pen and ink, wash, and water color.

4. **Isometric Drawing.** Either term. One hour. Lectures during practice. Practice by appointment, at any time from 8 to 1 o'clock on T, W, Th, F, or S. Dairy Building 371. Assistant Professor BAKER and Mr. REYNA.

Isometric drawing is an adaptation of mechanical drawing for the representation of rectangular solids. This form of drawing is not true perspective, but is well suited to the ready representation, either freehand or with a few instruments, of the common rectangular forms met with in the household, in cabinet work, carpentry, and architectural construction. It is suited to those who have no native ability in freehand drawing or are unable to devote to freehand the proper amount of time, but are desirous of a knowledge of some form of graphic expression. Students who have had course 1 may also register in this course for additional practice in isometric drawing.

5. **Perspective.** Throughout the year. Two hours. Prerequisite course 2 or its equivalent; primarily for Landscape Art students. Lectures during practice. Practice by appointment. Assistant Professor BAKER and Mr. REYNA. Appearance representation from plan and elevation.



**7. Freehand Sketching.** Throughout the year. Two hours a term. Pre-requisite course 2; primarily for Landscape Art students. Hours by appointment. Dairy Building 371. Assistant Professor BAKER.

Sketching and rendering, in various media, of indoor and outdoor subjects particularly pertaining to landscape design.

**Freehand Lettering.** No regular course in lettering is offered, but for the benefit of students who desire a knowledge of the essentials of plain lettering, with some practice and criticisms, lectures will be given in the first four weeks of each term, W, 11, and repeated Th, 11. No credit will be given for this work. Assistant Professor BAKER and Mr. REYNA.

Advanced students and graduates engaged in work on theses or in research requiring a considerable amount of drawing are encouraged to do the drawing in this department; or, if this cannot be done conveniently, to bring in their work for occasional criticism and suggestion.

## ENTOMOLOGY, BIOLOGY, AND NATURE STUDY

### Biology

**1. General Biology.** Throughout the year. Three hours a term. Lectures, M W, 9. Auditorium. Practice, M, T, Th, or F, 2-4.30; T, Th, F, or S, 8-10.30; or W, 10.30-1. Main 302. Professor NEEDHAM, Assistant Professor MATHESON, and assistants.

This is an elementary course designed to acquaint the general student with the main ideas of biology through selected practical studies of the phenomena on which biological principles are based. Both lectures and laboratory work will deal with such topics as: the interdependence of organisms, the simpler organisms, organization and phylogeny, oogenesis and ontogeny, 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 a term.

### Entomology

[1. **Invertebrate Zoology.**] Not given in 1912-13. See course 1 in Vertebrate Zoology.

**3. General Entomology.** Throughout the year. Three hours a term. Pre-requisite Biology 1 or Zoology 1. Lectures, W F, 9. Main Building 392. First term, Professor COMSTOCK; second term, Professor HERRICK. Practical exercises, Th or F, 2-4.30. First term, Professor COMSTOCK and Miss STRYKE; second term, Professor HERRICK.

First term, lectures on the characteristics of orders, suborders, and the more important families, and on the habits of representative species. The practical exercises include a study of the structure of insects and practice in their classification. The lectures only (credit two hours) are taken by those who have had courses 4 and 5.

Second term, lectures on the more important insect pests and on methods of controlling them. The practical exercises will include a study of the different stages of as many of the forms as time will permit, together with observations in the field on the habits of the pests. Laboratory fee, \$3 a term.

**4. Elementary Morphology of Insects.** Either term. Three hours. Laboratory open daily, except S, 8-5, Main Building 391. Professor W. A. RILEY and Mr. ———.

An introductory laboratory course required of all students who plan to do advanced work in the Department of Entomology. Laboratory fee, \$2.

**5. Elementary Systematic Entomology.** Either term. Two hours. Must be preceded or accompanied by course 4; may advantageously be preceded or accompanied by course 13. Laboratory and field work, Monday morning or



afternoon and Wednesday afternoon, or other hours by special arrangement. Main Building 301. Assistant Professor BRADLEY.

Practice in the identification of insects, and in the method of phylogenetic study as illustrated by their wing venation. With course 4, required of all students who plan to do advanced work in the Department of Entomology. Laboratory fee, \$2.

6. **Advanced Systematic Entomology.** Either term. Three or more hours. Prerequisite courses 4 and 5. Laboratory work, by appointment. Main Building 301. Assistant Professor BRADLEY.

A training course in the identification and interpretation of obscure characteristics used in the classification of insects. An elementary knowledge of German is desirable for this course. Laboratory fee, \$2 an hour.

7. **Histology of Insects.** Either term. Three or more hours. Prerequisite courses 3, 4, 5, and 12. Laboratory open daily, except S, 8-5. Main Building 391. Professor W. A. RILEY.

A laboratory course to accompany or to follow the first term of course 12. Laboratory fee, \$1.50 an hour.

9. **Advanced Economic Entomology and Insectary Methods.** Second term. Two hours. Open only to graduates and to undergraduates who have had courses 3, 4, and 5. Seminary, field work, and laboratory work, by appointment. Insectary. Professor HERRICK.

Economic problems connected with applied entomology will be discussed and reported upon, and field observations will be made. Experimental methods in breeding, photographing, investigating, and controlling insects discussed and studied. Designed for advanced students in entomology who desire to fit themselves for experiment station work. Laboratory fee, \$2.50.

10. **Classification of the Coccidae (Scale Insects).** Second term. Two hours. Prerequisite courses 4 and 5 and preferably 6. Laboratory work, by appointment. Main Building 301. Assistant Professor BRADLEY.

Designed to familiarize the student with the more injurious species of scale insects, the methods of preparing specimens for study, and the systematic arrangement of the species. Laboratory fee, \$3.

11. **Morphology and Classification of the Arachnida.** Throughout the year. Three or more hours a term. Laboratory work, by appointment. Professor COMSTOCK and Miss STRYKE.

12. **Morphology and Development of Insects.** Throughout the year. Two hours a term. Prerequisite courses 3, 4, and 5. Lectures, T Th, 10. Laboratory work to accompany or to follow this course is offered under course 7. Main Building 392. Professors COMSTOCK and W. A. RILEY.

13. **Entomotaxy.** Second term. Two hours. Laboratory and field work, by appointment. Main Building 301. Assistant Professor BRADLEY.

Methods of collecting insects and of preserving them for study and the cabinet, and other matters of technique; the principles of insect photography.

This course should preferably precede or accompany course 5, and is required of all students taking advanced work in systematic entomology. Laboratory fee, \$3.

14. **German Entomological Reading.** First term. One hour. Open only to advanced students in entomology or zoology. W, 7-9 p. m. Main Building 391. Professor W. A. RILEY.

16. **Elementary Economic Entomology.** First term. Two hours. A course designed for special students; not open to regular students. Lectures, T Th, 9. Main Building 392. Professor HERRICK.

Discussion of insect pests in general, with remedial suggestions. Occasionally, the class will be taken to the field to observe insect pests at work. Laboratory fee, \$.50.



[17. **Literature of Systematic Entomology.** First term. Three hours. Lectures, F, 8. Laboratory and library work, by appointment. Prerequisite course 3 or 5, or Zoology 5. Main Building 392. Assistant Professor BRADLEY.] Not given in 1912-13.

A study of general entomological literature. Practice in the use of generic and specific indices and of bibliographies, and in the preparation of the latter. The methods of preparing technical papers for publication, including the preparation of illustrations. The rules of nomenclature, including the derivation and formation of scientific names. Laboratory fee, \$2.

19. **General Limnology.** Second term. Three hours. Open only to students who have taken or are taking Biology 1 and Entomology 3. Lectures, Th, 8. Main Building 392. Professor NEEDHAM and Mr. LLOYD.

An introduction to the study of the life of inland waters. Aquatic organisms in their qualitative, quantitative, seasonal, and ecological relations. Laboratory fee, \$2.50.

20. **Research in Limnology.** Throughout the year. Three or more hours a term. Prerequisite course 19 or the equivalent. Laboratory and field work. Hours by appointment. Main Building 302 and Biological Field Station. Professor NEEDHAM.

22. **Animal Parasites and Parasitism.** First term. Two hours. Must be preceded or accompanied by Biology 1 or Zoology 1. Lectures, T, 8. Main Building 392. Practical exercises, sect. 1, M, 2-4.30; sect. 2, T, 2-4.30. Professor W. A. RILEY.

A consideration of the origin and biological significance of parasitism, and of the structure, life history, and economic relations of representative animal parasites. Laboratory fee, \$2.

23. **The Relations of Insects to Disease.** Second term. Two hours. Prerequisite first term of course 3 or 22. Lectures, T, 8. Main Building 392. Practical exercises, T, 2-4.30. Professor W. A. RILEY.

Causation and transmission of disease by insects and other arthropods. Laboratory fee, \$2.

24. **The Classification of Immature Insects.** First term. Three hours. Prerequisite courses 3, 4, 5, and 6. Laboratory work, M, 2-5, W, 8-1. Main Building 301. Assistant Professor BRADLEY. Laboratory fee, \$4.50.

27. **Research in Morphology of Insects.** Throughout the year. Three or more hours a term. Prerequisite courses 3, 4, and 5. Laboratory open daily except S, 8-5; S, 8-1. Main Building 391. Professors COMSTOCK and W. A. RILEY.

Special work arranged with reference to the needs and attainments of each student. Laboratory fee, \$1.50 an hour.

28. **Research in Systematic Entomology.** Throughout the year. Three or more hours a term. Prerequisite courses 3, 4, 5, 6, 13, and 17. Laboratory open daily except S, 8-5; S, 8-1. Main Building 301. Professor COMSTOCK and Assistant Professor BRADLEY.

Special work arranged with reference to the needs and attainments of each student. Laboratory fee, \$.50 an hour.

29. **Research in Economic Entomology.** Throughout the year. Three or more hours a term. Prerequisite courses 3, 4, and 5. Laboratory and field work, by appointment. Insectary. Professors COMSTOCK and HERRICK.

In most cases it is impracticable to complete an investigation in this subject during the college year. Students must arrange to conduct their observations during the growing season.

30. **Aquiculture.** Second term. Two hours. Lectures at hours to be arranged. Insectary, Biological Field Station, and Experimental Hatching Station. Assistant Professor EMBODY.



A course on the utilization of the resources of our inland waters. Laboratory fee, \$2.

**31. Forest Insects.** Second term. One hour. Prerequisite first term of course 3. Lecture, T Th, 9. Main Building 392. Professor HERRICK.

A course of lectures dealing with insects injurious to forest and shade trees, together with a consideration of the best methods of controlling their ravages.

