

# CORNELL UNIVERSITY OFFICIAL PUBLICATION

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Volume XIII

Number 14

## Announcement of the New York State College of Agriculture 1922-23

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June 15, 1922

## CALENDAR

### First Term, 1922-23

Sept. 12	Tuesday	University entrance examinations begin.
Sept. 20	Wednesday	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, Roberts Hall, unless permission to register has previously been sent to them by the Registrar.
Sept. 21	Thursday	Registration of new students.
Sept. 22	Friday	Registration of old students.
Sept. 25	Monday	Instruction begins. President's annual address to the students.
Oct. 13	Friday	Last day for payment of tuition.
Nov. 8	Wednesday	Registration of winter-course students.
Nov. —	Thursday	Thanksgiving recess.
Dec. 21	Thurs. 1 p.m.	Instruction ends in regular and winter courses.
Jan. 4	Thurs. 1 p.m.	Instruction resumed in regular and winter courses.
Jan. 11	Thursday	Birthday of Ezra Cornell. Founder's Day Convocation.
Jan. 29	Monday	Term examinations begin.

} Christmas  
recess.

### Second Term, 1922-23

Feb. 9	Friday	} Registration of all students.
Feb. 10	Saturday	
Feb. 12	Mon. 8 a. m.	Instruction begins in regular courses.
Feb. 12-17		Farmers' Week.
Feb. 16	Friday	Instruction ends in winter courses.
Mar. 2	Friday	Last day for payment of second term tuition.
Apr. 4	Wed. 1 p. m.	Instruction ends.
Apr. 11	Wed. 1 p. m.	Instruction resumed.
May 19	Saturday	Spring Day: a holiday.
June 5	Tuesday	Term examinations begin.
June 20	Wednesday	Fifty-fifth Annual Commencement.

} Spring recess.

### Summer Term, 1923

June 16	Saturday	Registration.
June 18	Monday	Instruction begins.
Sept. 8	Saturday	Instruction ends.

# NEW YORK STATE COLLEGE OF AGRICULTURE

## STAFF OF INSTRUCTION AND EXTENSION

Livingston Farrand, A.M., M.D., LL.D., President of the University.  
Albert Russell Mann, B.S.A., A.M., Dean of the College of Agriculture, Director of the Experiment Station, and Director of Extension.  
Isaac Phillips Roberts, M.Agr., Professor of Agriculture, Emeritus.  
John Henry Comstock, B.S., Professor of Entomology and General Invertebrate Zoology, Emeritus.  
John Lemuel Stone, B.Agr., Professor of Farm Practice, Emeritus.  
Liberty Hyde Bailey, M.S., LL.D., Litt.B., Ex-Dean, Professor, Emeritus.  
Whitman Howard Jordan, LL.D., Professor of Animal Nutrition, Emeritus.  
Mrs. Anna Botsford Comstock, B.S., Professor of Nature Study, Emeritus.  
Henry Hiram Wing, M.S. in Agr., Professor of Animal Husbandry.  
Thomas Lyttleton Lyon, Ph.D., Professor of Soil Technology.  
James Edward Rice, B.S.A., Professor of Poultry Husbandry.  
George Walter Cavanaugh, B.S., Professor of Chemistry in its Relations to Agriculture.  
George Nieman Lauman, B.S.A., Professor of Rural Economy.  
Herbert Hice Whetzel, M.A., Professor of Plant Pathology.  
George Frederick Warren, Ph.D., Professor of Agricultural Economics and Farm Management.  
William Alonzo Stocking, M.S.A., Professor of Dairy Industry.  
Wilford Murry Wilson, M.D., Professor of Meteorology.  
Ralph Sheldon Hosmer, B.A.S., M.F., Professor of Forestry.  
James George Needham, Ph.D., Litt.D., Professor of Entomology and Limnology.  
(Exchange Professor at Pomona College, 1922-23.)  
Rollin Adams Emerson, D.Sc., Professor of Plant Breeding.  
Harry Houser Love, Ph.D., Professor of Plant Breeding.  
Donald Reddick, Ph.D., Professor of Plant Pathology.  
George Alan Works, B. Ph., M.S. in Agr., Professor of Rural Education.  
Flora Rose, B.S., M.A., Professor of Home Economics.  
Martha Van Rensselaer, A.B., Professor of Home Economics.  
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 Rural Engineering.  
Harold Ellis Ross, M.S.A., Professor of Dairy Industry.  
Hugh Charles Troy, B.S.A., Professor of Dairy Industry.  
Samuel Newton Spring, B.A., M.F., Professor of Silviculture.  
Karl McKay Wiegand, Ph.D., Professor of Botany.  
William Henry Chandler, Ph.D., Professor of Pomology and Vice Director of Research.  
Arthur Bernhard Recknagel, B.A., M.F., Professor of Forest Management and Utilization.  
Merritt Wesley Harper, M. S., Professor of Animal Husbandry.  
Cyrus Richard Crosby, A.B., Extension Professor of Entomology.  
Elmer Seth Savage, Ph.D., Professor of Animal Husbandry.

- Edward Albert White, B.Sc., Professor of Floriculture and Ornamental Horticulture.
- Alvin Casey Beal, Ph.D., Professor of Floriculture.
- Herbert Andrew Hopper, B.S.A., M.S., Extension Professor of Animal Husbandry.
- Edward Sewall Guthrie, Ph.D., Professor of Dairy Industry.
- Maurice Chase Burritt, M.S. in Agr., Professor in Extension Service and Vice Director of Extension.
- William Charles Baker, B.S.A., Professor of Drawing.
- Mortier Franklin Barrus, Ph.D., Extension Professor of Plant Pathology.
- Lewis Josephus Cross, Ph.D., Professor of Chemistry in its Relations to Agriculture.
- Oskar Augustus Johannsen, Ph.D., Professor of Entomology.
- Clyde Hadley Myers, Ph.D., Professor of Plant Breeding.
- Bristow Adams, B.A., Professor in Extension Service, Editor, and Chief of Publications.
- Dick J. Crosby, M.S., Professor in Extension Service.
- Asa Carlton King, B.S.A., Professor of Farm Practice and Farm Superintendence.
- Cornelius Betten, Ph.D., Vice Dean of Resident Instruction.
- George Abram Everett, A.B., LL.B., Professor of Extension Teaching.
- Lewis Knudson, Ph.D., Professor of Botany.
- E. Gorton Davis, B.S., Professor of Landscape Architecture.
- Ralph Wright Curtis, M.S.A., Professor of Ornamental Horticulture.
- Jacob Richard Schramm, Ph.D., Professor of Botany.\*
- Harry Oliver Buckman, Ph.D., Professor of Soil Technology.
- Ralph Hicks Wheeler, B.S., Professor in Extension Service.
- William Foster Lusk, B.Ph., M.S.A., Professor of Rural Education. Third term, 1922.
- Paul Work, Ph.D., Professor of Vegetable Gardening.
- John Bentley, jr., B.S., M.F., Professor of Forest Engineering.
- Paul J. Kruse, Ph.D., Professor of Rural Education.
- Rolland Maclaren Stewart, Ph.D., Professor of Rural Education.
- James Ernest Boyle, Ph.D., Professor of Rural Economy.
- Ezra Dwight Sanderson, Ph.D., Professor of Rural Social Organization.
- Homer Columbus Thompson, B.S., Professor of Vegetable Gardening.
- William Joseph Wright, M.S., Extension Professor of Rural Education and State Leader of Junior Extension.
- Warren Simpson Thompson, Ph.D., Professor of Rural Social Organization.
- Cora Ella Binzel, Professor of Rural Education.
- Byron Burnett Robb, M.S. in Agr., Professor of Rural Engineering.
- Annette J. Warner, Professor of Home Economics.
- James Kenneth Wilson, Ph.D., Professor of Soil Technology.
- Edmund Louis Worthen, M.S., Extension Professor of Soil Technology.
- Julian Edward Butterworth, Ph.D., Professor of Rural Education.
- Roscoe Wilfred Thatcher, B.S., M.A., D.Agr., Professor of Plant Chemistry.†
- Ulysses Prentiss Hedrick, Sc.D., Professor of Pomology.†
- Lucius Lincoln Van Slyke, Ph.D., Professor of Dairy Chemistry.†

\*Absent on leave.

†By affiliation with the New York Agricultural Experiment Station at Geneva.



Fred Carlton Stewart, M.S., Professor of Plant Pathology.†  
 Percival John Parrott, M.A., Professor of Entomology.†  
 Robert Stanley Breed, Ph.D., Professor of Dairy Bacteriology.†  
 Rudolph John Anderson, Ph.D., Professor of Animal Nutrition.†  
 Reginald Clifton Collison, M.S., Professor of Soil Technology.†  
 Harold Joel Corn, Ph.D., Professor of Soil Technology.†  
 Arthur T. Dahlberg, M.S., Assistant Professor of Dairy Industry.†  
 Robert Pelton Sibley, M.A., L.H.D., Professor and Secretary.  
 James Chester Bradley, Ph.D., Professor of Entomology and Curator of Invertebrate Zoology.  
 George Charles Embury, Ph.D., Professor of Aquiculture.  
 Arthur Johnson Eames, Ph.D., Professor of Botany.  
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 William Irving Myers, Ph.D., Professor of Farm Finance.  
 Theodore Hildreth Eaton, Ph.D., Professor of Rural Education.  
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 Carl Edwin Ladd, Ph.D., Extension Professor of Farm Management.  
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 Lester Wayland Sharp, Ph.D., Professor of Botany.  
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 William Atwood Hilton, Ph.D., Professor of Zoology at Pomona College. (Exchange professor, 1922-23.)  
 Willard Winfield Rowlee, B.L., D.Sc., Professor of Dendrology.  
 Hugh Daniel Reed, Ph.D., Professor of Zoology.  
 Harry Morton Fitzpatrick, Ph.D., Professor of Plant Pathology.  
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 Axel Ferdinand Gustafson, Ph.D., Extension Professor of Soil Technology.  
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 Philip Henry Wessels, M.S., Research Professor of Vegetable Gardening.  
 Jay Coryell, B.S. in Agr., County Agent Leader.  
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 Marion Flemming, M.A., Instructor in Home Economics and Supervisor of the  
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Reena Roberts, B.S., M.A., Instructor in Home Economics.  
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Robert Bellows Willson, B.S., Extension Instructor in Apiculture.  
Charles Edward Hunn, Assistant in Plant Propagation.  
William Thomas Craig, Assistant in Cereal Investigations.  
Walton I. Fisher, Assistant in Plant Breeding Investigations.  
Harold Haydn Clum, A.B., Assistant in Botany.  
Carl Louis Wilson, M.A., Assistant in Botany.  
Mary Isabelle Potter, B.S., M.L.D., Assistant in Landscape Art.  
Ruth Gladys Williams, M.A., Assistant in Botany.  
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Cynthia Westcott, A.B., Assistant in Plant Pathology.  
Thomas Levingston Bayne, jr., B.S., Assistant in Rural Education.  
Charles Grover McBride, B.S. in Horticulture, Assistant in Marketing.  
Bernard Smit, B.S., Preparator in Entomology.  
Alton L. Markley, B.S., Assistant in Agricultural Chemistry.  
Dorothy Willison, B.A., Assistant in Agricultural Chemistry.  
Richard Hall Peabody, B.S., Assistant in Dairy Industry.  
Cecil D. Schutt, Assistant in Animal Husbandry.  
Benjamin William Barkas, B.S., Assistant in Rural Economy.  
Fred Harrison Dennis, Assistant in Plant Breeding Investigations.  
Stuart Taylor Danforth, B.S., Assistant in Aquiculture.  
Elizabeth Keyes, B.S., Assistant in Biology.  
Norman H. Stewart, A.B., M.S., Assistant in Biology.  
Leola Josephine Kruger, A.B., Assistant in Biology.  
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Frank Lee DuMond, B.S., Assistant in Forestry.  
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John H. McGillvray, M.S., Assistant in Vegetable Gardening.  
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Karl Herman Fernow, B.S., Assistant in Plant Pathology.  
Henry G. Good, B.S., Assistant in Entomology.  
Olin Whitney Smith, B.S., Assistant Secretary.  
Willard Waldo Ellis, A.B., LL.B., Librarian.  
George Wilson Parker, Managing Clerk.



# NEW YORK STATE COLLEGE OF AGRICULTURE

Cornell University is composed of seven colleges and the Graduate School. One of these colleges is the College of Agriculture.

Cornell University was chartered by the Legislature in 1865, being founded on the Land-Grant Act of 1862. By the terms of the Land-Grant Act, teaching in agriculture has been from the first a regular part of the university enterprise. As in other States, the State government has made large supplementary appropriations for the work in agriculture. In 1904 the Legislature of the State of New York made an appropriation of \$250,000 for the erection of buildings for the College of Agriculture in Cornell University with an additional appropriation for maintenance and operation and established the College as a state institution under the title, "The New York State College of Agriculture at Cornell University." Before this time the State had established at Cornell University "The New York State Veterinary College." In 1906 the Legislature passed an Administration Act defining the purpose and activities of the College of Agriculture thus: "The object of the said college of agriculture shall be to improve the agricultural methods of the state; to develop the agricultural resources of the state in the production of crops of all kinds, in the rearing and breeding of livestock, in the manufacture of dairy and other products, in determining better methods of handling and marketing such products, and in other ways; and to increase intelligence and elevate the standards of living in the rural districts. For the attainment of these objects the college is authorized to give instruction in the sciences, arts, and practices relating thereto, in such courses and in such manner as shall best serve the interests of the state; to conduct extension work in disseminating agricultural knowledge throughout the state by means of experiments and demonstrations on farms and gardens, investigations of the economics and social status of agriculture, lectures, publication of bulletins and reports, and in such other ways as may be deemed advisable in the furtherance of the aforesaid objects; to make researches in the physical, chemical, biological, and other problems of agriculture, the application of such investigations to the agriculture of New York, and the publication of the results thereof." Since 1906 the State has provided many additional buildings and has made increasingly large appropriations for maintenance and operation. The College has been designated by the State as the recipient of the funds appropriated to the State by the Federal Government under the Morrill and Smith-Lever Acts. It shares with the New York Agricultural Experiment Station at Geneva the funds derived from the Hatch and Adams Acts and with other institutions, those devoted to teacher training under the Smith-Hughes Act.

## THE BUILDINGS AND FARMS

**The buildings.** The buildings erected under the enactment of 1904 were first occupied in June 1907. The central group then erected consisted of a main administrative and classroom building, connected by covered loggias with the Dairy Building on the east and with Stone Hall, now used by the Department of Botany and the College Library, on the west. Subsequently, the Legislature provided

for the erection of two large barns, a greenhouse, a home economics building, a forestry building, a poultry husbandry building, a soils building, an auditorium, a classroom building and stock-judging building for animal husbandry, an extension to the greenhouse range, several small poultry buildings, a sheep barn, a swine barn, a farm shop and tool shed, an addition to the cafeteria in the home economics building, and a heating plant. There are, in addition, the frame buildings occupied by the Departments of Rural Engineering and Floriculture and Ornamental Horticulture, a fish-breeding house in Cascadilla Creek, a seed-storage house, and other small buildings on the farms. In 1920, the State authorized the College to plan a further development of its building program involving an expenditure of \$3,000,000 and appropriated \$500,000 for a new dairy building as the first unit in this plan. This building is under construction during 1922 and the State this year made provision for its equipment.

**The farms.** The College of Agriculture has 933 acres of land and rents 195 additional acres, making a total of 1128 acres under college management. These farms are run not for commercial but for educational purposes, and the practices are therefore modified to meet the varied demands of the institution.

Land in the vicinity of the College is very broken, abounding in hills and dales, brooks and gorges. In consequence, less than one-half of the total area is now available for tillage. Of the 1128 acres, 591 are classified as arable, 304 as pasture, and 143 as wood and waste; 51 are devoted to college grounds, buildings, and old orchards; 39 are retained for the other uses.

Of the tillable area, 45 acres have been laid out in permanent experiment plots for the use of the Departments of Agronomy and Plant Breeding; 50 acres have been assigned to the Department of Pomology and are largely planted to young trees; 29 acres have been assigned to the Department of Floriculture; 24 acres to the Department of Vegetable Gardening; 73 acres to the Department of Poultry Husbandry; 15 acres to farm-crop gardens and experiments; and there are left to the Department of Farm Practice 355 acres on which to conduct the regular farm operations.

The soil of the college farms is heavy, nearly all of it being Dunkirk clay loam. A few fields at the extreme southeastern corner are Volusia stony loam. The Dunkirk clay loam is entirely unsuited to potatoes and is not well adapted to corn, but will grow fair crops of corn if heavily manured. It is well adapted to wheat, oats, timothy, and clover. The Volusia stony loam, when well drained and freed from stones, is well adapted to corn and potatoes. The recently acquired areas lack both these improvements.

**The New York State Game Farm at Cornell University.** In order to provide for training in game farming and wild life conservation, New York State in 1917 established a state game farm in Tompkins County as part of the New York State College of Agriculture, under the control of the Board of Trustees of Cornell University, and administered in cooperation with the New York State Conservation Commission. The farm comprises about one hundred and seventy acres of land well adapted to game farming, and is equipped with barns and a dwelling house, houses for sitting hens, yarding for game birds, and a wild-fowl preserve with ponds. It lies east of and adjacent to the university farm, and is within easy walking distance of the College.

Instruction and experimentation in game farming have been suspended since July 1, 1921, in the absence of legislative appropriations for this work.

### THE COLLEGE LIBRARIES

The library facilities of the College of Agriculture include: a large collection of books and periodicals on agriculture, animal husbandry, botany, horticulture, forestry, entomology, and other kindred subjects, contained in the University Library and numbering about thirty thousand volumes; the Agricultural College Library in Stone Hall with a working and reference collection of approximately twenty-five thousand bound volumes, and a large number of bulletins, reports, and other pamphlets in unbound form; the Entomological Library (Roberts Hall, room 403, fourth floor), one of the largest and best working libraries in general entomology in the United States; and various small departmental collections for laboratory and office use. In addition to these, the Agricultural College Library possesses the Craig horticultural library, gift of the widow of the late Professor John Craig, consisting of about three hundred volumes and considered to be one of the best private collections in the United States. The Department of Animal Husbandry has a large and rapidly increasing collection of herd books, registers, and the like, for the use of its instructing staff and its students. Altogether, about sixty thousand volumes are available for the instructing staff and the students of the College of Agriculture. Wherever housed the books are regularly catalogued at the University Library.

All these libraries are likewise provided with the principal periodicals relating to agriculture and kindred subjects. In the University Library are to be found the files and current numbers of the leading foreign periodicals, especially those of a purely scientific character and those used chiefly for research. The Agricultural Library carries on its shelves over five hundred periodicals of various kinds for the use of students; these include the principal agricultural, horticultural, and stock-raising journals of the United States and Canada, together with many from foreign countries. The Entomological Library is supplied with the leading periodicals relating to general and economic entomology. In addition to these, many of the departments receive periodicals for the use of instructors and students, and the Departments of Dairy Industry, Home Economics, and Poultry Husbandry maintain small reading rooms of their own.

All the books of the Agricultural College Library are in reserve for reference purposes only; students are allowed to draw them for home use only when the library is closed over night and over Sunday. In order to afford the greatest possible opportunity for using the books, the Agricultural College Library is open from eight in the morning until ten o'clock at night every day of the week during the college year except Saturday, when it is closed at six o'clock in the afternoon.

### FACILITIES AND EQUIPMENT OF THE DEPARTMENTS

#### Agricultural Chemistry

Instruction in agricultural chemistry is given both in Caldwell Hall and in Morse Hall.

It is the plan of the Department to give its students not only a clear knowledge of the principles and theory of chemistry as found in agriculture and agricultural products, but also thorough training in the laboratory technique of making chemical analyses. Both elementary and advanced study is made of soils, fertilizers, insecticides, human and animal foods, and household materials. At the immediate disposal of the student is a library including the best reference books and textbooks relating to these subjects. Laboratory equipment includes everything found in the modern food, soils, and fertilizer laboratory, such as saccharimeters, vacuum ovens, special balances and apparatus for density measurements, alkalimeters, refractometers, ebulliometers, lactometers, colorimeters, board of health centrifuge and accessories, and muffle furnaces.

For advanced and graduate students special equipment and chemicals are provided. Among other forms, an apparatus for the electrometric determination of hydrogen-ion concentration is available.

### **Agricultural Economics and Farm Management**

This department occupies the Farm Management Building and a portion of the Forestry Building. It has equipment for statistical and reference work with laboratories for class work.

### **Agronomy**

The Department of Agronomy is housed in Caldwell Hall, a building erected for the department. 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 elementary laboratory is equipped to accommodate two hundred and fifty 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 amounts and effect of organic matter, and other important physical and chemical relations. Each student has the use of a desk and certain stock equipment.

Instruction in field 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. 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.

The mechanical soil analysis laboratory contains equipment sufficient for thirty students. This equipment includes shakers, centrifuges, microscopes, and other apparatus necessary for the accurate mechanical analysis of soils.



The great variety of soils and soil conditions in the vicinity of Ithaca is made use of for field excursions in order 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.

For advanced study a large laboratory is provided in which each student is assigned a compartment. Special apparatus is provided in each case according to the subject under investigation.

### **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 dairy cattle is maintained. To a large extent this herd has been bred and developed by the College itself. At present it contains representative specimens of Holsteins, Jerseys, Guernseys, Ayrshires, and Shorthorns.

A small herd of beef cattle is maintained and each year a carload of steers is purchased and fattened for the courses in meat production and slaughtering and curing.

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

A flock of about one hundred and twenty-five sheep includes representative specimens of Dorsets, Shropshires, and Rambouillets. A mixed flock is also maintained for the production of winter, or hothouse, lambs.

A herd of swine is maintained for the courses in meat production. At the present time it consists largely of Cheshires, Durocs, and Berkshires.

2. **Herd books and flock books.** The library of herd books and flock books is large, comprising more than one thousand 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 headquarters building for the Department of Animal Husbandry is at the eastern end of the campus. It is approximately fifty by ninety feet in area, with an extension about fifty by fifty feet, is three stories high, with a high basement, and contains offices, laboratories, lecture rooms, and classrooms for the department.

The large stock-judging pavilion adjacent is eighty by one hundred and eighty feet in area, with a clear span. It gives abundant opportunity not only for stock-judging purposes but also for the exhibition of horses and horsemanship.

### **Botany**

The Department of Botany is well supplied with microscopes and other necessary laboratory equipment, while the college farm and the ravines, marshes, and forests about Ithaca are unusually rich in botanical material.

The Laboratory 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, a 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 opportunities are offered to those properly trained in physiology, horticulture, and agronomy to undertake fundamental investigations in the general fields of plant response and behavior.

The greenhouses offer opportunities for class work and for individual investigation. Moreover, the university farms and grounds will supply a variety of crops and ornamental plants needed for particular observation and experiment, for those who may devote the growing season to their investigations.

### Dairy Industry

The Department of Dairy Industry occupies the building east of Roberts Hall connected with the latter by a loggia. 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 area and three stories high. All manufacturing work is conducted in the remaining part of the building, sixty by one hundred and sixty feet in area and one story high.

It is hoped that the new dairy building under construction during 1921-22 will be ready for occupancy by the department at the opening of the year 1922-23.

A deposit is required to partly cover the value of apparatus and materials used by the students. When the apparatus is returned in good order the deposit is returned, less a general breakage charge sufficient to cover losses of general equipment and for materials used. Clean white suits are required for all practice work in the department. Lockers for these suits, as well as for equipment used by individual students in the laboratories, are provided without charge.

### Entomology

The Departments of Entomology, Limnology, and Ornithology occupy the third and fourth floors of Roberts Hall. The 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, facilities are afforded by a field laboratory, located in Cascadilla Gorge, and a field station in the Renwick Marshes, provided with breeding cages and running water; and by a fish-cultural experiment station that is located on the college farm alongside Cascadilla Creek.

### **Extension**

The Department of Extension Teaching is located on the first floor of Roberts Hall. Its classes are held in a room on the first floor of this building and in one on the second floor of the Dairy Building.

### **Farm Practice**

The Office of Farm Practice and Farm Superintendence is located on the first floor of Stone Hall. This office has charge of the management of the university farm, and supervises the practical work done on farms by students.

A record of the farm experience of each student is taken on entrance. These records are kept on file and added to as the student gains more farm experience.

Records are also kept of farms where students many obtain employment during vacations and at other periods. These records show the type of farming, the number of acres, and the desirability of the place, and aid the office in assisting students to obtain places for farm work.

To those students entering with little or no farm experience the office offers a course which should familiarize them with the simpler things they should know before going out on farms. This course does not give credit toward graduation, but helps in meeting the farm-practice requirement.

### **Floriculture and Ornamental Horticulture**

The equipment of the Department of Floriculture and Ornamental Horticulture is divided into two parts: that belonging to the classrooms, laboratories, and administrative rooms, and that connected with the forcing houses and gardens and with experimental areas in the field.