**Seminary.** Throughout the year. M, 4.30-5.30. Main Building 392.

The work of an entomological seminary is conducted by the Jugatae, an entomological club which meets for the discussion of current literature and of the results of investigations. Attendance at the meetings may be counted as laboratory work.

### Nature Study

**1. Nature Study Pedagogy and Literature.** Second term. Two hours. Lectures, T Th, 12. Goldwin Smith 227. Mrs. COMSTOCK.

Lectures on nature study as a part of primary education and a discussion of methods of correlating nature study with other school work; a review of popular nature literature and its effect on the child.

**2. Nature Study in Field and Laboratory.** Throughout the year. Two hours or more a term. Practice, T Th, 8-10. Insectary. Mrs. COMSTOCK.

This course gives laboratory and field practice with those subjects in plant and animal life which are best fitted for nature study in the elementary schools. Special attention is given to methods of study and manner of presentation, and also to the relating of the topics to agriculture. The work consists of conferences, and field and laboratory practice.

**3. Nature Study.** Throughout the year. Two hours or more a term. Prerequisite course 2 and Biology 1; advanced course. Laboratory, first term, T Th, 11-1; second term, M, 2-4.30, W, 9-11, 2.30-5. Insectary and Main Building 406. Mrs. COMSTOCK.

Field and laboratory work. This course includes the nature study of the garden.

**5. Nature Study Seminary.** Second term. One hour. W, 12-1. Main Building 406. Professor NEEDHAM and Mrs. COMSTOCK.

Informal discussions of the relations of nature study to life, to science, to agriculture, and to the public schools.

### EXTENSION TEACHING

**1. Extension Work.** First term. Two hours. Open to juniors and seniors, and to others by arrangement. Lectures and practice, M F, 12, or T Th, 12. Auditorium. Criticism by appointment. Professor TUCK and Messrs. WHEELER and ———.

Lectures and discussions on problems of university extension in agriculture. Practice in oral and written presentation of topics in agriculture, with criticism and individual appointments on the technique of public speech. Designed to acquaint students with parliamentary practice, to encourage interest in public affairs, and to train for effective self-expression in public. A few juniors and seniors will be sent out into the State to address meetings.

**2. Extension Work.** Second term. Two hours, or three hours by arrangement. Prerequisite course 1, of which course 2 is a continuation. Lectures and practice, M F, 12, or T Th, 12. Auditorium. Criticism by appointment. Professor TUCK and Mr. WHEELER.

Special training will be given to competitors for The Eastman Prize for Public Speaking (see page 19).



## THE FARM

1. **The Farm.** First term. Two hours. Lectures, M, 8. Auditorium. Practice, M, T, W, Th, or F, 2-4.30, at appointed places on the farm. Professor NEEDHAM, Mrs. COMSTOCK, Assistant Professor EMBODY, and assistants.

This is a course in the study of our agricultural environment. The Cornell University farm will be explored. Its history, its topography, its population, and its chief crops, wild and cultivated, will be studied. Its fields, hills, woods, and streams will be explored, and records will be made of the things observed.

The course deals with the sources of agriculture. It considers crops from the naturalist's viewpoint—Nature's cereals and fruits and roots and fowls that were all present before agriculture developed. Wild products will be compared with cultivated varieties, and the related forms that have not been brought into cultivation will not be overlooked. Finally, these things will be viewed collectively, as conditioning the human affairs of the country community. They will be considered as elements that may be contributory to the beauty, the healthfulness, and the intellectual interest and enjoyment of the farm home. Fee, \$2.

## FARM MANAGEMENT

1. **Farm Management.** Throughout the year. Three hours a term. As many as possible of the following courses should precede or accompany this course: Farm Crops 1 or equivalent, Animal Husbandry 1, Farm Mechanics 3, Pomology 1, Poultry Husbandry 1 or 10, Farm Practice; students who have had or who are taking farm crops and animal husbandry and who have passed the examination in farm practice will be admitted; certain other combinations will be accepted after conference; it is recommended that this course be taken in the junior year. Lectures, T Th, 10. Dairy Building 222. Laboratory, M, T, W, Th, or F, 2-4.30. On days when farms are visited, the laboratory work will not close at 4.30. Agronomy Building 202. Professor WARREN, Assistant Professor LIVERMORE, and Mr. THOMPSON.

Lectures, recitations, and laboratory practice. First term, selection and purchase of farm, farm and building layout, and cost accounting. Second term, farming as a business, regions and types of farming, forms of tenure, capital and its distribution, cropping systems, the management of manure and fertilizers, the efficient use of labor and machinery and horses, marketing of farm products, studies of the management of successful farms, preparation of plans for the organization and management of specific farms. Two one-day excursions will be held about May 10 and 20 to farms at some distance from Ithaca. Laboratory fee, \$1 a term.

3. **Advanced Farm Management.** First term. Two hours. Prerequisite permission to register, and course 1. M or T, 2-5. Main Building 292. Assistant Professor LIVERMORE.

A further study of farm management, including lectures, problems, reading, and trips to successful farms. Expenses for the excursions are estimated to cost about \$5.

4. **Research.** Either term or throughout the year. Two or more hours a term. Prerequisite permission to register, course 1, and must be accompanied by course 5. The number of students will be limited. Professor WARREN, Assistant Professor LIVERMORE, and Mr. THOMPSON.

Investigation of special problems in farm management.

5. **Seminary.** Throughout the year. One hour a term. Open to graduate students and to a limited number of undergraduates who are taking course 3 or 4. Hours to be arranged. Professor WARREN, Assistant Professor LIVERMORE, and Mr. THOMPSON.



**FARM MECHANICS**

**3. Farm Mechanics.** Either term. Three hours. Students are urged to take Drawing 1 in preparation for this course. First term, lectures, T Th, 8. Animal Husbandry Building 112. Practice, M, T, or W, 2-4.30. Farm Mechanics Building. Second term, lectures, T Th, 12. Dairy Building 222. Practice, M, T, or W, 2-4.30. Farm Mechanics Building. Professor H. W. RILEY and Messrs. ROBB, KEPHART, WESTERVELT, and ———.

A study of the principles of operation, the details of construction, and the practical operation and care of: A—Machinery, including gasoline engines, water wheels, devices for transmitting power, hydraulic rams, pumps, spray nozzles, spraying outfits, water-supply outfits. B—Implements, including plows and binder attachments, with a discussion of the special mechanical features of some of these implements now on the market. Laboratory fee, \$2.

**4. Dairy Mechanics.** Second term. One hour. Prerequisite course 3. Lectures, F, 8. Animal Husbandry Building 112. Professor H. W. RILEY.

A brief lecture course on the principles of construction, installation, operation, and care of steam boilers, steam engines, and piping for steam.

**S4. Forge Work.** (Not an agricultural elective.) Either term. One or more hours. Practice, daily 8-11 or 11-2, or daily except S, 2-5, as assigned by Assistant Professor WELLS. East Sibley. Mr. HEAD.

A course given in Sibley College especially for agricultural students, covering the construction of the forge, selection of coal, care of the fire, practice in forging to shape and size, welding iron and steel, and tempering steel. By paying for material used, the student will have opportunity as far as time permits to make for himself a set of tongs, punches, chisels, and other tools. A laboratory fee will be charged.

**19. Research in Farm Mechanics.** Either term. One or more hours. Prerequisite permission to register, and course 3 or its equivalent, together with natural ability in mechanical practice. Professor H. W. RILEY.

Special work in farm mechanics on problems under investigation by the department or of special interest to the student, provided, in the latter case, the department can furnish adequate facilities.

**20. Farm Engineering.** Either term. Three hours. Prerequisite plane geometry; students are urged to take Drawing 1 in preparation for this course. First term, lectures, T Th, 12. Animal Husbandry Building 112. Practice, M, T, or W, 2-4.30. Farm Mechanics Building. Second term, lectures, T Th, 8. Animal Husbandry Building 112. Practice, M, T, or W, 2-4.30. Farm Mechanics Building. Professor H. W. RILEY and Messrs. ROBB and STEVE.

A study of the practical solution of the elementary problems involved in connection with surveying and mapping the farm; locating, digging, and laying drains; laying out building foundations and farm water-supply and sewage-disposal systems. From data obtained in the field a drainage map will be drawn for one of the fields near the college. Attention will also be given to concrete construction, the design of simple structures, and estimates of their cost. Laboratory fee, \$1.

**28. Advanced Work in Farm Engineering.** Second term. Two or more hours. Prerequisite permission to register, and course 20 or its equivalent. Lectures, hours to be arranged. Practice, one problem as assigned. Professor H. W. RILEY and Messrs. ROBB and STEVE.

The lectures will take up the consideration of the better types of surveying instruments, their adjustment and use, and also various methods for conducting complete farm surveys for drainage and irrigation. The practice will consist of one field trip, in parties consisting of two students and an instructor, to selected farms of which complete surveys are desired. The notes will be worked up, a map made, the drainage or irrigation system laid out, and an estimate of cost prepared.



## FARM PRACTICE AND FARM CROPS

## Farm Practice

1. **Farm Practice.** Either term. No University credit. Hour and place by appointment. Professor STONE and Mr. MOULTON.

An elective course designed to assist students in meeting the requirements in farm practice demanded by the College. In order to meet these requirements, students must have a practical knowledge of horses, cattle, sheep, swine, poultry, crops, farm machinery, orcharding, gardening, butter and cheese making, etc. All men students, except those whose record and registration at the beginning of the senior year show that they are specializing to the extent of fifteen hours in home economics, forestry, landscape art, entomology, or plant breeding, must fully satisfy, before the beginning of the senior year, the requirements in farm practice. All men students are required to report to the Department of Farm Practice as assigned within the first three weeks of their first term in the College.

[2. **Farm Structures.** First term. Two hours. Intended for special students. Lectures and quizzes, T Th, 8. Agronomy 152.] Not given in 1912-13.

A study of building materials used on the farm (including concrete), the principles of construction for barns, stables, and other farm buildings, and their application in practice. A discussion of homemade farm appliances and fences is included. Lectures will be supplemented by assigned reading. A set of working drawings of specified subjects will be required of each student.

[3. **Farm Structures.** Second term. Two hours. Prerequisite Drawing 1 or its equivalent. Lectures and quizzes, T Th, 8. Agronomy 152.] Not given in 1912-13.

Similar to course 2, but intended for more advanced and better prepared students.

## Farm Crops

1. **Cereals, Forage Crops, and Miscellaneous Crops.** First term. Four hours. To be preceded or accompanied by Soils 1 or 2. Lectures, M W F, 10. Auditorium. Laboratory, M, T, or W, 2-4.30. Agronomy Building 202. Professor MONTGOMERY and Mr. CATES.

This course is intended primarily for those students who wish only a general survey of the subject. Those more interested in crop production should take courses 2, 3, and 4. Laboratory fee, \$2.