1. **Classrooms and laboratories.** In the Floriculture Building lectures are given in the second-floor lecture room, which is provided with a stereopticon, and has a seating capacity of seventy-five persons. On this floor, also, are the offices of the instructors and a reading room containing floricultural publications. The first floor includes a large laboratory, a seed room, and the gardener's office.

The basement area is used for the storage of pots, flats, and other greenhouse material.

The department also has the use of the frame structure formerly known as the Landscape Art Building. This building contains department offices and laboratory and lecture rooms.

The administrative rooms are on the second floor of Roberts Hall, and consist of four offices and a filing room. Large display cases in the corridor are filled with horticultural implements and appliances.

**2. Forcing houses and gardens.** The greenhouses cover an area of about fourteen thousand square feet. This range consists of a house for ferns, palms, and other ornamental plants, a propagating house, and houses for the culture of roses, carnations, chrysanthemums, sweet peas, and other greenhouse plants.

The department has been assigned twenty acres of land for its large collection of nursery material, peonies, irises, perennial phlox, roses, sweet peas, gladioli, and miscellaneous annual and perennial flowers. These collections afford valuable material for study and offer numerous problems for investigation.

Aside from the ordinary equipment, the department has an herbarium of more than twelve thousand sheets and a collection of more than six thousand lantern slides.

### Forestry

The Department of Forestry occupies two and one-half floors in the Forestry Building, which was built and equipped by the State in 1914 at a cost of \$120,000. The building is one hundred and forty-two feet long by fifty-four feet wide, and four stories in height. Part of the building is now occupied temporarily by the Departments of Plant Breeding and Rural Economy, but the entire building is planned for the Department of Forestry and is to be used exclusively by that department as soon as buildings are provided for these other departments. The building affords ample room and equipment for undergraduate instruction and for advanced study.

The department has a tract of about one hundred and seventy-five acres of open land which is being used for forest planting; another tract of thirty-eight acres, partly open land and partly wooded; and eight woodlots, including stands of white pine, hardwoods, and hemlocks, which are being managed for sustained yield under a forest working plan. All these lands are within three miles of the university campus. The department has planted more than seventy acres of its land with experimental and demonstrational plantations. There is also a forest nursery.

A forestry library of more than fourteen hundred bound volumes, as well as extensive files of forestry periodicals is included in the University Library. There is an excellent collection of forestry instruments.

### Home Economics

The School of Home Economics occupies the building erected for its use in 1912. In the basement of the building are a cafeteria with kitchens and a bakery, and a small canning kitchen. On the first floor are offices, classrooms, and an apartment in which students in turn have practice in family housekeeping.

On the second floor is the assembly room in which are held the large classes of the school, public lectures, and social functions both of the College and of the school. On this floor are thoroughly equipped food laboratories for teaching the principles of food preparation and dietetics. The third floor contains clothing and textile laboratories, and offices. On the fourth floor is a large drafting room for courses in design and in house planning. A clothing laboratory and offices occupy the remainder of the building. West of the Home Economics Building is a small house which has been reconstructed and redecorated and is used as a practice house for students in home economics. The school has a good equipment of reference books, bulletins, lantern slides, and other illustrative material.

### **Meteorology**

The Department of Meteorology is located on the fourth floor of Roberts Hall, and is maintained in cooperation with the United States Weather Bureau. This arrangement affords an unusual opportunity for students to acquaint themselves with the practical application of the science of meteorology to weather forecasting and to the study of local and general climatology in its relations with agriculture. The observatory is equipped with a full set of meteorological instruments, from which continuous observations are made. Reports are received by telegraph from about seventy-five weather stations in the United States, from which a daily weather map is made and forecasts are prepared. The departmental library, which is open to students, contains general works on meteorology and publications bearing on the climate of various parts of the United States and of many foreign countries.

### **Plant Breeding**

The Department of Plant Breeding has its offices, classrooms, and undergraduate and research laboratories on the second floor of the Forestry Building, and a graduate laboratory on the third floor. The departmental laboratories are equipped with the necessary appliances for both undergraduate instruction and graduate research, including calculating machines, microscopes, microtomes, paraffin ovens, balances, seed germinators, cameras and photographic accessories, and the like. The departmental library contains the principal books and periodicals dealing with plant breeding and general genetics. Graduate students have the use of a part of the greenhouse space belonging to the department. The plant-breeding garden affords room for most of the cultures grown by graduate students and for the plant material used in the undergraduate courses.

### **Plant Pathology**

The Department of Plant Pathology is located in the basement of Bailey Hall. There are two elementary laboratories—each providing facilities for twenty-four students—a laboratory for advanced and research students, offices for the staff, and an ample stock room filled with necessary apparatus. The equipment of the laboratories and the offices consists of furniture especially built for the purpose, a complete set of microscopes and accessories, cameras, a photomicrographic out-

fit, microtomes, incubators, sterilizers, ovens, reagents, and so forth, for teaching and investigation. An extensive collection of prepared slides and photographs is available to students. There is also a growing collection and museum of pathological specimens, and a department library rich in classic works, monographic treatises, and phytopathological periodicals. Land and greenhouses are available for experimental work as well as for teaching. The department is now in position to offer facilities for practically every line of work within its field.

### **Pomology**

The classrooms and laboratories of the Department of Pomology are located on the second floor of Roberts Hall. There is also a fifty-acre field laboratory devoted to commercial and varietal orchards of the different fruits. On the grounds are orchards of nearly all temperate-zone fruits, each orchard including a rather large collection of varieties. There are also collections of various nut trees that may be grown in New York State, including the English walnut. The department is also starting a nursery which will include not only all the different species that are likely to be grown in this section, but also dwarf trees and various stocks used for dwarfing.

Orchards operated by the department furnish fruit for variety studies and packing. Each year a large assortment of fruit from various parts of this and other States, is brought together at the College, and used for purposes of instruction.

### **Poultry Husbandry**

The Department of Poultry Husbandry is located in the Poultry Building, east of the greenhouses. Approximately one mile distant is the poultry farm, a tract of some eighty acres. Houses erected north of the Poultry Building provide room for instruction in exhibiting, feeding, rearing, and fattening poultry.

The Poultry Building is one hundred and thirty-two feet by forty-eight feet in area, and consists of three stories and a basement. It contains a killing room, an egg-grading, testing, and marketing room, cold-storage facilities for commercial and experimental purposes, a lecture room seating two hundred and fifty persons, three laboratories for instruction and research, two recitation rooms, a seminary room, a photographic room, a library, and lockers for three hundred students. At the poultry plant and the poultry farm are houses for about one hundred flocks, providing room for about twenty-five hundred fowls. These houses include a pipe-system brooder house, thirty colony brooder houses, and summer houses for rearing five thousand or more chickens annually.

### **Rural Education**

The Department of Rural Education occupies three rooms on the second floor and one room on the fourth floor of Caldwell Hall; one room in the basement of the Forestry Building; and two rooms on the second floor of the Poultry Building.

The Department is equipped to carry on teacher-training work for positions



of teachers of agriculture, homemaking, nature study, and science; for teachers and supervisors of vocational education; and for principals of high schools and leaders in rural school supervision and teacher-training.

### Rural Engineering

The Department of Rural Engineering is housed in the Rural Engineering building, a temporary one-story structure which provides laboratory space for the work in manual training and farm mechanics, stock rooms, and offices. Drafting-room space for the work in drawing and farm structures, and for the indoor work in farm engineering, is provided in Caldwell Hall.

### Vegetable Gardening

The equipment of the Department of Vegetable Gardening consists of the usual classrooms and laboratory facilities and also four glasshouses and a frame yard. The glasshouses are used largely for laboratory and experimental work. A tract of about fifteen acres is available for field laboratory exercises and experimental work.

## APPLICATION FOR ADMISSION

Application for admission must be made not later than August 1 and must be accompanied by a deposit of \$25 (see page 22). Those applying after August 1 will be admitted only if there are adequate facilities for their instruction and, in the case of women, if the University can provide suitable rooming accommodations.

## PAYMENTS TO THE UNIVERSITY

### Tuition

Tuition is free to the following classes of students:

(1) Students pursuing full, special, or short courses in the New York State College of Agriculture or the New York State Veterinary College, and such students in the Graduate School as are taking their major work in these state colleges, who at the beginning of the college year are, and for at least twelve months prior thereto have been, *bona fide* residents of the State of New York, are exempt from the payment of tuition fees; *provided*, however, that no student shall be allowed to transfer from any such course to another course wherein tuition is charged without first paying the regular tuition fees for the hours for which he may receive credit in the latter course.

(2) Tuition is free to the students who hold the State Scholarships in Cornell University provided for by Section 1037 of the New York State Education Law of 1910.

(3) Members of the instructing staff registered in the Graduate School and having their major subject in the college or the line of work in which they are instructing, or already having a degree and registered for the first degree in the

college in which they are instructing, are exempt from the payment of tuition fees and from the payment of laboratory and shop fees in the department in which they are employed to give instruction; members of the instructing staff who take work for which they must pay tuition are required to pay in proportion to the amount of work for which they are registered.

To students in Agriculture *not* exempted by the above statement the University charges *tuition fees*, as follows:

For the regular year . . . . .	\$200
In the Graduate School . . . . .	75
In the third term in Agriculture (1922) . . . . .	75
In the Summer Session (1922) . . . . .	40
In the Summer School in Agriculture (1922) . . . . .	40
In the Winter Courses in Agriculture (1922) . . . . .	25

*A student who fails to pay his indebtedness to the University within twenty days after the last registration day of the term (or within five days after the beginning of the Summer Session or the Winter Courses) is thereby dropped from the University.*

*Any tuition fee or other fee may be changed by the Trustees to take effect at any time without previous notice.*

The tuition fee of \$200 is payable in installments of \$110 at the beginning of the first term and \$90 at the beginning of the second term, but a student enrolled only for the second term of the academic year is required to pay tuition at the rate of the first term. The installment for any term becomes a liability at once when the student registers.

The tuition fee for any term may be refunded to any student who, for reasons satisfactory to the Comptroller and the Registrar, formally withdraws from the University within twenty days after the first registration day. A student who formally withdraws from the University, for reasons satisfactory to the Comptroller and the Registrar, on or before November 15 or April 1, may have one-half of the tuition fee for the current term refunded. Students registering after December 1 pay for the remainder of the first term two-thirds of the tuition fee for the first term; students registering after April 1 pay for the remainder of the second term two-thirds of the tuition fee for the second term.

### Other Fees

*A matriculation fee* of \$10 is required of every student upon entrance into the University.

*A deposit* of \$25 must be made in connection with the application for admission and this must be filed by all prospective students of the first term not later than August 1 of that year. In case the applicant completes his registration for the first term, the deposit is credited to his account. If the applicant fails to complete his entrance-examination requirements, he is entitled to a refund of the deposit in excess of accrued charges; if he fails for other reasons to enter the University, such balance may, at the discretion of the Comptroller and the Registrar, be refunded, and this will in general be done if the vacancy caused by the withdrawal is filled.



*An infirmary fee\** of \$5 a term is required, at the beginning of each term, of every student. In return for the infirmary fee, any student who is ill is admitted to the Infirmary on his physician's certificate and is given without further charge a bed in a ward, board, and ordinary nursing, for a period not exceeding two weeks in any one academic year. Extra charges are made for private rooms, special food, and special nurses. If an ill student who has not received two weeks service in the year is unable to gain admittance to the Infirmary, by reason of lack of accommodation, or if he is not cared for elsewhere by the University, he is entitled to a refund of the fee for both terms.

A *locker fee* of \$2 a term is required, at the beginning of each term, of every male undergraduate student. Payment of this fee entitles the student to the use of the gymnasium and the university playgrounds, and to the use of a locker, together with the use of bathing facilities and towels, in the gymnasium, or in the New York State Drill Hall, or in the Schoellkopf Memorial Building.

A *graduation fee* is required, at least ten days before the degree is to be conferred, of every candidate for a degree. For a first, or baccalaureate, degree the fee is \$10; for an advanced degree it is \$20. The fee will be returned if the degree is not conferred.

*Laboratory Fees.* In courses of study that require work in laboratory, shop, or drafting room, or field work, a fee is charged to cover the cost of material used by the student.

*Laboratory Deposits.* In some courses, particularly in Chemistry, the student is required to make in advance at the office of the Treasurer of the University a deposit of money to cover the cost of material to be used and supplies to be consumed by him in the course of the term; accounts are kept and charges are entered against the deposit; at the end of the term any balance remaining of the deposit is returned to the student. Every student registered in the first year of the Course in Chemistry must deposit \$20 at the beginning of the first term and \$30 at the beginning of the second term. The advanced student of Chemistry should be prepared, if he takes several courses at the same time, to deposit as much as \$60 or \$70 for a single term. In some of the courses in Chemistry, however, the student is required to pay a comparatively small laboratory fee instead of making a deposit.

*Payment of the Fee or the Deposit.* Every person taking work in a laboratory or in a course wherein a laboratory fee is charged or wherein a deposit is required must pay to the Treasurer of the University the laboratory fee or the deposit as directed by the laboratory card which he will receive.

*The Graduate School.* An administration fee of \$12.50 a term is required of every student registered in the Graduate School.

*Exemption of Instructors.* Members of the instructing staff who are registered in the Graduate School are exempt from the payment of the laboratory and shop fees in courses taken or in research pursued in the departments in which they are respectively employed to give instruction.

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\*Students in the University Summer Session or the Summer School in Agriculture have the privilege of admission to the Infirmary; they pay no fee in advance, but are liable to the regular charge for any service rendered there.

For Students in the Winter Courses in Agriculture, the infirmary fee is \$3.

### Assessments

Every student is held responsible for any injury done by him to any of the university property.

Assessments are levied upon the student in certain circumstances, under the following rules of the University:

A student desiring to be reinstated after being dropped from the University for delinquency in scholarship or in conduct shall first pay a fee of \$25.

A matriculated student desiring to register after the close of registration day shall first pay a fee of \$5. [Students in the Graduate School are excepted.]

A student desiring to file his registration of studies after the date set by his college for filing the same shall first pay a fee of \$2.

A student desiring to take an examination or other test for the removal of a term condition (including the making up of a mark of "absent" or "incomplete") shall first pay a fee of \$2 for each examination or other test.

A student desiring to continue his university work after being absent from any class or exercise occurring during the two days immediately preceding or the two days immediately following the Thanksgiving Recess, the Christmas Recess, or the Easter Recess, shall pay a fee of \$5 for each day on which an absence occurred. [Students in the Graduate School are excepted.]

For reasons satisfactory to the proper authority any of the above-mentioned *assessments* (except that levied for examination or other test to remove a condition) may be waived in any individual case if the student's failure to comply with the regulation was due to ill health or to any other reason beyond his control.

### EXPENSES

A student's expenses at Cornell, beyond the stated university fees and a small outlay for books and instruments, depend in large measure on his personal tastes and habits. His expenses, other than those for board and room, may be estimated at the normal rate prevailing throughout that section of the country in which Ithaca is situated.

Parents and guardians are earnestly cautioned against providing students with an excessive amount of pocket money. Many students have been handicapped in their university careers by over-indulgence in this respect.

### RESIDENTIAL HALLS

The University has five residential halls for men students, situated on the campus and furnishing accommodations for about four hundred and twenty men. For particulars, address the University Treasurer, Ithaca, New York. There are, also, many private boarding and lodging houses near the university campus. In these the cost of board and furnished room, with heat and light, varies from \$10 to \$15 a week. By the formation of clubs, students are sometimes able to reduce their expenses for room and board. Cafeterias are maintained by the University in Cascadilla Hall and Baker Court, and by the College of Agriculture in the Home Economics Building, where meals may be obtained at reasonable prices.

Before engaging rooms, students should carefully examine sanitary conditions and should particularly insist on satisfactory and sufficient fire escapes. The University publishes and distributes a list of approved lodging houses. This list is ready for distribution on August 15. New students are advised to come to Ithaca a few days in advance at the beginning of their university duties in order that they may have ample time to secure room and board before the opening of the academic year. The Freshman Advisory Committee offers its assistance to new students in the selection of lodging and boarding houses.

The residential halls for women students are Sage College and Prudence Risley Hall. In these buildings the total cost of board, laundry, and rent of furnished rooms, with heat and light, is \$460. The halls are heated by steam and lighted by electricity. The University Dean of Women has jurisdiction over all women students in the University, and women students are not permitted to board and lodge outside of the halls for women except in houses approved by the Dean, and subject to her direction. Prospective women students should write to the Dean of Women for information concerning any matters in which they may need assistance. Dormitory facilities for women are inadequate, and prospective students desiring such accommodations are urged to make early application. Inquiries in regard to board and rooms in the women's halls should be addressed to the Manager of Residential Halls, Sage College, Ithaca.

## SCHOLARSHIPS

### State University Scholarships

Known at Cornell as the "State Cash Scholarships"  
(Awarded by New York State)

Under the law of the State of New York (Chapter 292, Laws of 1913), State Scholarships have been established in the several counties of the State, to be maintained by the State as provided by law. Five such scholarships are to be awarded each county annually for each assembly district therein. Each such scholarship will entitle the holder thereof to the sum of \$100 for each year of his attendance upon an approved college in the State during a period of four years.

For particulars in regard to the awarding of State Scholarships, application should be made to the Commissioner of Education, Albany, New York.

### University Undergraduate Scholarships

(Awarded by the University)

Eighteen University Undergraduate Scholarships, each continuing for two years and of an annual value of \$200, 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.

Every candidate for such a scholarship must have satisfied the full entrance requirements (as stated on p. 28) of that college of the University which he proposes to enter.

### Special Undergraduate Scholarships

**The Roberts Scholarship Fund**, a gift of the late Dr. Charles H. Roberts of Oakes, Ulster County, New York, provides five scholarships, each retainable 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 close of the first term of each year. Application blanks and copies of the regulations may be obtained at the office of the Secretary of the College of Agriculture. All applications must be on the official blanks, which, with all other information, must be filed with the Secretary of the College before February 1. The value of each scholarship is \$240.

**Scholarships for Non-residents.** There are available ordinarily ten scholarships carrying free tuition to non-residents of New York who are especially worthy of aid.

**Scholarships for Foreign Students.** With a view to aiding worthy students from the devastated countries of Europe, especially France, Italy, Belgium, Serbia, and Roumania, there have been established in the College of Agriculture five free-tuition scholarships to be awarded by the Dean to worthy applicants from these countries. These scholarships carry free tuition for a period of four years each for such students to whom they may be awarded as shall enter any time prior to the close of the academic year 1922-23.

A description of other scholarships open under certain conditions to undergraduates in the College of Agriculture will be found in the *General Circular of Information*, pp. 43 and 44.

### Winter Course Scholarships

**State Grange Scholarships in Agriculture.** At its annual meeting in February, 1914, 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 in Cornell University. The scholarships are each of the value of \$50, to be awarded to men or women who attain the highest standing in competitive examinations. The candidate should apply to the Master of the Pomona Grange in his home county, or to the Deputy in counties which have no Pomona Grange.

**Beatty Agricultural Scholarships.** By the will of the late Harrison L. Beatty of Bainbridge, New York, the income of \$5,000 is devoted to three equal scholarships in the winter courses, to be known as the Beatty Agricultural Scholarships. These scholarships are to be awarded to residents of Chenango County, one of whom shall be a resident of the town of Bainbridge. In making the award, equal consideration will be given to education and practical experience. Competitive examinations are held annually in Norwich and Bainbridge, New York, in the last week of September; the exact dates are to be announced to those applying for the examinations. The applications must be sent to the Secretary of the College of Agriculture, Ithaca, New York, by September 1.



**FELLOWSHIPS**

A graduate fellowship in agriculture is awarded annually. Applications must be filed, on official blanks, on or before March 15.

A number of industrial fellowships are established for a limited period, usually two years, by growers' companies which 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.

**PRIZES****The Eastman Prizes for Public Speaking**

With the object of developing qualities of personal leadership in rural affairs, Mr. A. R. Eastman, of Waterville, New York, has established annual prizes, the first of \$100 and the second of \$20, for public speaking on country-life subjects in the College of Agriculture. These prizes are designated the Eastman Prizes for Public Speaking. Competition is open to any regular or special student. The contest takes place in February.

**The Ring Memorial Prizes**

By bequest of Mr. Charles A. Ring, of Niagara County, New York, a first prize of approximately \$30 and a second prize of approximately \$20 have been established, to be awarded to undergraduate students in agriculture who, in essays giving reviews of the literature on problems in floriculture, vegetable gardening, or pomology, show the greatest ability to evaluate scientific evidence. The essays must be submitted to the Secretary of the Faculty of Agriculture by noon on May 1.

**The Stewart Prize for the Production of Clean Milk**

With the object of increasing the interest in the production of clean milk, Mr. S. L. Stewart, of Brookside Farm, Newburg, New York, has offered for the coming year a prize of \$50 to be divided among students participating in a clean-milk contest. This money is to be apportioned by the Department of Dairy Industry, and the regulations governing the contest are to be fixed by the department. Definite announcement concerning the contest will be made to students taking Course 6 in dairy industry, soon after the course opens in February.

**Alumni Prize**

The Alumni Association of the College of Agriculture contributes an annual prize of \$25 to be awarded at the close of junior year to a student of good moral character who has maintained the best scholastic record during his three years in the University, the award to be made by the faculty of the College.

For information concerning other prizes offered in the University and open to competition of students in the College of Agriculture, see the special pamphlet on prizes, which may be obtained upon application to the Secretary of the University.

### HONOR SYSTEM

Examinations throughout the University are conducted under the honor system, which is administered by students. New students are given an opportunity to become thoroughly acquainted with the regulations of the system.

### GENERAL INFORMATION CONCERNING COURSES

The regular instruction in the College of Agriculture constitutes a course of four years, or eight terms, leading to the degree of bachelor of science. There is a combined course with the State Veterinary College comprising seven years and leading to two baccalaureate degrees (page 34). There is a Summer School in Agriculture, six weeks in length designed especially for teachers, school principals, and superintendents. Aside from these there are winter courses, not leading to credit in the University, and opportunities for students to pursue special work. Circulars describing the winter courses and the summer school may be obtained on application to the Secretary.

**The third, or summer, term.** The college year in Cornell University is divided into two terms, or semesters, extending from the last of September to the early part of June. In the College of Agriculture there has been established a third, or summer, term, which continues from early June into September. It is open only to students who have completed the required work of the freshman year in agriculture, or the substantial equivalent thereof. The primary purpose of the summer term is to take advantage of the growing season in teaching certain subjects to students regularly registered in either graduate or undergraduate courses. The facilities of the College are available for graduate study throughout the summer. In addition, opportunity is provided for advanced students, teachers and those who are otherwise engaged during the regular school year, to have the advantage of a long period of special instruction.

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 acceptable credentials of the University of the State of New York, or on acceptable school certificates.



*Prospective students who have neither lived on farms nor had considerable practical experience in agriculture are urged to spend at least one year on a well-managed farm in order to familiarize themselves with common farm affairs and operations before entering the College. This experience is necessary in order to meet the farm-practice requirement. (Pages 31 and 59)*

Candidates for admission must apply before August 1 and must file their credentials and obtain permits for examination at the University Registrar's office, Morrill 18. The results of examination may be ascertained from the Registrar.

### Entrance Requirements for the Four-Year Course

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

1a English No. 1 . . . . .	(1½)	8a Ancient History . . . . .	(½-1)
1b English No. 2 . . . . .	(1½)	8b Mod. and Medieval History . . . . .	(½-1)
1c English (elective) . . . . .	(1)	8c American History, Civics . . . . .	(½-1)
2a First Year Greek . . . . .	(1)	8d English History . . . . .	(½-1)
2b Second Year Greek . . . . .	(1)	9a Elementary Algebra . . . . .	(1)
2c Third Year Greek . . . . .	(1)	9b Intermediate Algebra . . . . .	(½)
3a First Year Latin . . . . .	(1)	9c Advanced Algebra . . . . .	(½)
3b Second Year Latin . . . . .	(1)	9d Plane Geometry . . . . .	(1)
3c Third Year Latin . . . . .	(1)	9e Solid Geometry . . . . .	(½)
3d Fourth Year Latin . . . . .	(1)	9f Plane Trigonometry . . . . .	(½)
4a First Year German . . . . .	(1)	9g Spherical Trigonometry . . . . .	(½)
4b Second Year German . . . . .	(1)	10 Physics . . . . .	(1)
4c Third Year German . . . . .	(1)	11 Chemistry . . . . .	(1)
4d Fourth Year German . . . . .	(1)	12 Physical Geography . . . . .	(½-1)
5a First Year French . . . . .	(1)	13 Biology* . . . . .	(1)
5b Second Year French . . . . .	(1)	14 Botany* . . . . .	(½-1)
5c Third Year French . . . . .	(1)	14a Zoology* . . . . .	(½-1)
5d Fourth Year French . . . . .	(1)	15 Bookkeeping** . . . . .	(½-1)
6a First Year Spanish . . . . .	(1)	16 Agriculture (including Home	
6b Second Year Spanish . . . . .	(1)	Economics)** . . . . .	(½-4)
6c Third Year Spanish . . . . .	(1)	17 Drawing . . . . .	(½-1)
6d Fourth Year Spanish . . . . .	(1)	18 Manual Training . . . . .	(½-1)
7a First Year Italian . . . . .	(1)	19 Any high school-subject or	
7b Second Year Italian . . . . .	(1)	subjects not already used . . . . .	(½-1)
7c Third Year Italian . . . . .	(1)		

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

\*If an applicant has counted Biology (1) he may not also offer Botany (½) or Zoology (½).