2. **Cereal Crops.** First term. Four hours. To be preceded or accompanied by Soils 1 or 2. Lectures, M W F, 8. Main Building 292. Laboratory, Th or F, 2-4.30. Agronomy Building 202. Professor MONTGOMERY and Mr. CATES.

The history, culture, uses, and distribution of the principal cereal crops. Laboratory study of principal types, varieties, and qualities. Laboratory fee, \$2.

3. **Forage Crops.** Second term. Four hours. To be preceded or accompanied by Soils 1 or 2. Lectures, M W F, 10. Main Building 292. Laboratory, Th or F, 2-4.30. Agronomy Building 202. Professor MONTGOMERY and Mr. CATES.

Lectures, recitations, and laboratory practice on the history, production, and uses of the principal forage crops. Laboratory fee, \$2.

[4. **Potatoes, Beans, Cabbage, and Special Crops.** Second term. Four hours. To be preceded or accompanied by Soils 1 or 2. Lectures, M W F, 9. Main Building 292. Laboratory, M, T, or W, 2-4.30. Agronomy Building 202. Professor MONTGOMERY.] Not given in 1912-13.

Lectures, recitations, and laboratory practice on the history, production, and uses of the crops named above. Laboratory fee, \$2.

9. **Research.** Either term or throughout the year. Two or more hours a term. Prerequisite, permission to register, and courses 2 and 3 or the equivalent; number of students limited. Hours by appointment. Professor MONTGOMERY.



10. **Seminary.** Throughout the year. One hour a term. Required of research students. A limited number of advanced students will be admitted. Professor MONTGOMERY.

12. **Systematic Field Crops.** Throughout the year. Two or more hours a term. Prerequisite adequate training in botany and in field crops. Lectures and laboratories to be arranged. Professor MONTGOMERY.

A course designed primarily for graduates or advanced students who are preparing for experimental work, teaching, or plant breeding. In most cases students will be expected to remain during the summer in order to grow and collect material.

## FORESTRY

The instruction in forestry is designed to meet the needs of several classes of students: (1) students of general agriculture and of landscape art who wish elementary instruction in the care of woodlands and in forest planting and forest nursery work; (2) prospective teachers, business men, lawyers, and others who desire an understanding of the place of forestry in the housekeeping of a nation; (3) technical students in other lines who wish one or more technical forestry courses, such as wood technology; (4) professional forestry students, preparing for forestry as a life work, or pursuing a professional forestry course as a means of general education, useful in business life or otherwise. The course is designed not only to prepare professional students for a career in general forestry, but also to provide opportunity for graduate work in silviculture, forest pathology, forest entomology, and other lines in which specialists will be useful.

The professional course requires five years, leading to the degree of Bachelor of Science at the end of the fourth year and to that of Master in Forestry at the end of the fifth year. The entrance requirements are the same as for general agriculture, except that solid geometry and plane trigonometry are required.

During the first four years the student is registered in the College of Agriculture and his work must include: (a) all of the courses required of general agricultural students; (b) such other courses as the Department of Forestry believes to be best adapted to meet the needs of the individual student. On page 41 is given a recommended sequence of studies that will prove desirable for most students specializing in this field. It is to be understood, however, that this is not a curriculum required of all students. At the discretion of the department deviations from it will be made for students entering the course with advanced standing, and for other students when advisable. In all cases the course of study for a professional forestry student must be planned by the Department of Forestry; and the Faculty has ruled that each professional forestry student must choose as his faculty adviser one of the professors or assistant professors in the Department of Forestry. Admission to candidacy for the degree of Master in Forestry may be conditioned on compliance with this regulation. Before becoming a candidate for the master's degree, the student must have had at least three months experience in forestry work or in a logging camp, satisfactory proof of which is to be by a signed statement or by an examination in woodsmanship, or by both. Students specializing in forestry are not required to pass the examination in farm practice.

In the fifth year the student registers in the Graduate School for one major and one minor subject, and pursues either advanced study or research along these lines. This year is not devoted to undergraduate class work taken by graduate students, although in special cases a part of the student's time may be spent in such classes.

**Courses intended primarily for students who do not expect to make forestry their major work.**

1. **Farm Forestry.** Either term. Two hours. Lectures, M, 9. Home Economics Building 115. Practice, M or T, 2-4.30. Home Economics Building 360. Professor MULFORD.



The management of the farm woodlot, and the starting of new woodlots by planting or sowing. A course dealing with the woodlot as deserving and repaying proper care, such as is given the other crops on the farm. Laboratory fee, \$.50.

Students expecting to take courses 2 and 3 should not elect course 1, as the ground covered in course 1 is gone over in courses 2 and 3.

**2. Elements of Forestry: Mensuration, Utilization, and Management.** First term. Three hours. Lectures, T Th, 9. Home Economics Building 115. Practice, W or Th, 2-4.30. Home Economics Building 360. Assistant Professor BENTLEY.

An elementary course including estimating and measuring the amount of standing timber and its value; measurement of logs and of other forest products; the rate of growth of timber in diameter, height, volume, and value; the best uses to which various forest products can be put; methods of logging, milling, and sale of timber; identification of common woods; age at which timber should be harvested; methods of regulating the amount of timber cut so as to insure a permanent income. (See course 3.) Laboratory fee, \$1.

**3. Elements of Forestry: Silviculture.** Second term. Three hours. Lectures, T Th, 9. Home Economics Building 115. Practice, W or Th, 2-4.30. Home Economics Building 360. Professor SPRING.

An elementary course including the life history of the forest; the influence of soil and climate on forests; the influence of forests on stream flow, climate, and soil; forest planting, sowing, and nursery work; reproducing the forest without planting or sowing; care of the crop during its growth, including thinning; protection from fire and other enemies; identification of a few of the principal timber trees of this region. Laboratory fee, \$1.

Courses 2 and 3 may be taken independently. If both courses are taken, they should meet the needs of students who wish a more detailed knowledge of timberland management than is given in course 1, but do not wish the professional courses.

#### **Courses intended for both professional forestry students and students in other lines**

**6. The Field of Forestry.** First term. Two hours. Lectures, W F, 9. Home Economics Building 115. Professor SPRING.

The place of forestry in the housekeeping of a nation; its aims and importance; national, state, communal, and private forestry enterprises; the day's work of a forester.

**8. Wood Technology.** Second term. Two hours. Lectures, M, 10. Home Economics Building 115. Practice, T, 2-4.30. Home Economics Building 360. Assistant Professor —.

The structure, identification, and technical qualities of the leading kinds of timber; seasoning, preservation, and distillation of wood; paper pulp. Laboratory fee, \$1.

#### **Courses intended primarily for professional forestry students, but open to others who wish detailed technical courses**

Professional forestry students should not elect courses 1, 2, and 3, as the following required professional courses will cover the same ground in greater detail.

**9. Forest Utilization.** First term. Four hours. Lectures, M T W Th, 10. Home Economics Building 115. Field trip, one week (spring vacation), study of a lumbering operation in the Adirondacks or in northern Pennsylvania. Assistant Professor —.

The principal uses of leading timbers; production and consumption of lumber; markets; methods of lumbering and milling; utilization of other forest products, such as naval stores, maple sugar, nuts, game, etc.



[10. **Forest Engineering.** Second term. Two hours. Hours to be arranged. Assistant Professor ———.] Not given in 1912-13.

The construction of trails, roads, telephone lines, etc.

11. **Forest Mensuration.** Second term. Five hours. Lectures, M W, 8. Home Economics Building 115. Practice, F, 8-1 and 2-4.30. Home Economics Building 360. Assistant Professor BENTLEY.

Measurement of logs and of standing timber; timber cruising; study of the rate of growth of timber; volume and yield tables. Laboratory fee, \$1.50.

13. **Timber Trees and Forest Regions.** First term. Three hours. Lectures, M W, 12. Home Economics Building 115. Practice, F, 2-4.30. Home Economics Building 360. Assistant Professor BENTLEY.

Brief account of the forest regions of the world; detailed description of the forest regions of the United States and Canada; the distribution, importance, and silvical characteristics of a large number of the leading timber trees of the United States and Canada, and the identification of such of these as do not grow near Ithaca. (The identification of trees growing near Ithaca is included in Botany 10.) Laboratory fee, \$1.

14. **Silviculture: Forest Ecology.** First term. Three hours. Prerequisite Botany 1 and 2 or the equivalent. Lectures, W F, 8. Home Economics Building 115. Practice, W, 2-4.30. Home Economics Building 360. Professor MULFORD.

The influence of site on the forest, and of the forest on site; the behavior of trees as members of a forest community. Laboratory fee, \$.50.

15. **Silviculture: Natural Reproduction and Care of the Forest.** Second term. Three hours. Prerequisite courses 13 and 14. Lectures, T Th, 8. Home Economics Building 115. Practice, Th, 2-4.30. Home Economics Building 360. Professor MULFORD.

A technical discussion of the silvicultural systems as practiced in Europe, and the possibility of using them in each of the forest regions of the United States and Canada; improvement cuttings, thinning, and underplanting; marking timber for cutting on the National Forests and elsewhere. Laboratory fee, \$.50.

16. **Silviculture: Forest Planting and the Forest Nursery.** Second term. Three hours. Lectures, W, 9. Home Economics Building 115. Practice, S, 8-1. Home Economics Building 360. Professor SPRING.

Collection, care, and testing of tree seeds; identification of tree seeds and seedlings; raising trees in a forest nursery; starting forests by planting trees and by direct seeding; fixation of sand dunes; forestation on the prairies and under the semiarid conditions of the Far West; great forestation enterprises of the world. Laboratory fee, \$1.50.

18. **Forest Protection.** First term. Two hours. Lectures, T Th, 11. Home Economics Building 115. Professor SPRING.

Protection of forests from fire, wind, and other enemies.

19. **Forest Policy, Forest Law, and History of Forestry.** First term. Two hours. Lectures, M W, 11. Home Economics Building 115. Professor SPRING.

The historical development and present status of the relations of state and individual to forestry; the elements of forest law.

20. **Forest Management.\*** First term. Five hours. Open only to graduate students. Four lectures and seminary discussions, one practice period. Hours to be arranged. Home Economics Building 115. Professor MULFORD.

The regulation, valuation, and administration of forest properties; forest working plans.

22. **Seminary.\*** Throughout the year. Two hours a term. Open only to graduate students. Hours to be arranged. Home Economics Building 115. Professors MULFORD and SPRING, and Assistant Professors BENTLEY and ———.

\*Courses 20 and 22 will not be given until 1913-14, unless more than three students apply for them in 1912-13.



23. **Advanced Work.** Throughout the year. Two or more hours a term. Open to undergraduate and graduate students who have had the necessary training. Hours by appointment.

Individual advanced study of designated topics.

24. **Research.** Throughout the year. Three or more hours a term. Open only to graduate students who have had the necessary training.

### Recommended sequence of studies for professional forestry students

The subjects in black faced type are required of all students in the College of Agriculture.

		Freshman year	
		Hours 1st term	Hours 2d term
English 1 .....	4	English 1 .....	4
Chemistry 1 .....	6	Chemistry 85 .....	4
Biology 1 .....	3	Biology 1 .....	3
The Farm 1 .....	2	Drawing 1 .....	2
		Meteorology 1 .....	3
Sophomore year			
Botany .....	5	Plant Physiology 7 .....	4
Geology 1 .....	3	Geology 11 .....	3
Physics 1 .....	4	Advanced Surveying .....	4
Elementary Surveying .....	3	Entomology 31 .....	1
Entomology 3 .....	3	Soil Technology 1 .....	3
		Farm Mechanics 3 .....	3

### Summer following sophomore year

Summer camp for six weeks, beginning in June. Topographic surveying, six hours credit.

		Junior year	
		Hours 1st term	Hours 2d term
Political Science 51 .....	3	Political Science 51 .....	3
Forestry 6 .....	2	Forestry 8 .....	2
Plant Pathology 1 .....	3	Plant Pathology 8 .....	2
Zoology 5 .....	3	Zoology 5 .....	3
Botany 10 .....	3	Rural Economy 7 .....	3
Forge Work S4 .....	1	Entomology 30 .....	2
Geology 15* .....	1	Landscape Art 2 .....	1

### Senior year

Forestry 9 .....	4	Forestry 10 .....	2
Forestry 13 .....	3	Forestry 11 .....	5
Forestry 14 .....	3	Forestry 15 .....	3
Forestry 18 .....	2	Forestry 16 .....	3
Forestry 19 .....	2		

The remaining work of the undergraduate years should be chosen with reference to the tastes and needs of the individual student.

### Fifth Year

Forest management (Forestry 20); seminary (Forestry 22); and either advanced work (Forestry 23) or research (Forestry 24). During the six or eight weeks preceding Commencement, students taking course 23, except those who are specializing in lines not requiring the work, will be engaged in the preparation of a forest working-plan of a large forest tract in New York or Pennsylvania.

\*New course in general lithology not given until 1913-14.



**HOME ECONOMICS**

A four-year course in home economics is planned for students desiring to specialize in this work. The first two years of the course, which are prerequisite to most of the work in home economics, follow the work as outlined for all students in the College of Agriculture, with the addition of some courses not required in the regular schedule. The last two years permit specialization in some one or more of the branches included under the term home economics. As the course develops, new subjects will be incorporated. All students who register in this department must report to the department at the beginning of the freshman year.

**1. Survey Course in Home Economics.** Second term. Six hours. May be taken in any year. Lectures, M T W Th, 9. Practice, hours to be arranged. Home Economics Building. Professors VAN RENSSELAER and ROSE, and Miss BROWNING.

A course intended for students registered in any department in the University who desire a general knowledge of some of the subjects grouped under the term home economics. The lectures will include a discussion of foods, food preparation, human nutrition, household sanitation, and household management. Laboratory fee, \$7.50.

**2. Field of Home Economics.** Throughout the year. One hour a term. Open only to freshmen in home economics. M, 11. Home Economics Building. Professors ROSE and VAN RENSSELAER, and other members of the department.

A course to establish in the mind of the student the relation of home economics to the sciences and arts; its significance in home making, professional life, and technical lines of activity.

**3. Foods.** Second term. Six hours. Prerequisite Biology 1, Chemistry 1 and 6; should be taken in the sophomore year. Lectures, M W F, 11. Practice, M W F, 2-5. Home Economics Building. Professor ROSE and assistants.

A course for establishing a fundamental knowledge of foods. The lectures will include a discussion of the composition and characteristics of foodstuffs; principles of selecting foods and methods of preparing them; food preservation; comparative nutritive and economic values of various food combinations. Laboratory practice will be given to apply scientific principles to food preparation. Laboratory fee, \$10.

**4. Household Sanitation.** Second term. Three hours. Dairy Industry 15 and Physics 1 must precede or accompany this course. Lectures, M W F, 12. Home Economics Building. Professor VAN RENSSELAER and Professor H. W. RILEY.

The lectures in this course will include consideration of the sanitary conditions of the house and site; conditions for health and care of the sick; the relation of bacteriology to the household in cleaning, in the preservation of foods, in disease, and in disinfection; heat, light, ventilation, and disposal of refuse.

**5. Institutional Management.** Second term. One or more hours. Prerequisite Home Economics 3, 4, 6, 14; should be taken in the senior year. Lectures and practice; hours by arrangement. Home Economics Building.

This course is for students in home economics who wish to choose a field, outside of teaching, in caring for and feeding large numbers.

**6. Human Nutrition.** Throughout the year. Two hours first term, six hours second term. Prerequisite Home Economics 3, Physics 1, Human Physiology 3; Chemistry 32 must precede or accompany this course; should be taken in the junior year. Lectures, first term, M W, 10; second term, T Th, 9. Practice, second term, T Th, 10-1 and 2-5. Home Economics Building. Professor ROSE.

A course for the development of a working knowledge of human nutrition. A study of methods of investigating dietary problems and of the practical means of applying scientific principles in planning family and institution dietaries; consideration of special problems of nutrition, as in infant feeding and feeding in cases of abnormal metabolism. Laboratory work will include, as far as possible,



practice in planning and preparing dietaries. An excursion of three or four days to visit schools and various industries may occur at the close of the spring vacation; estimated expense, ten to twelve dollars. Laboratory fee, \$15.

**7. Survey Course in Foods and Human Nutrition.** Second term. Three hours. Lectures, M W, 9. Practice to be arranged. Home Economics Building. Professor ROSE and assistants.

A course intended for students desiring general knowledge of foods, food preparation, and human nutrition. This course is designed especially to meet the needs of the men students who desire a knowledge of nutrition in the planning for numbers of employees on the farm or in other occupations. It also is to be a guide to them in personal selection of food for health and efficiency. Laboratory fee, \$5.

**9. Rational House Planning.** First term. Three hours. Not open to students below the junior year. Lectures, W F, 11. Practice, M, 2-4.30. Home Economics Building. Assistant Professor YOUNG.

This course aims to develop in its students an understanding of good house planning and of good design, in order that they may have intelligent standards of judgment on the housing problem. Besides the drawing of plans, the course will include discussions of various types of dwellings, of the house and its site, of building material, cost, color schemes, constructive features, entrances, porches, etc. Special attention is given to kitchen and pantry arrangements. Laboratory fee, \$2.

**10. Household Art.** Second term. Three hours. Not open to students below the junior year. Lectures, W F, 11. Practice, M, 2-4.30. Home Economics Building. Assistant Professor YOUNG.

A course for the development of artistic expression in the individual. The lectures in this course will apply principles of color and design to questions of interior decorating and furnishing. Students will experiment with color combinations for decorative schemes, and with textile combinations for curtain stuffs, wearing apparel, etc. Laboratory fee, \$2.

**12. Woman and the Family.** Second term. Three hours. Intended for seniors. Lectures, M W F, 9. Home Economics Building. Professor VAN RENSSELAER.

This course embraces a study of woman and the family through the early ages to the present time. It treats survivals with reference to various characteristics and conditions of woman in the family and in the state. Woman's work and her industrial and economic condition are studied with reference to the home and to society.

**14. Household Management.** First term. Three hours. Prerequisite Political Science 51; Home Economics 3 must precede or accompany this course; intended for seniors. Lectures, W M F, 9. Home Economics Building. Professor VAN RENSSELAER.

This course will include a study of the family income, cost of living, household accounts, problems of domestic service, methods of housekeeping, equipment, marketing.

**15. Sewing.** Throughout the year. Two to three hours a term. Not open to students below the junior year; open in 1912-13 only to students registered in the regular course in home economics. Hours to be arranged. Home Economics Building.

**20. Special Problems.** Throughout the year. Credit and hours by arrangement. Prerequisite a fundamental knowledge of home economics; open to seniors or graduate students in home economics, and to other qualified persons by special arrangement. Home Economics Building. Professors VAN RENSSELAER and ROSE, and Assistant Professor YOUNG.

A course intended for the development of the individual student in particular lines of work. Special facilities will be arranged for those intending to teach



home economics, which will include a consideration of the logical methods of organizing and developing courses of study in home economics. Problems of original investigation will be planned for graduate students, or for undergraduate students who have proved themselves capable of undertaking such work. Laboratory fee to be determined by the amount of work done.

**22. Seminary.** Throughout the year. One hour a term. Required of students in home economics and open only to them. By arrangement. Home Economics Building. Professors ROSE and VAN RENSSELAER, and Assistant Professor YOUNG.

**23. Extension in Home Economics.** Throughout the year. Two hours. Open to juniors and seniors, and to others by arrangement. Lectures, F, 10. Laboratory by arrangement. Home Economics Building. Professor VAN RENSSELAER.

Principles of extension work in home economics, with special reference to rural communities; organization; material to be presented; manner of presentation; speaking; writing.

## HORTICULTURE

### Floriculture

**14. Commercial Floriculture.** Second term. Three hours. Prerequisite first term of Floriculture 22, or commercial experience; students are advised to take greenhouse construction before entering this course. Lectures, W F, 9. Main Building 232. Practice, W or F, 2-4.30. New Greenhouses. Assistant Professor BEAL and Mr. ———.

Studies in the propagation and culture of the leading florist crops. As facilities permit, students will be assigned space in the greenhouses for practical experience in the growing of roses, carnations, chrysanthemums, violets, sweet peas, etc. Laboratory fee, \$2.

**15. Commercial Floriculture.** First term. Three hours. Lectures, W F, 9. Main Building 232. Practice, W or F, 2-4.30. New Greenhouses. Assistant Professor BEAL and Mr. ———.

A continuation of Floriculture 14, with discussions on diseases, insects, botany, and the packing, handling, and marketing of cut flowers and plants for retail and wholesale markets. The class will participate in a required excursion to Elmira on December 7. Laboratory fee, \$1.50.

**16. Garden Flowers.** Second term. Three hours. Lectures, T Th, 9. Main Building 232. Practice, T, 2-4.30. New Greenhouses. Assistant Professor BEAL.

This course is designed to acquaint the student with garden plants and to give practical knowledge of the propagation and culture of the annuals, herbaceous perennials, bulbs, and shrubs used for cut flowers or in ornamental planting. Laboratory fee, \$2.

**19. Greenhouse Construction.** First term. Two hours. Prerequisite Drawing 1. Lectures, M, 12. Main Building 232. Practice, Th, 2-4.30. Main Building 201. Assistant Professor BEAL.