\*\*An applicant may offer not to exceed four units in vocational subjects under numbers 16, 18, and 19 combined. Bookkeeping may not be offered together with more than one of the subjects listed under 16, 17, and 18.

A. Fifteen units arranged as follows: English (3), history (1), elementary algebra (1), plane geometry (1), a foreign language (3 units in one language or 2 units in each of two), elective (6 or 5). Solid geometry and plane trigonometry are recommended among the elective units for students entering the courses in forestry or landscape art.

B. Of diplomas authorized by the Board of Regents prior to 1921, either (1) The Arts College Entrance Diploma, (2) the Science College Entrance Diploma, or (3) the Academic Diploma in Agriculture or in Homemaking issued by the Board of Regents of the University of the State of New York, or evidence of equivalent training.

If an applicant holding one of these last-named diplomas does not present three units of foreign language, he must elect an equivalent amount of work in the University in one or more of the following subjects: foreign language, English, mathematics, philosophy, psychology, history, economics, political and social science.

### Requirements for Admission of Special Students

Opportunities are provided for persons who desire to pursue special studies. In order to be eligible for admission to special work, applicants must offer two full years of recent farm experience and must also either have fifteen units of entrance credits or be twenty-one years of age. In addition, an applicant for admission on the age requirement must satisfy the faculty of his ability to perform 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 other such 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 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 students 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, but only after admission to the College.

Special students must leave a record of their farm experience with the Department of Farm Practice during registration week.

### Other Details of Admission

Other details as to subjects and methods of admission may be found in the *General Circular of Information*, which may be obtained on application to the Secretary of Cornell University, Ithaca, New York.

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. Details may be found in the *General Circular of Information*.

For admission as a special student, communications should be addressed to the Secretary of the College of Agriculture.

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 are residence for eight terms, and, in addition to the prescribed work in the Departments of Physical Training and Military Science and Tactics, and in Hygiene and Preventive Medicine, the completion of one hundred and twenty hours of required and elective work, as outlined on pages 32-39.

All men students must satisfy the farm-practice requirement before the beginning of the senior year. This requirement is the equivalent of a year or more of actual farm work. In order to meet it students should have a good working knowledge of horses, cattle, sheep, swine, poultry, crops, and machinery, and of the ordinary farm operations as they are practiced on a general farm. Exemption from this requirement is allowed only to students specializing in the Departments of Botany, Home Economics, Forestry, or Entomology. Application for such exemption must be made at the office of the Secretary. Students should complete the requirement as early in their course as possible, as it is a prerequisite for admission to courses in farm management, pomology, and rural education.

All women students specializing in home economics must satisfy the practice requirement in home economics before the beginning of the senior year. This requirement is equivalent to six weeks of actual independent housekeeping experience. In order to meet this the student must have a good working knowledge of the care and management of the house and of food preparation.

Freshmen are required to attend, during their first term, a course of lectures, designed to orient students in the life of the University and specifically to acquaint them with the scope and purpose of the course of instruction in the College. The course requires attendance two hours a week and carries one hour of credit.

Credit toward a degree for work done in a preparatory school on subjects that 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 at least twenty-four hours before the first examination, specifying which fifteen units he intends to offer in satisfaction of the entrance requirements, and on 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 on which he proposes to enter, but passes the credit examination in any other subject or subjects, he may use the latter toward satisfying entrance requirements, but in that case he cannot also receive college credit for it. The college-credit examinations will be held September 12 to 16, 1922, on the dates set for the entrance examinations in the same subjects.

A student who receives at entrance twelve or more hours of credit in addition to the requirements for admission may be regarded as having satisfied 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 afterwards completed in two or more 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 degree of bachelor of science which is allowed for the work of any one summer session is eight 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 obtain the degree of bachelor of science, he must have completed the prescribed subjects in the four-year course and the requisite number of elective hours in agricultural subjects. He must also have been in residence in the College of Agriculture for his last two 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 twelve hours each term, and no new student may register for more than eighteen hours.

Regular students may take, at their discretion, during their four years, not to exceed twenty hours of elective subjects in courses offered in other colleges than Agriculture; but such elective subjects shall not interfere with required or back work. Special students must take at least two-thirds of the entire work of each year from the agricultural subjects described on the following pages.

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

	Hours
Freshman Orientation Course .....	1
English.....	6
Botany, Biology, or Zoology.....	6
Chemistry or Physics.....	6
Physiology, one of the following.....	3
Physiology of Domestic Animals	
Human Physiology	
Plant Physiology	
Political Science.....	5
Botany, Zoology, Bacteriology, Chemistry, Physics, Geology, Physical Geog- raphy, Mathematics, Drawing, Biology, Psychology, Economics 51, 55a, 55b, 56b, 76a, 86, 88, Government and Public Law 1, 10 .....	18

Students who do not present chemistry for entrance are required to take chemistry.

Students who do not present physics for entrance are required to take physics.

\*The required courses given in other colleges than Agriculture are announced on pages 101-102.



Students other than those specializing in home economics who do not present geology or physical geography for entrance are required to take one of these subjects.

Professional students in forestry and landscape art who do not offer solid geometry and plane trigonometry for entrance are required to take these subjects in their freshman year.

Not less than twenty-four hours of the required work is to be taken in the freshman year, including English, botany, biology or zoology, and physics or chemistry.

In the eighteen hours of optional science work listed above, applied science courses may not be counted. Thus agricultural chemistry, photography, and dairy bacteriology may not be included as chemistry, physics, and bacteriology for this requirement.

Where an option of required courses is offered, consideration should be given to the prerequisites demanded by the elective courses to be taken subsequently.

Biochemistry 14 is prerequisite for Home Economics 22.

Botany 1 is prerequisite for further work in botany; for professional courses in forestry; for courses in plant breeding, plant pathology, and pomology; and for some of the courses in agronomy, floriculture, and vegetable gardening.

Botany 20 is prerequisite for Floriculture 3, for professional courses in forestry, and for courses in plant breeding and pomology.

Chemistry 101 is prerequisite for courses in agronomy, home economics, and pomology.

Chemistry 210 and 225 are prerequisite for advanced courses in agricultural chemistry, Agronomy 5, 6, and 7, and Dairy Industry 7.

Chemistry 375 is prerequisite for Home Economics 3 and 22.

Drawing is prerequisite for Rural Engineering 1 and 2.

Economics 51 is prerequisite for Agricultural Economics 10 and 30, Home Economics 120, and Poultry Husbandry 9.

Economics 55a and 55b are prerequisite for Rural Social Organization 5.

Geology 1 is prerequisite for Agronomy 1.

Physical Geography 5 is prerequisite for Agronomy 5.

### Elective Courses

The remainder of the work—seventy-five hours—is made up of electives to be taken under the following restrictions:

A student may take at his discretion during his four years not to exceed twenty hours of elective subjects in courses offered in other colleges than Agriculture; but such elective subjects shall not interfere with required or back work. The remainder of his elective work must be chosen from the agricultural subjects described on the following pages.

In selecting his course after the first year, the student must obtain the approval of a faculty adviser, preferably in 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, rural education, or home economics must take as their advisers professors or assistant professors in those departments. All students who are preparing for teaching are advised

to consult the Professor of Rural Education as well as their faculty adviser before filing their term schedules.

The following courses are open to freshmen, subject to the requirements stated above, provided also that prerequisites are satisfied and that acceptable equivalents have not been credited toward entrance:

Agricultural Chemistry 805	German 1, 1a, 3, 3a, 4, 5, 8
Animal Husbandry 1, 2, 5, 10, 11	Greek 1, 2
Aquiculture 51	History 1, 31
Bibliography 1, 2	Home Economics 1, 90
Biology 1	Italian 1
Botany 1, 2	Latin A, B, 1, 3
Chemistry 101, 205, 210, 220 225	Mathematics 1, 2, 3, 4, 5, 6, 7 (1)
Dairy Industry 1, 4, 5, 6	7 (2), 15
English 1	Meteorology 1
Entomology 2, 4, 5	Music 1, by examination
Field Ornithology 6	Physics 2, 3, 4a, 4b, 7, 10
Floriculture and Ornamental Horti- culture 1, 2, 6, 9, 20, 21	Physiology 3, 6
Forestry 1, 2, 3, 4, 6 (by special per- mission)	Poultry Husbandry 1
French 1, 2, 3, 4a, 4b, 5a, 5b, 16	Rural Education 60a, 60b
Geology 1, 1a, 2, 11, 21	Rural Engineering 3, 20, 30, 51
	Spanish 1, 3, 4a, 4b, 5a, 5b
	Zoology 1, 5, 12

### GRADUATED CREDIT

The passing grades are designated A, B, C, D, and P. Students meriting grade C receive normal credit toward graduation; grade B, 10 per cent additional credit; grade A, 20 per cent additional credit; grade D, credit reduced 10 per cent; and grade P, credit reduced 20 per cent. No student may be graduated in less than eight terms unless his work in the College of Agriculture averages 15 per cent excess credit.

### COMBINED COURSE IN AGRICULTURE AND VETERINARY MEDICINE

Inasmuch as the requirements for graduation of the College of Agriculture and of the College of Veterinary Medicine are to some degree the same, it is possible, by a judicious use of elective hours, to complete the requirements in both colleges in seven or in six and a half years.

## DEPARTMENTS OF INSTRUCTION

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

#### SPECIAL NOTICE

The first term begins with the opening of the college year, in September. The second term begins in February. The third, or summer, term begins in June. (See calendar, page 2.)

Unless otherwise noted, all courses are given in the buildings of the College of Agriculture. Courses enclosed in brackets will not be given in 1922-23.

#### AGRICULTURAL CHEMISTRY

**805. Agricultural Chemistry, General Course.** Second term. Credit four hours. Prerequisite, Chemistry 101. It is recommended but not required that this course be preceded by organic chemistry. Lectures, M W F, 11. Rockefeller B. One recitation, to be arranged. Professor CAVANAUGH.

The relation of chemistry to agriculture, and an introduction to the study of the composition and chemical properties of plants, soils, fertilizers, feedstuffs, insecticides, and fungicides.

**806. Agricultural Chemistry, Introductory Laboratory Course.** Second term. Credit two hours. First term also if more than four students apply. Prerequisite, Chemistry 210 and 225 and organic chemistry; to be accompanied or preceded by course 805. T Th, 2-5; if necessary, Thursday morning may be substituted. Caldwell Hall 250. Assistant Professor RICE.

Simple analyses of plants and plant by-products, feedstuffs, soils, fertilizers, insecticides, and fungicides.

**808. Chemistry of Fertilizers and Insecticides, Laboratory Course.** First term. Credit three hours. Prerequisite, course 806; should be preceded or accompanied by course 810. T Th, 2-5.30; if necessary, Thursday morning may be substituted. Caldwell Hall 250. Assistant Professor RICE.

Practice in the use of the methods of the Association of Official Agricultural Chemists. Determinations of the important constituents in fertilizers, insecticides, and fungicides. Special emphasis is placed on correct analytical manipulation and procedure.

**809. Chemistry of Fertilizers, Advanced Course.** Second term. Credit three or more hours. Prerequisite, courses 808 and 810, or their equivalent. Lectures, T, 11. Laboratory, hours to be arranged. Caldwell Hall 341. Professor CROSS.

The composition of chemical manures, the raw materials used in their manufacture, and the chemical control of their manufacture, sale, and inspection.

**810. Chemistry of Fertilizers and Insecticides.** First term. Credit three hours. Prerequisite, course 805. It is recommended but not required that this course be preceded by course 806 and accompanied by course 808. Lectures, M W F, 10. Morse Hall. Professor CAVANAUGH.

A more detailed study of the chemistry of fertilizers and insecticides than is

covered in course 805. Methods of sampling and analyses used by the Association of Official Agricultural Chemists.