The development of the modern greenhouse; types of houses, materials and methods of construction, installation of heating systems, etc. Laboratory practice in erecting section of cypress and iron frame houses, and in planning and estimating the cost of commercial ranges. The class will participate in a required excursion to Elmira on December 7. Laboratory fee, \$1.

**21. Investigation in Floriculture.** Throughout the year. One, two, or three hours a term. Prerequisite Floriculture 14 and 15, and permission to register; designed primarily for upperclassmen and graduate students. Consultations, by appointment. Assistant Professor BEAL.

The investigation of problems in the growing of cut flowers, exotics, and garden flowers; hybridizing; study of varieties.



**22. Greenhouse and Garden Practice.** Throughout the year. One to three hours. Practice either term by appointment. Professor CRAIG, Assistant Professor BEAL, and Mr. ———.

Designed to give the student practical knowledge of greenhouse work. Lectures and exercises in greenhouse management, propagation, composting soils, potting, watering, etc.

**[23. Conservatory Plants.** Second term. Two hours. Prerequisite Floriculture 22; students are advised to take greenhouse construction before entering this course. Lectures, M, 12. Main Building 232. Practice, Th, 2-4.30. New Greenhouses. Assistant Professor BEAL and Mr. ———.] Not given in 1912-13.

A study of the culture and uses of tropical and subtropical plants grown in conservatories, including palms, ferns, begonias, orchids, etc. Laboratory fee, \$1.50.

**24. Floral Design.** First term. One hour. Lectures, demonstrations, and practice, S, 10.30-1. New Greenhouses. Mr. ———.

A study of the principles of floral art. Practice in the arrangement of flowers in designs and bouquets, baskets, table decorations, interior decoration, etc.

### Olericulture

**25. Elementary Vegetable Growing.** Second term. Three hours. Open to those who have taken or are taking Soils 1. Lectures, T Th, 12. Main Building 292. Laboratory, sect. I, T, 2-4.30; sect. II, Th, 2-4.30. New Greenhouses. Mr. WORK and Mr. ———.

The principles of vegetable growing as applied in commercial production. Important vegetable crops—their adaptation, culture, special requirements, varieties, enemies, marketing, and profits. The laboratory work includes exercises in management and planning, the growing of early plants under glass, and the planting and care of early outdoor vegetables. Each student assumes charge of his own plantings, carrying them through to the end of the term. Laboratory fee, \$1.50.

**26. Vegetable Forcing.** First term. Three hours. Prerequisite Soils 1, Olericulture 25. Lectures, T Th, 12. Main Building 292. Laboratory, T, 2-4.30. New Greenhouses. Mr. WORK and Mr. ———.

Vegetable growing under glass; important forcing crops; laboratory will consist of practical work in crop production. Each student will be assigned a plot in the greenhouse on which he will grow vegetables to maturity, assuming full charge except in heating and ventilation. This will be supplemented by descriptive studies. The class will participate in a required excursion to Rochester on December 14, to visit greenhouses; cost, \$4.50. Laboratory fee, \$1.50.

**27. Systematic Olericulture.** First term. Two hours. Prerequisite Olericulture 25. Lectures, T, 8. Main Building 292. Laboratory, hours to be arranged. Mr. WORK.

Lectures and descriptive studies dealing with vegetable crops, their origin and botany. Special attention will be given to varieties and their adaptation to different cultural and market conditions. The important commercial types of the different vegetables are grown in the garden each year and there is an abundance of first-hand material for the course. Laboratory fee, \$2.

**28. Advanced Olericulture.** Second term. Two or three hours. Prerequisite Olericulture 25. Lecture, T, 8. Main Building 232. Special problem by appointment. Mr. WORK.

The student's time will be divided between advanced studies of vegetable crops and their culture, and the study of a special problem to be agreed upon. An excursion to two or three important vegetable-growing centers will constitute a part of this course, the cost to be eight to ten dollars; date to be announced later. Laboratory fee, \$2.



29. **Home Vegetable Gardening.** Second term. Two hours. Lecture, W, 12. Main Building 232. Practice, S, 8-10.30. Greenhouses. Mr. WORK and Mr. ———.

A study of vegetables and their production for home use. The planning and management of the garden, special crop requirements, factors influencing quality, and control of pests will be considered. The laboratory work consists of actual practice in the garden. The starting of early plants in hotbeds and frames, intercropping and succession cropping to secure largest yields from small areas, will be studied. Each student will assume charge of his own plants and carry them through to the end of the term. Laboratory fee, \$2.

### Advanced and Special Courses

32. **Elementary Horticulture.** Throughout the year. Three hours a term. Must be preceded or accompanied by Botany I. Lectures, M W, 12. Main Building 292. Practice, M, 2-4.30. Greenhouse and by appointment. Professor CRAIG, Mr. ———, and Mr. HUNN.

This course aims to emphasize principles and practices involved in the cultivation of garden plants grown for pleasure or profit. It includes the propagation, botany, culture, and economic uses of plants. Some attention is also given to garden making. Designed for teachers of nature study or of elementary agriculture. Laboratory fee, \$1.50.

33. **Nuciculture.** Second term. Two hours. Prerequisite training in systematic botany. Lectures, T Th, 11. Main Building 201. Professor CRAIG.

Lectures on the practical and systematic phases of nut culture, with special reference to the cultivation and improvement of the forms native to the United States. The Morris collection of edible nuts of the world in the Department of Horticulture furnishes abundant material for illustrating the lectures. The Robert T. Morris prize of twenty-five dollars for proficiency in propagating nut trees is offered in this course.

34. **Subtropical Pomology.** First term. Three hours. Prerequisite Botany I and 2. Lectures, T Th, 11. Main Building 232. Laboratory, T, 2-4.30. Main Building 201. Professor CRAIG and Mr. ———.

A study of citrus and other tropical fruits, with special reference to American conditions. Copiously illustrated. Laboratory work in describing and judging the various fruits. Laboratory fee, \$3.50.

35. **Literature of Horticulture and Landscape Gardening.** First term. Three hours. Open to juniors and seniors, and required of graduates. Lectures, M W F, 11. Main Building 232. Professor CRAIG.

A comprehensive survey of the writings of European and American authors, with special reference to the evolution of horticultural methods.

36. **Evolution of Plants.** Second term. Three hours. Open to juniors and seniors, and required of graduates. Lectures, M W F, 11. Main Building 232. Professor CRAIG.

Historical development of theories of evolution; recent theories, including a careful examination of present-day methods. Practice in the greenhouse in the technique of plant breeding.

37. **Investigation.** Either term. One or more hours. For advanced students and graduates. Consultations, by appointment. Professor CRAIG.

The student is assigned a subject which, as far as possible, combines original research with bibliographical methods.

38. **Seminary.** Throughout the year. One hour a term. Required of advanced students who elect Horticulture 37, and of all graduate students. Th, 4.35-5.45 p. m. Main Building 201. Professor CRAIG and members of instructing staff.

39. **Gardening.** Throughout the year and the summer. Three hours. Open to a limited number of students. Meetings, F, 2-4.30. Lazy Club Room. The



instructional staff of the departments of Horticulture and Landscape Art, assisted by Messrs. HUNN, CORNELIUS, and FREE.

A personal and informal course for lovers of plants and gardens. The course consists of actual work with the identification and growing of plants, supplemented by conferences and informal discussions. Attention will be given to garden literature and history, planning of grounds, etc.

## LANDSCAPE ART

### Not open to special students

The instruction noted below may be made to constitute a four or five-year course in landscape art leading to the degree of Bachelor of Science at the end of the fourth year and to a special degree, Master in Landscape Design, at the end of the fifth year. The course includes the required work of the College of Agriculture, or its acceptable equivalent. The course aims to teach in four years an appreciation and understanding of landscape improvement. A fifth or graduate year better fits the student to enter the more professional field of landscape art, especially when supplemented by one year or more of training in the office of a reputable landscape architect. The individual courses are open to any student in the university who meets the prerequisites or their equivalents. Instruction in this department will be given during the summer session in alternate years, beginning with the Summer School of 1913; such instruction supplementing and furthering the regular work of the department, and in particular amplifying the regular instruction in the identification and use of plant materials.

### Recommended sequence of studies for professional students in Landscape Art

The subjects in black faced type are required of all students in the College of Agriculture:

	Freshman year	No. of course	Hours 1st term	Hours 2d term
English	.....	1	4	4
Chemistry	.....	1	6	—
Chemistry	.....	85	—	4
Biology	.....	1	3	3
The Farm	.....	.....	2	—
Drawing	.....	2	2-3	2-4
Landscape Art	.....	2	—	1
	Sophomore year			
Geology	.....	1	3	—
Physics	.....	1	—	4
Botany	.....	.....	5	—
Plant Physiology	.....	7	—	4
Elements of Architecture	.....	11	3	3
Shades and Shadows	.....	13	1	—
Water Color	.....	14	—	2
History of Architecture	.....	.....	2	2
Landscape Art	.....	3	1	1
Landscape Art	.....	4	2	2
	Junior year			
Political Science	.....	51	3	3
Elementary Surveying	.....	10	3	—
Topography, Civil Engineering	.....	.....	—	4
Perspective Drawing	.....	5	2	2
Landscape Art	.....	10	1	1
Landscape Art	.....	11	3	3
Landscape Art	.....	13	3	—
Horticulture	.....	16	—	3



Senior year	No. of course	Hours 1st term	Hours 2d term
Landscape Art.....	14....	4....	-
Landscape Art.....	15....	3-5....	3-5
Landscape Art.....	16....	2....	2
Landscape Art.....	17....	3....	3
Landscape Art.....	20....	-....	1
Soils .....	1....	-....	3

## Suggested Additional Electives

Plant Pathology .....	I and 2....	3....	3
Entomology .....	3....	3....	3
Geology .....	30....	-....	3
Mechanics .....	35....	4....	-
History of Art .....	....	0....	0

**2. Lectures Introductory to Work in Landscape Art.** Second term. One hour. Lectures, T, 12. Assistant Professor DAVIS, and occasional lectures by Professor FLEMING.

A preliminary course introductory to Landscape Art 4 and suggested as of cultural value to the general student. Regular students in the department should elect this course in their freshman year.

**3. History of Landscape Design.** Throughout the year. One hour a term. Intended for sophomores in landscape art, but open to others. Lectures, M, 9. Assistant Professor DAVIS, with occasional lectures by Professor FLEMING.

A study of the chronological development and literature of landscape gardening, its modifications in different countries, and the influences that have affected it. A comprehensive study of the three types of gardening—ancient, medieval, and modern—and their relation to landscape work of the present day.