**815. Chemistry of Insecticides and Fungicides, Advanced Course.** First or second term. Credit two or more hours. Prerequisite, courses 808 and 810. Hours to be arranged. Professor CAVANAUGH.

The composition and manner of action of both old and new insecticides and fungicides; methods of preparation; consideration of compatibility in mixing. Instruction will take the form of personal consultation and supervision of laboratory work.

**650. Chemistry of Foods and Food Products.** Second term. Credit two hours. Prerequisite, Organic Chemistry. Lectures, T Th, 11. Place to be arranged. Professor CAVANAUGH.

The chemical composition, chemical properties, and methods of manufacture of the principal foods and food products. Methods for the determination of the normal constituents of foods. Special attention is given to the chemistry of milk and milk products, cereal products, sugars, fruits, and fruit products.

This course is announced also under Sanitary Chemistry, College of Arts and Sciences.

**820. Chemistry of Foods, Elementary Laboratory Course.** Second term. Credit two hours. Prerequisite, Organic Chemistry. T Th, 2-4.30. Caldwell Hall 250. Assistant Professor RICE.

This course is designed for students in home economics and others who desire an introductory laboratory course in food products but cannot offer the prerequisites of qualitative analysis.

The chemistry of proteins, fats, carbohydrates, potable water, baking powders, jellies, sirups, butter, oleomargarine, olive oil, salad oils, cheese, milk, food preservatives, artificial coloring, flavoring extracts, habit-forming agents, tooth powders, and so forth. Recitations are held during laboratory periods, and reports are required.

**825. Chemistry of Foods and Food Products, Laboratory Course.** Second term. Credit two hours. First term also if more than four students apply. Prerequisite, qualitative and quantitative analysis and organic chemistry. T Th, 2-5; if necessary, Thursday morning may be substituted. This course is designed to accompany course 650. Caldwell Hall 250. Assistant Professor RICE.

The conventional "complete" analysis of carbohydrate foods is made. Examination and analysis of proteins, fats, carbohydrates, soaps, baking powders, jellies, sirups, butter, oleomargarine, olive oil, salad oils, cheese, milk, artificial coloring, flavoring extracts, and so forth.

**830. Chemistry of Food and Nutrition. Advanced Course.** First term. Credit three hours. Prerequisite, course 650. Lectures, M W F, 10. Caldwell Hall 100. Professor CROSS.

Detailed discussion of the analytical processes involved in determining the character, purity, and value of foods and beverages. Emphasis is laid on the interpretation of analytical results with special reference to the problems of food manufacture and control.

**835. Food Analysis, Advanced Laboratory Course.** First term. Credit three hours. Second term also if as many as five students apply. Prerequisite, course 825; must be preceded or accompanied by course 830. T Th, 2-5.30; if



necessary, Thursday morning may be substituted. Caldwell Hall 250. Assistant Professor RICE.

The determination of fat constants, the distinguishing tests for the important fats and oils, the quantitative determination and qualitative tests for sugars in saccharine products, the determination of special constituents of raw milk and of condensed, evaporated, dried, and malted, milks. Practice in the use of the different forms of lactometers, colorimeters, ebulliometers, refractometers, the saccharimeter, and other special apparatus usually found in the food laboratory. The methods employed are those of the Association of Official Agricultural Chemists, of Leach (Food Inspection and Analysis) and of Woodman (Food Analysis) and also the newer procedures described in recent literature.

**840. Chemistry of Dairy Products.** First or second term. Credit two or more hours. Prerequisite, courses 830 and 835. Hours to be arranged. Professor CAVANAUGH, Professor CROSS, or Assistant Professor RICE.

The composition and methods of analysis of dairy products are such broad subjects that the previous courses constitute no more than an introduction to these fields. In this course a detailed study is made of the chemistry of such products as butter, cheese, condensed milk, evaporated milk, powdered milk, and malted milk; refractive index, electrical resistance, hydrogen-ion concentration, cryoscopy, enzymes, and food accessory substances are among the things which may be chosen for study. The methods of manufacture are studied and an inspection of an Ithaca condensed-milk factory will be arranged. Recent views concerning the physical and physiological chemistry of milk will be studied.

The student may elect the instructor under whom the work is to be taken.

**845. Chemistry of Fats and Oils.** First or second term. Credit three or more hours. Prerequisite, courses 830 and 835. Lecture, T, 9. Laboratory, hours to be arranged. Caldwell Hall 341. Professor CROSS.

The chemistry of oils, fats, and waxes, including those that are edible; their commercial preparation, and their use either in the industries or as food; the disposal of waste oils and residues and the commercial products derived therefrom.

**850. The Chemistry of Sugars.** First or second term. Credit three or more hours. Prerequisite, courses 830 and 835. Lecture, T, 10. Laboratory, hours to be arranged. Caldwell Hall 341. Professor CROSS.

The source, manufacture, and chemistry of the carbohydrate foods; optical and chemical examination of sugar products; determination of standard factors; calibration of apparatus. Critical study is made of the suitability and limitations of the different methods of examination. Instruments used in commercial practice are available.

**855. Chemistry of Plant Products.** Second term. Credit three or more hours. Prerequisite, courses 830 and 835. Lectures, M W F, 10. Caldwell Hall 100. Laboratory, hours to be arranged. Caldwell Hall 341. Professor CROSS.

The chemical constitution, characteristics, identification, quantitative determination, and industrial uses of the more important plant products, including lecithin, dextrine, gums, glucosides, tannins, pigments, nitrogen bases, colloids, and enzymes. Designed for students who desire to acquaint themselves with the chemistry and biological significance of some of the more important substances occurring in plants.

**AGRICULTURAL ECONOMICS AND FARM MANAGEMENT**

**1. Farm Records and Accounts.** First term. Credit three hours. Open to juniors and seniors who have passed the farm-practice requirement. Should precede course 2. Lectures, T Th, 10. Poultry Building 375. One laboratory period a week. Students must report to the department for assignment to laboratory sections. In addition to the regular laboratory period, outside work will occasionally be assigned instead of lectures. Assistant Professor NOBLE and Mr. \_\_\_\_\_.

Farm inventories, cash accounts, income-tax reports, single-enterprise cost accounts, complete farm cost accounts, and other farm records. Special emphasis is given to the interpretation of results and their application in the organization and management of farms. Two half-day field trips will be taken, one about October 1 and the other about December 1. On these days the laboratory period will be from twelve o'clock to seven o'clock. Laboratory fee, \$2.

**2. Farm Management.** Second term. Credit four hours. Open to juniors and seniors who have passed the farm-practice requirement. This course is designed for students who have had considerable farm experience. It should be taken near the end of the student's college course, and should be preceded or accompanied by course 1, economics, and as many as possible of the subjects dealing with the production of crops and animals. Lectures, M W F, 10. Dairy Building 222. One laboratory period a week. Students must report to the department for assignment to laboratory sections. On days when farms are visited, laboratory work may last longer than two and one-half hours. Professor \_\_\_\_\_ and Mr. \_\_\_\_\_.

Lectures, recitations, and laboratory practice. Farming as a business; types of farming; balance of business; size of business; rates of production; farm layout; building arrangement; labor management; machinery; marketing; ways of starting to farm; forms of tenure and leases; choosing and buying a farm; use of capital and credit; planning, organization, and management of specific farms. One or two out-of-town trips during April and May will necessitate leaving on noon trains and returning on evening trains. Laboratory fee, \$2.

**3. Advanced Farm Management.** First term. Credit four hours. Prerequisite, permission to register, and an unusually good record in courses 1 and 2. Th F, 2-5 (or, if there are enough students for two sections, M T, 2-5.) Two or three two-day trips will be taken in October or early November, on the regular class days. On days when out-of-town trips are taken, the class will usually leave before 2 o'clock and will not return until evening. Professor SCOVILLE and Mr. \_\_\_\_\_.

During the first half of the term, successful farms in different regions of the State will be visited. Their business organization and management, and also the agricultural conditions and systems of farming in the regions, will be studied. The work in the second half of the term will consist of discussion of the farms visited and also of advanced studies of such divisions of the subject of farm management as tenure, credit, fertility maintenance, building arrangement, buying farms, insurance, and accounting. Expenses for trips are estimated to be about \$25.

**4. Types of Farming in the United States.** Second term. Credit two hours.

Prerequisite, course 2. Laboratory, Th, 2-4.30. Farm Management Building. Professor WARREN and Mr.———.] Not given in 1922-1923.

A study of the types and methods of farming best adapted to different sections of the United States, and of the natural and economic conditions that make those types best.

10. **Marketing.** First term. Credit four hours. Prerequisite, Economics 51. Open to juniors, seniors, and graduate students. Lectures, M W F, 8. Farm Management Building 102. One laboratory period a week. Students must report to the Department for assignment to laboratory sections. Professor BOYLE.

A study of the present organization, functions, and operations of the market structure, with particular reference to agriculture. Cooperative marketing is included. Laboratory fee, \$1.

11. **The Organized Exchanges and Speculation.** First term. Credit two hours. Open to graduate students and seniors with adequate preparation. Recitations, T Th, 8. Farm Management Building 102. Professor BOYLE.

12. **Collective Bargaining.** Second term. Credit two hours. Open to graduate students and seniors with adequate preparation. Class limited to twenty-five students, on basis of scholarship. Recitations, T Th, 8. Farm Management Building 102. Professor BOYLE.

Collective bargaining and its use by labor, capital, and agriculture. The policy of collective bargaining.

13. **Cooperative Marketing.** Second term. Credit three hours. Open to juniors, seniors, and graduate students. Should be preceded or accompanied by course 2. Lectures, T Th, 9. Farm Management Building 102. One laboratory period a week. Students must report to the Department for assignment to laboratory sections. Professor BABCOCK.

New York State cooperative laws; theory of organization, financing, and managing of cooperative corporations; existing cooperative marketing associations; exercises in working out the problems confronting the cooperative marketing associations operating in New York State.

The purpose of this course is to acquaint students with the cooperative marketing associations of the State with particular reference to the principles involved and the working out of these principles in everyday practice. Laboratory fee, \$2.

14. **Advanced Cooperative Marketing.** First term. Credit two hours. Open to graduate students and seniors who have made an unusually good record in course 13. Lecture, T, 9. Farm Management Building 202. One laboratory period a week. Students must report to the Department for assignment to laboratory section. Professor BABCOCK.

The purpose of this course is to make a first-hand study of the problems confronting cooperative associations operating in New York State. Laboratory fee, \$2.

20. **History of Agriculture.** First term. Credit three hours. Open only to seniors and graduate students. Lectures, M W F, 11. Forestry Building 210. Professor LAUMAN and Mr. BARKAS.

The important phases of the development of agriculture are considered his-

torically. Special stress is laid on the rise of the agricultural classes, on agrarian problems, as well as on the beginnings of rational agriculture.

**21. History of Agriculture in the United States.** Second term. Credit three hours. Open only to seniors in all colleges and to graduate students. Lectures, M W F, 11. Forestry Building 210. Professor LAUMAN and Mr. BARKAS.

This course deals with the land, its settlement, and its settlers in their economic, social, and political aspects; the technical development of agriculture; the beginnings of permanent agriculture; the rise and course of marketing problems and of the agrarian movements.

**22. Agricultural History Seminary.** First and second terms. Primarily for graduate students and for seniors by invitation. Th, 2.30. Forestry Building 126. Professor LAUMAN.

The year will be devoted to a study of the rise and development of the Non-partisan League.

**29. Agricultural Economics, General Course.** Second term. Credit four hours. Prerequisite, Economics 51. Open to juniors, seniors, and graduate students. Lectures, M W F, 8. Farm Management Building 102. One laboratory period a week. Students must report to the department for assignment to laboratory sections. Professor BOYLE.

A study of the economic and social problems of agriculture; agriculture as an industry; coordination of demand and supply; land tenure; labor; machinery; marketing; credit; transportation; agricultural insurance; storage; price speculation; farmers' organizations; state aid; county agent; grain trade; livestock and meat industry; taxation and protective tariff; foreign competition; food supply. Laboratory fee, \$1.

**30. Agricultural Economics, Elementary Course.** First term. Credit three hours. Prerequisite, Economics 51. Open to graduate students, and to seniors by special permission. Lectures, M W F, 9, and individual conferences. Forestry Building 210. Professor LAUMAN and Mr. BARKAS.

A study of the factors underlying the present conditions in rural communities at home and abroad, and of forces at work in shaping the agriculture of the world, chiefly along economic lines.

**31. Agricultural Economics, Advanced Course.** Second term. Credit four hours. Prerequisite, course 30 or its equivalent. Lectures, M W F, 9. Forestry Building 210. Professor LAUMAN.