**4. Theory and Aesthetics of Landscape Design.** Throughout the year. Two hours. Lectures, T W, 9. It is desirable that this course and course 3 be taken simultaneously. While this course is intended for students specializing in landscape art, it may be elected by others satisfying the department of their fitness to do justice to the work. Professor FLEMING, Assistant Professor DAVIS, and staff of visiting lecturers.

A study of the principles of landscape design, and discussions of theory in application to specific problems. Professor FLEMING and Assistant Professor DAVIS will be assisted by representative farm superintendents, nurserymen, park superintendents, gardeners, garden architects, civic advisers, and landscape architects. Subjects to be covered are as follows: ideals of landscape design; the appreciation of landscape; principles, elements, and materials of landscape design; the theory of roads and allées: the above relating to landscape improvement of public and private properties, including farms, country estates, home grounds, gardens, and parks, and to park maintenance.

**6. Rural Improvement.** A course of six lectures, beginning after the Christmas recess. No university credit. These lectures are outlined primarily for the winter course student. Time and place to be announced. Professor FLEMING, Assistant Professor DAVIS, and possible visiting lecturers.

This course consists of brief outlines and discussions of the ways and means of bettering out-of-door conditions. It deals with questions of rural improvement in a way to enable the young man or woman from the farm, or others, to gain a point of view on landscape art, and offers specific suggestions for the solution of some of the simpler home problems.

**10. Plan Evolution.** Throughout the year. One hour a term. Prerequisite courses 3 and 4, and interrelated with course 11; intended for juniors. Lectures, F, 9. Mr. MONTILLON, with occasional lectures by Professor FLEMING and Assistant Professor DAVIS.



A detailed study of the plan as controlled by the natural or created landscape features, the "genius of the place". An explanation of architecture in relation to landscape design.

**11. Elementary Landscape Design.** Throughout the year. Three hours a term. Prerequisite courses 3 and 4, and to parallel course 10. Practice, M W F, 2-4.30. Drafting rooms of the department. Assistant Professor DAVIS and Mr. MONTILLON, assisted by Professor FLEMING in consultation, criticism, and judgments.

The solving and drafting of problems supplementary to and illustrative of course 10; explanatory of the theory and principles of landscape design, the aim of the course being to familiarize the student with the various types of plans, details, and presentations as applied to different problems.

**13. Elements of Planting Design.** First term. Three hours. Prerequisite botany. Lectures, W, 11. Practice, T Th, 2-4.30. Lecture and drafting rooms of the department. Assistant Professor DAVIS and Mr. ———.

A study of the identification and characteristics of the trees, shrubs, and vines commonly used in landscape planting, together with the elementary principles of their composition.

**14. Freehand Sketching.** First term. Four hours. Intended for seniors. Prerequisite Drawing 2 and 5. Hours by arrangement.

Sketching and rendering, in various media, of indoor and outdoor subjects pertaining particularly to landscape design and its presentation.

**15. Landscape Design.** Throughout the year. Three hours a term, and by special arrangement additional hours. Prerequisite courses 10, 11, and 14. Drafting periods, M W F, 2-4.30. Drafting rooms of the department. Assistant Professor DAVIS and Mr. MONTILLON, assisted by Professor FLEMING in consultation, criticism, and judgments.

Work on practical and frequently local problems in design, finished plans, and detailed working drawings, together with reports and specifications.

**16. Landscape Engineering and Details of Construction.** Throughout the year. Two hours a term. Prerequisite Civil Engineering 10, Topography, and Landscape Art 10; intended for seniors. Lectures, T, 10. Practice, M, 10-12.30. Assistant Professor DAVIS and Mr. MONTILLON.

The engineering work peculiarly necessary to landscape gardening will be considered in its adaptation to various kinds of surveys, methods of drainage, types of road and path construction, finished grade designs and their staking, together with their modeling and mapping in plans, profiles, and sections, cost estimates, and specifications.

**17. Planting Design.** Throughout the year. Three hours a term. Prerequisite courses 11 and 13; intended for seniors. Lectures, W, 11. Practice, T Th, 2-4.30. Assistant Professor DAVIS, Mr. ———, and Professor FLEMING in consultation and criticism.

A detailed study of the use, adaptation, arrangement, and æsthetic composition of trees, shrubs, vines, and herbaceous perennials in the planting problems of the landscape designer and landscape gardener, together with nursery lists and cost estimates.

**20. Seminary.** Second term. One hour. Seminary room of the department. Hours to be announced. Professor FLEMING and Assistant Professor DAVIS.

The course includes a review of current literature, the discussions of important questions relating to various phases of landscape work, and reports on investigations.

**39. Gardening.** Given in cooperation with the Department of Horticulture. For description of this course see page 46.

**Excursions.** During or at the end of each term, inspection trips will be taken for the purpose of studying good examples of landscape work.



## METEOROLOGY

1. **Meteorology and Climatology.** Second term. Three hours. Lectures, M W F, 10. Dairy Building 222. Professor WILFORD M. WILSON.

Lectures and weather observations. Designed to acquaint the student with the general circulation of the atmosphere; development, movement, and conditions that attend cyclones, tornadoes, and special storms; practical weather forecasting from weather maps and local observations; the use of meteorological instruments; general and special climatology and its relation to agriculture.

## PLANT BREEDING

1. **Principles of Plant Breeding.** First term. Three hours. Prerequisite Botany 1 and 2 or the equivalent; for regular students only. Lectures, M W, 12. Dairy Building 222. Practice, M or F, 2-4.30. Second floor, New Greenhouses. Professor GILBERT and Dr. WINTERS.

This course will undertake a careful consideration of the principles of plant breeding with reference to variation, selection, and hybridization as factors in the amelioration of cultivated plants. Laboratory fee, \$3.

2. **Methods of Plant Breeding.** Second term. Three hours. Prerequisite Plant Breeding 1; for regular students only. Lectures, M W F, 8. Dairy Building 222. Laboratory work in some of the one-hour periods. Professor GILBERT and Dr. WINTERS.

A study of the practice of plant breeding with special reference to the genetic relations of plants. Methods and results of present-day plant breeders will be considered.

3. **Plant Breeding.** First term. No university credit. Open only to special students. Lectures, T Th, 10. Main Building 292. Practice, T, 2-4.30, or S, 10.30-1. Second floor, New Greenhouses. Dr. WINTERS.

A study of the improvement of plants by selection and hybridization, with special reference to present-day practice. Laboratory fee, \$3.

4. **Biometry.** First term. One hour. For graduate students only; required of graduate students whose major subject is plant breeding. Lectures and practice, by appointment. Professor LOVE.

A discussion of statistical methods as applied to problems in biology and practical breeding. The course is designed primarily to develop methods of interpretation and presentation of biological data.

5. **Research.** Throughout the year. Two hours a term. Prerequisite course 2 or its equivalent; primarily for senior thesis work. By appointment. Agronomy Building 311. Professor GILBERT.

This course affords the student an opportunity to study a plant-breeding problem that will give him practice in bibliographical and research methods.

6. **Research.** Throughout the year. Special work for a few advanced graduate students, arranged with reference to individual aims and attainments. By appointment. Agronomy Building 311. Professors WEBBER, LOVE, and GILBERT.

Problems in plant breeding, heredity, and general evolution.

7. **Seminary.** Throughout the year. One hour a term. Th, 2-4. Second floor, New Greenhouses. Professors WEBBER, GILBERT, and LOVE, Assistant Professor MYERS, and Dr. WINTERS.

A seminary for the discussion of the fundamental problems of plant breeding, heredity, and general evolution, of methods of plant breeding, and of the literature of plant breeding.



## PLANT PATHOLOGY

1. **Plant Pathology.** First term. Three hours. Prerequisite Botany I and 2 or their equivalent. Lectures, F, 12. Main Building 392. Practice, W F, 2-4.30, or Th, 2-4.30, and S, 10.30-1. Agronomy Building 302. Professor WHETZEL and Messrs. GREGORY and CHUPP.

A fundamental course treating of the common diseases of cultivated plants, their nature, cause, and control. A prerequisite for all other courses in plant pathology. The practice sections must be taken in the couplets announced above. Laboratory fee, \$4.50.

2. **Principles of the Control of Plant Diseases.** Second term. Three hours. Prerequisite course 1. Lectures, F, 12. Main Building 392. Practice, W F, 2-4.30, or Th, 2-4.30, and S, 10.30-1. Agronomy Building 302. Professor WHETZEL and Messrs. GREGORY and CHUPP. Professors GILBERT and H. W. RILEY will assist in this course.

A consideration of methods for the control of plant diseases, including sanitation, seed treatment, seed selection, spraying, tree surgery, immunization, preservation of timber, etc. The practice sections must be taken in the couplets announced above. Laboratory fee, \$4.50.

3. **Advanced Plant Pathology.** Throughout the year. One hour a term. Prerequisite course 1; required of all students taking advanced work. Lectures, M, 12. Agronomy Building 302. Professors WHETZEL and REDDICK.

4. **Etiology of Plant Diseases.** Throughout the year. Four hours a term. Prerequisite course 1. Lectures, W Th, 12. Agronomy Building 302. Practice, M T, 2-4.30. Agronomy Building 302. Mr. FITZPATRICK.

Designed especially for students who wish to specialize in plant pathology. The taxonomy and phylogeny of organisms producing diseases in plants. Laboratory fee, \$4.50 a term.

5. **Diseases of Field and Truck Crops.** First term. Three hours. Prerequisite course 1. Conference, T, 12. Agronomy Building 302. Practice, M T, 2-4.30. Professor REDDICK. Laboratory fee, \$4.50.

6. **Diseases of Fruit and Fruit Trees.** Second term. Three hours. Prerequisite course 1. Conference, T, 12. Agronomy Building 302. Practice, M T, 2-4.30. Agronomy Building 302. Professor REDDICK and Mr. —.

Designed especially for students who expect to become practical fruit growers. Laboratory fee, \$4.50.

7. **Diseases of Forcing-house and Florists' Crops.** First term. Three hours. Prerequisite course 1. Conference, T, 12. Agronomy Building 302. Practice, M T, 2-4.30. Professor WHETZEL and Mr. MASSEY.

Designed especially for students specializing in forcing-house or floricultural work. Laboratory fee, \$4.50.

8. **Dendropathology.** Second term. Two or three hours. Prerequisite course 1. Conference, F, 12. Agronomy Building 302. Practice by appointment, Th F, 8-1. Mr. RANKIN.

Designed especially for students in forestry and rural art. Laboratory fee, \$4.50.

## Advanced and Graduate Courses

14. **Phytopathological Technique.** Throughout the year. Three hours a term. Must be preceded or accompanied by course 3. Professors WHETZEL and REDDICK and Assistant Professor BARRUS.

Laboratory practice in the study of the pathogenicity of organisms, isolation, culture work, inoculation, infection, etc. Laboratory fee, \$4.50 a term.

15. **Phytopathological Histology.** Throughout the year. Three hours a term. By appointment. Agronomy Building 326. Professor WHETZEL.

Study of types of histological modifications of plant tissues resulting from disease. Laboratory fee, \$4.50 a term.



20. **Research.** Throughout the year. Not less than three hours a term. Professors WHETZEL and REDDICK and Assistant Professor BARRUS.

Original investigation of problems in plant pathology. Laboratory fee, \$1.50 an hour.

25. **Seminary.** Throughout the year. Required of all graduate students in plant pathology. Hour by arrangement. Agronomy Building 302. Professors WHETZEL and REDDICK and Assistant Professor BARRUS.

The work of the seminary in plant pathology is conducted by the Plant Doctors, a phytopathologists' club which meets for the discussion of current literature and of research.

## PLANT PHYSIOLOGY

[3. **Crop Ecology and Geography.** Second term. Two hours. Prerequisite Plant Physiology 7, and all sophomore work or equivalent; recommended for juniors or seniors, and for students with some agricultural experience. Lectures, W F, 11. Main Building 292.] Not given in 1912-13.

Lectures, demonstrations, and reports, emphasizing the relations of plants to climate; a study of crops and economic plants with respect to environment and distribution.

7. **General Plant Physiology.** Second term. Four hours. Prerequisite all freshman work or its equivalent; this course may be taken to satisfy the requirement in plant physiology. Lectures, T Th, 10. Animal Husbandry Building 112. Laboratory, sect. I, M, 2-5, Th, 11-1; sect. II, T, 2-5, S, 11-1; sect. III, T, 11-1, Th, 2-5; sect. IV, M, 10-1, W, 11-1. Agronomy Building 21. Assistant Professor KNUDSON, Mr. PRUCHA, and Messrs. WILSON, ROBBINS, and NANZ.

Lectures and laboratory work, supplemented by field studies where possible. The topics include absorption, nutrition, relations to environment, growth, reproduction, and propagative processes. Laboratory fee, \$5.

8. **Advanced Plant Physiology.** Throughout the year. Four hours a term. Prerequisite training in botany and chemistry, to be determined in each case by the instructor; recommended for the junior or senior year. Lectures, W F, 10. Main Building 232. Laboratory, W F, 2-4.30. Agronomy Building 21. Assistant Professor KNUDSON, and Messrs. WILSON, ROBBINS, and NANZ.

Lectures, laboratory practice, and reports. This is a comprehensive course in normal physiology and requires on the part of the student good fundamental preparation. It is designed for those specializing in plant study, including the applied lines. Laboratory fee, \$6 a term.

9. **The Physiology of Fermentation.** First term. Three hours. Prerequisite required work through the sophomore year, bacteriology, and Plant Physiology 7 or 8. Lectures, T, 10. Main Building 232. Laboratory by appointment. Assistant Professor KNUDSON and Mr. PRUCHA.

A course in technical microbiology in its relation to fermentation. The course deals primarily with the yeasts, molds, and bacteria that are concerned in the more important fermentation processes. Recommended for graduates and for undergraduates specializing in physiological, bacteriological, or pathological work. Laboratory fee, \$5 a term.

10. **Physiology of Bacteria.** Offered in 1912-13, if facilities permit, to a limited number on consultation.

12. **Cytology.** Throughout the year. Three hours a term. Prerequisite adequate training in botany. Lectures, M, 10. Main Building 232. Laboratory, T, 2-5, Th or S, 11-1. Agronomy Building 21. Assistant Professor KNUDSON, and Mr. ———.

A course for advanced students, giving instruction in the physiology of the cell, and of reproduction and inheritance. Microtechnique and special topics. Laboratory fee, \$5 a term.



### Courses Primarily for Graduates

**[14. Special Chapters in Metabolism.** Second term. One hour or more. Lectures, Th, 12. Main Building 232. Laboratory, hours by appointment. Agronomy Building 21.] Not given in 1912-13.

A study of some of the more important temporary and storage products of plant metabolism. Open only to graduates, or to undergraduates who have had Plant Physiology 8 and organic chemistry.

**16. General Seminary.** Throughout the year. One hour a term. Limited to advanced students and to graduates taking work in the department. Conference, F, 11. Agronomy Building 192. Assistant Professor KNUDSON.

During the first term, topics will be chosen from current work in plant physiology. During the second term, special outlines will be followed and reports on research studies presented.

**18. Research, General Physiology.** Throughout the year. Credit for major or minor, otherwise not less than four hours a term. Prerequisite adequate training in botany, chemistry, and physiology. By appointment. Agronomy Building 101. Assistant Professor KNUDSON.

**19. Research, Cell Physiology.** Throughout the year. Credit for major or minor, otherwise not less than four hours a term. Prerequisite adequate training in botany and physiology. By appointment. Agronomy Building 101. Assistant Professor KNUDSON.

In courses 18 and 19, problems in plant physiology (including ecology, cytology, and heredity) and the general relation of plant physiology to agriculture will be assigned for investigation. Reports or theses will be required. The amount of the laboratory fee is governed by the nature of the work.

### POMOLOGY

**1. Elementary Pomology.** First term. Three hours. Lectures, T Th, 11. Auditorium. One recitation, M or W, 12, F, 11, or S, 9. Dairy Building 202. Professor WILSON and Messrs. ANTHONY and KNAPP.

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. (See course 1a).

**1a. Elementary Pomology.** First term. One hour. Required of students taking the advanced courses in pomology. Laboratory course to accompany course 1, Th or F, 2-4.30. Main Building 202. Professor WILSON and Messrs. ANTHONY and KNAPP.

A study of the methods of budding, grafting, pruning, and planting; varieties, nursery trees, and fruit buds. Laboratory fee, \$2.

**2. Practical Pomology.** Second term. Three hours. Prerequisite course 1. Lectures, M W, 11. Auditorium. One recitation, M or W, 12, F, 11, or S, 9. Dairy Building 202. Professor WILSON.

A study of the soils and varieties for the orchard; 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.

**4. Bush Fruits.** Second term. One hour. Prerequisite course 1. Lectures and discussions, T, 10. Main Building 292. Professor WILSON.

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

**6. Spraying of Fruit Trees.** Second term. Two hours. Prerequisite course 1, 1a, Plant Pathology 1, Entomology 3 or 16. Lectures, W, 8. Main Building



292. Practice, Th or F, 2-4.30. Main Building 202. Professor WILSON and Mr. ANTHONY.

A study of the preparation and application of the spray mixtures used in orchard practice. Laboratory fee, \$2.

8. **Advanced Practical Pomology.** First term. Two hours. Prerequisite courses 1 and 2, and Botany 1 and 2 or Biology 1. Lectures or recitations, W, 11. Main Building 292. Practice, W, 2-4.30. Main Building 202. Professor WILSON and Messrs. ANTHONY and KNAPP.

The course considers the packing of apples in boxes and barrels; a comprehensive study of the varieties of peaches, plums, grapes, pears, and apples; the judging of fruits; the preparation of planting and working plans; the disposition of inferior grades and culls. From the students in this course teams will be chosen to do practical judging at the annual meetings of the state societies at Rochester. The preparation of the fruit exhibit at the College is required of the students in this course. Laboratory fee, \$2.

10. **Systematic Pomology.** Second term. Two hours. Prerequisite courses 1, 1a, 2, and 8, and Botany 1 and 2 or Biology 1. Lectures or recitations, Th S, 11. Main Building 292. After May 1 a laboratory period, S, 10.30-1, is substituted for one lecture. Professor WILSON.

A course designed primarily for graduates and students who are preparing to do experimental work. 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.

[13. **Research in Pomology.** Throughout the year. One or more hours a term. Prerequisite courses 1, 1a, 2, and 8; students taking this course are required to take Pomology 14. F, 9. Main Building 202. Professor WILSON and Mr. ANTHONY.] Not given in 1912-13.

Original investigation of problems in pomology. A typewritten thesis is required.

14. **Seminary.** Second term. One hour. Open only to graduates and students taking course 10 or 13. F, 9. Main Building 202. Professor WILSON and Mr. ANTHONY.

## POULTRY HUSBANDRY

1. **Poultry Husbandry.** First term. Three hours. Lectures, T Th, 9. Poultry Building 375. Practice, W or Th, 2-4.30. Poultry Plant or Poultry Building 350. Professor RICE, and Messrs. BENJAMIN and ———.

A somewhat specialized course for those who desire to make a more extended study of poultry husbandry than is provided in course 10. To precede or to be taken in connection with courses 2, 3, 4, 5, 6, 7, and 8. Principles of poultry breeding, anatomy and physiology of poultry; study of the egg; embryology; incubating and brooding; poultry feeds; feeding for egg production; fattening and rearing; diseases, parasites, and sanitation.

2. **Feeding and Care.** Second term, after February 16. One hour. Must be preceded or accompanied by course 1 or 10, preferably also by Animal Husbandry 1. Practice, three short periods a day for four weeks: morning, 7.45-8.30; noon, 12.45-1.15; night, 4.30-5. Poultry Plant. Messrs. SCHREINER and ———.

The managing and keeping of records of fowls for egg production and for fattening, including the preparation for market.

3. **Incubator Practice.** Second term, after February 16. One hour. Must be preceded or accompanied by course 1 or 10. Practice, three short periods a day for four weeks: morning, 7.45-8.30; noon, 12.45-1.15; night, 4.30-5. Poultry Plant. Messrs. SCHREINER and ———.

Practice in operating incubators, testing eggs, and keeping records, including the taking apart and setting up of machines.



4. **The Breeds and Judging.** First term. Two hours. Must be preceded or accompanied by course 1. Lectures or recitations, F, 12. Poultry Building 375. Practice, F, 2-4.30. Poultry Building 350. Assistant Professor ROGERS and Mr. ———.

The origin, history, and classification of breeds of domestic poultry. Judging the principal breeds for fancy and utility points, by both score card and comparison methods, and fitting fowls for exhibition.

5. **Poultry House Design and Construction.** Second term. Two hours. Must be preceded or accompanied by course 1. Lectures or recitations, F, 12. Poultry Building 375. Practice, F, 2-4.30. Poultry Building 350. Assistant Professor ROGERS and Mr. ———.

Planning and construction of poultry buildings and estimating the cost.

6. **Poultry for the Household.** First term. Two hours. Lectures or recitations, T, 12. Poultry Building 375. Practice, T, 2-4.30. Poultry Building 350. Messrs. BENJAMIN and KENT.

This course is given primarily for students in home economics, but is open to others. Buying poultry and poultry products, preservation of poultry products, judging dressed poultry, trussing, carving, etc.