A more extended study, primarily theoretical, of the general economic problems of agriculture.

**32. Agricultural Statistics.** Second term. Credit two hours. Prerequisite, permission to register. Lecture, M, 8. Farm Management Building 202. Laboratory, M, 2-4.30. Assistant Professor PEARSON.

A study of the principles involved in the collection, tabulation, and interpretation of agricultural statistics. This course is designed for students who expect to do research work. Laboratory fee, \$2.

**33. Research in Agricultural Economics or History.** First and second terms. Credit two or three hours a term. For seniors who have done superior work in course 20 or 30, and for graduate students. Forestry Building 126. Professor LAUMAN.

**34. Agricultural Economics Seminary.** First and second terms. Primarily



for graduate students, and for seniors by invitation. T, 2.30. Forestry Building 126. Professor LAUMAN.

The earlier part of the year will be devoted to a fundamental survey of the agricultural credit problem; the later part is for the presentation of the work of advanced students.

**35. Research.** First, second, and third terms. Credit one or more hours a term. Prerequisite, permission to register. Hours by appointment with any professor in the department.

**36. German Readings in Agricultural Economics.** First term. Credit two hours. Open only to seniors and graduate students. Recitation T, 9. Farm Management Building 102. Professor BOYLE.

Important developments in German thought and practice in the field of agricultural economics.

**37. French Readings in Agricultural Economics.** Second term. Credit two hours. Open only to seniors and graduate students. Recitation T, 9. Farm Management Building 102. Professor BOYLE.

Important developments in French thought and practice in the field of agricultural economics.

**38. Seminary.** First, second, and third terms. Credit one hour. Open only to graduate students. M, 4.45-6. Farm Management Building 101. Professors WARREN, BOYLE, MYERS, MISNER, SCOVILLE, BABCOCK, and LADD, and Assistant Professors NOBLE and PEARSON.

**39. Agricultural Prices.** Second term. Credit two hours. Open to juniors, seniors, and graduate students who have had work in political science, farm management, and agricultural economics. Lecture, T, 8. Farm Management Building 202. Laboratory, T, 2-4.30. Assistant Professor PEARSON. Laboratory fee, \$2.

**41. Transportation of Agricultural Products.** Second term. Credit two hours. Open to juniors and seniors. Lectures, T Th, 11. Farm Management Building 102. Mr. GABRIEL.

A study of the farmers' shipping problems. The course will include such problems as computing demurrage, tracing shipments, ordering cars, making claims, routing shipments, packing and making shipments, checking freight bills, and loading cars. A brief discussion of water and motor transportation will be included.

## AGRONOMY

All of the instruction in soils offered in the College is given in the Department of Agronomy, but part of the instruction in field crops is offered elsewhere. A general introductory course to the study of field crops is comprised in Agronomy 2. Advanced study in taxonomy and breeding of field crops may be obtained in the Department of Plant Breeding.

**1. The Nature and Properties of Soil.** First or second term. Credit five hours. Prerequisite, Chemistry 101 and Geology 1. Assignment to laboratory and recitation sections must be made at the time of registration. Lectures, M W F, 9. Caldwell Hall 100. One laboratory period, Caldwell Hall 31. Two recitations, Caldwell Hall 143. Professor BUCKMAN.

A comprehensive course dealing with the origin, composition, and properties of soils, with particular reference to their management in crop production. The laboratory work consists in practice designed to demonstrate fundamental physical and chemical relations. Laboratory fee, \$2.

2. **Cereals, Forage Crops, and Miscellaneous Crops.** First or second term. Credit four hours. To be preceded by course 1 and Botany 1. Lectures, M W, 10. Poultry Building 375. Laboratory, first term, section 1, M Th, 2-4.30; section 2, T F, 2-4.30; second term, section 1, M, 2-4.30; second period by appointment; section 2, T, 2-4.30, second period by appointment. Assignment to laboratory sections must be made at the time of registration. Poultry Building 350. Mr. COOPER.

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

[3. **Practical Soil Management.** First term. Credit two hours. Given in alternate years. Prerequisite, courses 1 and 2. Lectures M W, 8. Caldwell Hall 100. One recitation by appointment. Caldwell Hall 143. Professor WORTHEN.] Not given in 1922-23.

A course dealing with methods of soil utilization, including the use of lime, commercial fertilizers, stable manure, and green manure crops, in agricultural practice. It includes a study of the influence of crop rotations and fertilizers on the productivity of soils, as shown by field experiments. Particular stress is placed upon factors essential for the practical utilization of New York soils.

5. **Mechanical Analysis of Soil.** First term. Credit one hour. Given in alternate years. Prerequisite, course 1 and Chemistry 210 and 225. One laboratory period by appointment. Caldwell Hall 201. Professor BIZZELL.

A theoretical and practical study of the methods used in the mechanical analysis of soils. Intended for students specializing in soils. Laboratory deposit, \$2.

6. **Soils, Advanced Course.** First term. Credit three hours. Prerequisite, course 1 and Chemistry 210 and 225. Students must consult Professor BIZZELL before registering for this course. Lectures, T Th F, 8. Caldwell Hall 143. Professor BIZZELL.

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

7. **Soil Bacteriology.** Second term. Credit three hours. Prerequisite, course 1, Dairy Industry 4, and Chemistry 210 and 225. Lecture, W, 8. Caldwell Hall 282. Two laboratory periods, by appointment. Caldwell Hall 201. Professor J. K. WILSON.

A course in biological soil processes, designed primarily for students specializing in soil technology. The laboratory work will be supplemented by reports and by abstracts of important papers on the subject. Laboratory fee, \$5.

11. **Research.** Throughout the year. For graduate students only. Hours by appointment. Caldwell Hall 350. Professors LYON, BIZZELL, and J. K. WILSON.

14. **Seminary.** Throughout the year, without credit. Open to seniors who have taken course 6, and required of graduate students taking work in the Department. S, 11-12.30. Caldwell Hall 143.

## ANIMAL HUSBANDRY

Students intending to specialize in animal husbandry are advised to register for courses 1 and 2 before taking the more advanced courses.

1. **Principles and Practice of Feeding Animals.** Second term. Credit three hours. Lectures T Th, 10. Animal Husbandry Building A. One practice period, T W Th or F, 2-4.30, by appointment. Animal Husbandry Building. Mr. NORRIS and assistants.

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

2. **Principles of Animal Breeding.** Second term. Credit three hours. Lectures, T Th, 9. Practice, F, 2-4.30. Animal Husbandry Building A, and Judging Pavilion. Professor WING, and Messrs. ALLEN and McCONNELL.

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

5. **The Horse.** Second term. Credit three hours. Lectures, T Th, 11. Animal Husbandry Building A. Practice, W, 2-5. Judging Pavilion. Professor HARPER and Mr. E. E. VIAL.

A general course treating of the horse and the mule. Judging, scoring, care and management, economy in feeding, breeding, stable management, including harnessing, hitching, and the like. Origin, history, and development of the breeds of horses.

6. **Horse Training, Practical Course.** First term. Credit two hours. Prerequisite, course 5 and permission to register. Lecture, F, 9, Animal Husbandry Building. Practice, in sections by appointment. Animal Husbandry Building and barns. Professor HARPER.

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

10. **Dairy Cattle.** First term. Credit four hours. Lectures, M W, 9. Practice, M T W Th or F, 2-6, by appointment; Animal husbandry Building A, Judging Pavilion, barns, and stables. Professor WING, and Messrs. ALLEN and McCONNELL.

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. Practice in judging, scoring, milking, feeding, stable management, and keeping records.

11. **Swine.** First term. Credit three hours. Lectures, T Th, 11. Animal Husbandry Building A. Practice, T or Th, 2-4.30. Judging Pavilion. Assistant Professor HINMAN and assistants.

Origin, history, and development of the breeds of swine; herd management; practice in judging swine and reports on assigned topics. This course will consist of lectures, recitations, discussions, tracing of pedigrees, and field trips that will give the student a thorough knowledge of the management, production, and marketing of swine. Estimated cost of trips, \$15.

12. **Beef Cattle and Sheep.** Second term. Credit five hours. Lectures,

M W F, 11. Animal Husbandry Building A. Practice, T Th, 2-4.30. Judging Pavilion. Assistant Professor HINMAN and assistants.

Origin, history, and development of the breeds of beef cattle and sheep; herd and flock management. Practice in judging. This course will consist of lectures, recitations, discussions, reports, tracing of pedigrees, and field trips that will give the student a thorough knowledge of the management, production, and marketing of beef cattle and sheep, both grade and purebred. Estimated cost of trips, \$20.

13. **Meat and Meat Products.** First or second term. Credit three hours. Registration limited to forty. Laboratory assignment must be made at the time of registration. Lecture, M, 8. Two laboratory periods a week, M T W F, 2-4.30, and W S, 8-10.30. Animal Husbandry Building B and Meat Laboratory. One required inspection trip to Buffalo and vicinity. Mr. SCHUTT.

A practical course in slaughtering farm animals, the cutting of carcasses, and the preparation and curing of corned, dried, and salted meats.

[14. **Commercial Feeding Stuffs.** Second term. Credit two hours. Registration by appointment only. Practice, M W, 2-4.30. Animal Husbandry Building 21. Professor MAYNARD.] Not given in 1922-23.

The relation of milling processes to the feeding value of by-product feeds. A study of feed materials, and their identification, especially those found in proprietary feeds. A study of possible adulterants and their detection.

15. **Principles of Animal Nutrition, Advanced Course.** Second term. Credit three hours. Prerequisite, course 1 and Veterinary Physiology 10. For advanced and graduate students. Lectures, M W F, 11. Animal Husbandry Building. Professor MAYNARD.

16. **Problems in Animal Genetics, Advanced Course.** First term. Credit two hours. Prerequisite, course 2. Lecture, F, 11. Recitation period by appointment. Animal Husbandry Building. Professor HARPER and assistants.

Lectures, conferences, and reports, including statistical methods as applied to breeding animals. The work will consist in large part of practice in making reports on statistical problems.

17. **Advanced Judging, Dairy Cattle.** Second term. Credit one hour. Saturdays after Easter recess. Hours by appointment. Successful students may also register for one hour in the succeeding fall term. Professor WING and Messrs. ALLEN and McCONNELL.

Excursions to neighboring herds and preparation for stock-judging competitions. Attendance at the State Fair will be required.

18. **Seminary.** First and second terms, without credit. Required of all graduate students taking either a major or a minor subject in the department. Advanced undergraduates will be admitted by permission, and if a satisfactory thesis on an approved subject is presented may receive not to exceed two hours credit. T, 10. Departmental staff.

30. **Health and Disease of Animals.** First term. Credit three hours. Not open to freshmen or to those who have had no courses in animal husbandry. Lectures, M W F, 11. Veterinary College. Professors MOORE and BIRCH.

The course is designed to give the student a clear conception of the causes and nature of the diseases of animals, with suggestions for their prevention. Special



attention is given to the methods for preventing the spread of the infectious and epizootic diseases. Such information as is practicable is given for the treatment of slight injuries and for first aid in emergencies.

31. **Horseshoeing.** Second term. Credit one hour. Limited to thirty seniors. W, 2-4, or Th, 10-12. Farriery, Veterinary College. Professor ASMUS.

## BOTANY

Students wishing instruction in special groups of plants or in special subjects should consult the department.

1. **General Botany.** First and second terms. Credit three hours a term. Lectures, T Th, 9 or 11. Dairy Building 222. Laboratory, one period of two and one-half hours. Stone Hall. Assignment to sections must be made at the time of registration. Professor PETRY, Dr. WANN, Misses FERNALD and WILLIAMS, and Messrs. CLUM, WILSON, and MANNING.

This course is designed to furnish a general knowledge of the fundamental facts and principles of plant life. A careful study is made of form, structure, and reproduction of representatives from the principal groups, with a view to orient the student in the plant kingdom and to acquaint him with the principal evolutionary tendencies exhibited. Considerable attention will be given to life processes, particularly in the higher plants. Laboratory fee, \$2.50 a term; deposit, \$3, for first term only.

2. **Forest Botany** First term. Credit three hours. Prerequisite, course 1 or its equivalent. Lecture, T, 8. Stone Hall 192. Laboratory or field work, M W, or T Th, 2-4.30. One all-day field trip is required. Stone Hall, Botanical Laboratory. Assignment to laboratory sections must be made in the Botany office at the time of registration. Dr. MUENSCHER.