7. **Marketing.** First term. Two hours. Must be preceded or accompanied by course 1. Lectures or recitations, M, 12. Poultry Building 375. Practice, M, 2-4.30. Poultry Building 350. Messrs. BENJAMIN and KENT.

The preparation of poultry and eggs for market, storage, preservation, and the principles of marketing.

8. **Poultry Farm Management.** Second term. Two hours. Must be preceded or accompanied by courses 1, 2, 3, 4, 5, and 7; should be preceded or accompanied by Farm Management 1. Lectures and recitations, M, 12. Poultry Building 375. Practice, M, 2-4.30. Poultry Building 350. Professor RICE and Mr. BENJAMIN.

There will be several excursions to representative poultry plants in April and May.

10. **Farm Poultry.** Second term. Three hours. Lectures, T Th, 9. Poultry Building 375. Professor RICE. Practice, T, W, Th, or F, 2-4.30. Poultry Plant or Poultry Building 300. Professor RICE, and Messrs. KENT and ———.

An elementary course, covering briefly the general field of poultry husbandry; primarily for persons who expect to make poultry keeping a minor part of farming.

11. **Seminary.** Either term or throughout the year. One to three hours a term. Prerequisite courses 1, 2, and 3; should be preceded or accompanied by courses 4, 5, 6, 7, and 8; can best be taken in the last year by special students and in the junior or senior year by regular students. Recitations and conferences, W, 12, Poultry Building 276. Professor RICE, Assistant Professor ROGERS, and Mr. BENJAMIN.

For advanced study and conference. Includes review of literature, written reports on research, and study of advanced problems.

12. **Research.** Either term or throughout the year. One to three hours a term. Prerequisite courses 1, 2, and 3; should be preceded or accompanied by courses 4, 5, 6, 7, 8, and 11. By appointment. Poultry Building 276. Professor RICE, Assistant Professor ROGERS, and Mr. BENJAMIN.

An original investigation of a problem in poultry husbandry, to be presented as a written thesis.

## RURAL ECONOMY

1. **Agriculture.** First term. Two hours. Open only to freshmen. Lectures, T Th, 11. Main Building 392. Professor LAUMAN.

A brief general survey of agriculture in its technical, economic, social, and historical aspects. Designed to give the beginner a view of the whole field of agriculture.



4. **Rural Economy.** First term. Three hours. Prerequisite Political Science 51. Lectures, M W F, 9. Goldwin Smith B. Professor LAUMAN.  
A study of the general economic problems of agriculture.

5. **Rural Social Conditions.** First term. Three hours. Prerequisite Political Science 51. Lectures, M W F, 11. Main Building 392. Professor LAUMAN.  
A study of the social history, status, and problems of the rural community.

[6. **History of Agriculture.** Second term. Three hours. Not open to students below the junior year. Lectures, M W F, 9. Agronomy Building 152. Professor LAUMAN.] Not given in 1912-13.

The more important phases of the development of agriculture are considered historically.

[7. **Conservation.** Second term. Three hours. Open to juniors and seniors in all colleges. Lectures, M W F, 11. Agronomy Building 152. Professor LAUMAN.] Not given in 1912-13.

8. **Cooperation.** First term. Two hours. Prerequisite Political Science 51. Lectures, T Th, 9. Main Building 232. Professor LAUMAN.

A study of the general principles and history of cooperation, with special reference to agriculture and the conditions prevailing in the United States.

[14. **Rural Economy.** Second term. Three hours. Prerequisite course 4. Lectures, T Th, 9. Main Building 193. Professor LAUMAN.] Not given in 1912-13.

An advanced course of more detailed and critical study of a few of the general economic problems of agriculture.

18. **Investigation.** First term. For graduates not candidates for degrees, and for advanced seniors by special permission. Credit for undergraduates, two or three hours a term. Main Building 195. Professor LAUMAN.

[19. **Seminary.** Throughout the year. One hour a term. By arrangement. For graduates, and open to advanced seniors by special permission. Main Building 195. Professor LAUMAN.] Not given in 1912-13.

Devoted to current literature, the study of monographs, and reports on the progress of the investigations by members of the seminary.

## RURAL EDUCATION

It is expected that courses in rural education, for the benefit of those who expect to teach, will be offered in 1912-13.

## SOIL TECHNOLOGY

1. **Principles of Soil Management.** Either term. Three hours. Prerequisite Chemistry 1 and Geology 1. Lectures, M W, 9. First term, Poultry Building 375; second term, Dairy Building 222. Laboratory, M, W, or F, 2-4.30. Agronomy 42. Assistant Professor BUCKMAN.

A comprehensive course dealing with the origin, composition, and properties of soils, with particular reference to their management in crop production. The laboratories will consist in practices designed to demonstrate fundamental physical relations, and will be supplemented by laboratory lectures. Laboratory deposit, \$3.

2. **Elementary Soils.** First term. Two hours, without credit. Must be preceded or accompanied by Chemistry 91; designed for special students. Lectures, T Th, 9. Auditorium. Three field trips are required, arranged by appointment. Assistant Professor BUCKMAN.

A practical course in soils, dealing with their origin, composition, properties, and modes of handling. The lectures will consist in a practical discussion and demonstration of (a) the formation and classes of soils, (b) tilth, (c) soil moisture



and its management, (d) soil amendments, (e) fertilizers and manures, (f) soil biology, and (g) soil management from the standpoint of plant production.

**5. Soil Surveying.** First term. Two hours. Prerequisite Soils 1; Farm Management 1 is a desirable preparation; for seniors. Practice, S, 8-1. Field, and Agronomy Building 42. Professor FIPPIN and Assistant Professor BUCKMAN.

Preparation of reports and maps on soil conditions; classification and agricultural development of specific areas, with particular reference to soil utilization. Study of the business development of land.

**6. Advanced Soils.** Second term. Two hours. Prerequisite Soils 1, Chemistry 6 and 12. Lectures, T Th, 9. Main Building 292. Professor BIZZELL.

An advanced course designed particularly for men specializing in soil technology. The lectures will deal with the important properties of soils from the theoretical and technical standpoint. The review of literature and preparation of papers will be an important part of the work.

**7. Manures and Fertilizers.** Second term. One hour. Prerequisite Soils 1 and Chemistry 85. Lectures, Th, 11. Main Building 392. Assistant Professor BUCKMAN.

This course deals with the composition, handling, and economic use of barnyard and green manures; the general composition and utilization of commercial fertilizers and soil amendments. A consideration of experimental work along these lines will be an important phase of this course.

**8. Drainage and Irrigation.** First term. Two hours. Prerequisite Soils 1 and Farm Engineering 20; for juniors and seniors. Lectures, F, 10. Animal Husbandry Building 112. Practice, F, 2-4.30. Agronomy 42. Professor FIPPIN and Assistant Professor BUCKMAN.

History, economic relations, principles, and practice of drainage and irrigation.

**11. Research in Soils.** Throughout the year. For graduate students only. By appointment. Laboratory deposit, \$5. Agronomy Building 211. Professor BIZZELL.

Three graduate students may register for their major subjects with Professor LYON.

**14. Soil Seminary.** Throughout the year. One hour a term. Open to seniors having Soils 6, and required of graduate students. M, 7.30 p. m. Agronomy Building 42. Professors LYON, FIPPIN, and BIZZELL and Assistant Professor BUCKMAN.

## SPECIAL WORK

Opportunities are provided for persons who desire to pursue special studies. To be eligible for admission to special work applicants must offer, first, two full years of recent farm experience, and second, either fifteen units of entrance credits, or be twenty-one years of age. Applicants for admission on the age requirement must satisfy the faculty of their ability to handle the work; and every applicant must satisfy the faculty of his bona fide desire for special study. He will be required to present an honorable dismissal from the school last attended, certificates of good moral character, and such other certificates and letters as may be desired. The special work is designed to meet the needs of young men and young women from farms who have not time for a four-year course, and of other mature persons who desire to spend a brief period in specialized study. The work is not a definite "course" in the sense of having a program or a prescribed set of studies. The student chooses any of the agricultural "electives" that he is fitted to pursue. Certain courses are given by some of the departments for those who lack some of the fundamental work usually required in those subjects. Admission as a special student does not admit to classes. The student is admitted to the various classes by the heads of the departments concerned.



1. **Physics. Introductory Experimental Physics.** Repeated in second term, credit four hours. Professors NICHOLS and SHEARER and Assistant Professor GIBBS. M T W Th, first term 9 or 12, second term 12. Rockefeller A.

Entrance physics is not accepted as an equivalent of this course.

1. **Zoology. General Zoology.** First term, credit five hours. Assistant Professor REED. M W F, 10. McGraw 5.

Sect. 1, W F, 2-4.30, McGraw 5. Dr. ALLEN and Mr. LEONARD.

Sect. 2, T Th, 2-4.30, McGraw 5. Dr. ALLEN and Mr. LEONARD.

A general survey of the animal phyla, the life processes, adaptations, and relationships of animals, the principles of zoology, and an introduction to morphology and development. As far as possible each phase of the subject will be illustrated with living material.

12. **Veterinary Physiology. The Physiology of the Nutrition and Secretion of the Domesticated Animals.** Three hours weekly. Second term. T Th F, 10. Veterinary College. Professor FISH.

3. **Physiology. Elementary Human Physiology.** Second term. Credit three hours. Professor SIMPSON and assistants. M W F, 10. Stimson Hall, Large Amphitheatre.

For students who expect to teach physiology in the secondary schools, and an introductory course for students of the biological sciences. A general review of the functions of the systems and organs of the human body, with introductory remarks on structure. The lectures will be fully illustrated by experiments, lantern slides, and diagrams, and periodical quizzes and examinations will be given.

51. **Political Science. Elementary Economics.** Throughout the year, credit three hours a term. One lecture and two recitations each week. Lectures, M, 11; repeated M, 12. Assistant Professor BAUER. Recitations, T Th, 8, 10, 11, 12; W F, 8, 10, 11, 12. Drs. USHER, SPEDDEN, and Mr. SMITH.

A general introduction to economics. This course is a prerequisite for most of the other courses in the field of political science. For section assignments and other information apply at Goldwin Smith 260.















## 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, First Term, 1911-12, 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, January 1, 1912.

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

Announcement of Sibley College of Mechanical Engineering and the Mechanic Arts, Feb. 15, 1912.

Announcement of the College of Civil Engineering, March 1, 1912.

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, Aug. 1, 1912.

Announcement of the Winter Courses in the College of Agriculture, November 1, 1911.

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

Announcement of the New York State Veterinary College, April 15, 1912.

Announcement of the Graduate School, January 15, 1912.

Announcement of the Summer Session, April 1, 1912.

Annual Report of the President, December 1, 1911.

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, N. Y.