A course dealing with the identification of trees and shrubs, both in summer and in winter condition. The laboratory work covering identification will be done largely in the field. The work of the latter part of the term will be a study of the taxonomy of woody plants. This course is adapted to the needs of all students wishing a technical knowledge of trees and shrubs. Laboratory fee, \$3; deposit, \$3.

3. **Veterinary Botany.** Second term. Credit five hours. Lecture, M W, 9. Laboratory, M, 2-4.30. Recitation, T, 11. Stone Hall, Botanical Laboratory. Dr. MUENSCHER.

A course designed to acquaint the student with those facts about plants of special value to the veterinarian. Special emphasis will be placed on poisonous plants, fodder plants, weeds, and plants used in medicine. Laboratory fee, \$5.

4. **Microscopic Wood Technology.** First term. Credit two hours. Prerequisite, courses 1 and 2 or an equivalent. Laboratory, M, 2-4.30, F, 10.30-1. A few lectures will be given during the laboratory periods. Stone Hall, Botanical Laboratory. Professor EAMES and Mr. KENT.

This course is planned for students in wood technology and in general forestry. The object is to familiarize the student with the microscopic anatomy of wood. It includes the identification of commercially important woods; a study of types of wood structure as related to uses, such as wood pulp; the structure of wood as affecting its impregnation with preservatives and other chemicals; and tests of

paper to determine source of material. Laboratory fee, \$4. This course is prerequisite to Forestry 7 and 8.

**6. Taxonomy of the Higher Plants.** Second or third term. Credit four or five hours. Prerequisite, course 1 or its equivalent. Third term: Lecture, F, 8. Laboratory, M W F, 2-5, the remaining work by appointment. Second term: Lecture F, 8. Laboratory, T Th, 2-5, S, 8-11. Stone Hall, Botanical Laboratory. Professor WIEGAND and Mrs. GRANT.

A study of the kinds of seed plants and ferns, their classification into genera, families, and orders, and field work on the local flora. Emphasis will be placed on wild plants, but the more common cultivated plants will receive some attention. The course is planned to follow course 1 and to furnish an introduction to the knowledge of the field botany and classification of the higher plants, in preparation for special work in various departments and as an aid in teaching. Instruction will be given in the preparation of an herbarium and of keys. Laboratory fee, \$4; deposit, \$3.

**6a. Advanced Field Course in Taxonomy.** Third term. Credit four hours. Prerequisite, course 6 or its equivalent. Laboratory and field work, hours to be arranged. Remainder of work at times optional with the student. Professor WIEGAND.

An intensive study of the summer flora about Ithaca, with the consideration also of some advanced problems and methods in taxonomy. Laboratory fee, \$4; deposit, \$3.

**6b. Advanced Course in Taxonomy of the Higher Plants.** Second term. Credit three hours. Prerequisite, course 6 or its equivalent. Lectures, laboratory, and field work; hours to be arranged. Stone Hall, Botanical Laboratory. Professor WIEGAND and Mrs. GRANT.

A study of technical problems connected with the taxonomy of plants. Special stress will be placed on training for research. Laboratory fee, \$3; deposit, \$3.

**9. Histology.** First term and alternate third terms. Credit four hours. Prerequisite, course 1 or its equivalent. Third term. Lectures, T Th, 12. Laboratory, T Th, 8-12, F, 8-10.30. First term, lecture, T, 12; laboratory, T Th S, 9-11.30. Stone Hall, Botanical Laboratory. Professor EAMES and Mr. WILSON.

This course is designed to give a working acquaintance with the internal morphology of vascular plants and with the terminology of cells, tissues, and organs. Emphasis is placed on practice in interpretation and determination of material. To cover the range of variation in cells and tissues, a large amount of material is studied. Variation in form and structure is considered from the standpoint of phylogenetic development and adaptive modification. The course is of value especially to students of morphology, pathology, and plant physiology. Laboratory fee, \$5.

**10. Cytology.** Second term. Credit four hours. Prerequisite, course 1 or its equivalent. Conferences, T Th, 9. Laboratory, T Th, 10-12.30. Stone Hall, Botanical Laboratory. Professor SHARP.

This course is planned as an introduction to the subject matter, literature, and problems of cytology. The survey of the field is inclusive enough to make the course of value to students of various branches of biology, while emphasis on certain features gives it a special significance for the geneticist. The conference

hour is devoted to a discussion of topics suggested by the laboratory observations and assigned reading, and during the latter part of the term, to the review of new literature. Laboratory fee, \$5.

[11. **Methods in Histology and Cytology.** First or third term. Credit three hours. Prerequisite, course 1 or its equivalent. Laboratory, first term, M W F, 2-4.30, with an occasional lecture during a laboratory period; third term, F, 9-1, remaining work by appointment. Stone Hall, Botanical Laboratory. Professors EAMES and SHARP and DR. WANN.] Not given in 1922-23.

A course designed to acquaint the student with methods employed in preparing material for histological and cytological study. Laboratory fee, \$5.

[12. **Comparative Morphology of Algae.** Second term. Credit four hours. Prerequisite, course 1 or its equivalent. Lectures, W F, 8. Stone Hall. Laboratory, W F, 10-1. Stone Hall, Botanical Laboratory. Professor SCHRAMM.] Not given in 1922-23.

An advanced course embracing a study, principally from the standpoint of comparative morphology and relationships, of selected types of algae. Laboratory fee, \$5.

[13. **Comparative Morphology of Bryophytes.** Credit one hour. Prerequisite, course 1 or its equivalent. Hours to be arranged. Stone Hall, Botanical Laboratory. Dr. RANDOLPH.] Not given in 1922-23.

This course deals with the structure and development of bryophytes, and is designed for advanced students of botany. Emphasis is placed on evolutionary and reproductive features. Laboratory fee, \$2.

14a. **Comparative Morphology of Vascular Plants, Part I.** First term. Credit four hours. Prerequisite, course 1 or its equivalent. Lectures, T Th, 9. Laboratory, T Th, 10-12.30. Stone Hall, Botanical Laboratory. Dr. RANDOLPH.

Courses 14a and 14b are designed to cover the field of vascular-plant morphology. They include a study of both living and fossil forms, emphasis being placed upon the evolutionary history of the plant kingdom as shown by a comparison of the morphological characters of its constituent groups. Part I deals with the more primitive vascular plants, chiefly pteridophytes, and Part II, with higher forms, chiefly seed plants. The two parts are offered in alternate years. Laboratory fee, \$5.

[14b. **Comparative Morphology of Vascular Plants, Part II.** First term. Credit four hours. Prerequisite, course 1 or its equivalent. Lectures, T Th, 9. Laboratory, T Th, 10-12.30. Stone Hall, Botanical Laboratory. Dr. RANDOLPH.] Not given in 1922-23.

See statement under course 14a.

**Comparative Morphology of Fungi.** Given in the Department of Plant Pathology.

20. **Plant Physiology.** First or second term. Credit four hours. Prerequisite, all freshman work or its equivalent, and course 1. Lectures and recitations, T Th, 10. Stone Hall 192. Laboratory, T Th, 2-4.30 or W F, 2-4.30. Stone Hall 21. Assignment to laboratory sections must be made at the time of registration. Professor KNUDSON or Professor O. F. CURTIS, and Messrs. NANZ, PROEBSTING, JONES, and CLUM.

This course is designed to acquaint the student with the general principles of plant physiology. Topics, such as water relations, photosynthesis, translocation,

digestion, respiration, mineral nutrition, growth, and reproduction, are studied in some detail, and particular emphasis is placed, in both laboratory and recitations, on discussions of the principles taught and their applications. Laboratory fee, \$4; deposit, \$2.

**21. Plant Physiology, Advanced Lecture Course.** First and second terms. Credit three hours a term. Prerequisite, training in botany and chemistry, to be determined in each case by the department. Recommended for seniors and graduate students. Lectures, M W F, 10. Stone Hall 192. Professor Knudson or Professor O. F. CURTIS.

[**21a. Plant Physiology, Advanced Lecture Course.** Third term. Credit three hours. Prerequisites as in course 21. Lectures, T W Th S, 8. Stone Hall 192. Professor O. F. CURTIS.] Not given in 1922.

This course is equivalent to the work of the first term of course 21.

**21b. Plant Physiology, Advanced Lecture Course.** Third term. Credit three hours. Prerequisites as in course 21. Lectures, T W Th S, 8. Stone Hall 192. Professor O. F. CURTIS.

This course is equivalent to the work of the second term of course 21 and alternates with 21a.

**22. Plant Physiology, Advanced Laboratory Course.** First and second terms. Credit three hours a term. Must be preceded or accompanied by course 21. Laboratory, M, 2-5, S, 8-12.30. Stone Hall 21. Professors KNUDSON and O. F. CURTIS, and Mr. PROEBSTING.

Laboratory fee, \$5; breakage deposit, \$2.

**22a. Plant Physiology, Advanced Laboratory Course.** Third term. Credit four hours. Requirements as in course 22. Laboratory, T Th, 9-1, T, 2-5. Professor O. F. CURTIS and Mr. NANZ.

Course 22a is approximately the equivalent of course 22. Courses 21 and 21a or 21b, 22, and 22a are comprehensive and are recommended for students specializing in plant study, including the applied subjects. Laboratory fee, \$10; breakage deposit, \$5.

### Courses Intended Primarily for Graduate Students

[**17. History of Botany.** Second term, without credit. M, 4.15. Stone Hall 203.] Not given in 1922-23.

A course of lectures given by various members of the staff with the purpose of acquainting advanced students of botany with the historical development of their science.

**18. Research in General Botany, Taxonomy, Histology, Cytology, and Algae.** Throughout the year. Credit not less than three hours a term. By appointment. Professors WIEGAND, SCHRAMM, EAMES, and SHARP.

A course designed for graduate and advanced students. Original investigations by students who are adequately prepared. The laboratory fee depends upon the nature of the work.

**19. Seminary in Taxonomy, Morphology, Cytology, and Histology.** Throughout the year. Required of graduate students in these subjects. Hours to be arranged. Professors WIEGAND, EAMES, and SHARP, assisted by other members of the department.



Broad problems pertaining to botany will be discussed, literature will be reviewed, and reports of research will be given.

**31. Seminary in Plant Physiology.** Throughout the year. Required of graduate students taking work in the department. Conference, F, 11. Stone Hall 192. Professors KNUDSON and O. F. CURTIS.

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

**33. Research, Plant 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. Stone Hall. Professors KNUDSON and O. F. CURTIS.

In this course, problems in plant physiology and in the general relation of plant physiology to agriculture will be assigned for investigation. Reports on work will be required. The amount of the laboratory fee is governed by the nature of the work.

## DAIRY INDUSTRY

**1. Milk Composition and Tests.** First or second term. Credit three hours. Assignment to laboratory sections must be made at the time of registration. First term, lectures, W S, 11. Dairy Building 222. Practice, M or T, 2-4.30, or S, 8-10.30. Dairy Building 232. Second term, lectures, W S, 11. Dairy Building 222. Practice, W, 2-4.30, Th, 10.30-1, or S, 8-10.30. Dairy Building 232. Professor TROY, Assistant Professor MCINERNEY, and Messrs. BELL and HOLLIS.

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

**1a. Milk Composition and Tests.** Second term. Credit three hours. For veterinary students. Assignment to laboratory sections must be made at the time of registration. Lectures, T, 11, Dairy Building 119; S, 11, Dairy Building 222. Practice, W, 8-10.30, or S, 8-10.30. Dairy Building 232. Professor TROY, Assistant Professor MCINERNEY, and Messrs. BELL and HOLLIS.

This course is similar to course 1. Laboratory deposit, \$3, part returnable.

**2. Butter.** First or second term. Credit three hours. Must be preceded or accompanied by courses 1 and 6. Assignment to laboratory sections must be made at the time of registration. Lectures, first term, F, 9; second term, F, 8. Dairy Building 222. Practice, M, T, or W, 1-6. Dairy Building. Professor GUTHRIE and Assistant Professor JACKSON.

This course considers the principles and practice of butter making in farm dairies and creameries, cream separation, pasteurization, starters, cream ripening, churning, judging, marketing, creamery management, and the like. Laboratory deposit, \$4, part returnable.

**3. Cheese.** First term. Credit four hours. Prerequisite, courses 1 and 6; should be preceded or accompanied by course 8. Lectures, recitations, and assigned readings. Th, 8. Dairy Building 222. Practice, M, W, or Th, 12-6. Cheese Laboratory. Professor FISK and Mr. PRICE.

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, \$2.50, part returnable.

4. **Bacteriology, Elementary Course.** First term. Credit four hours. For regular students only, except by special permission. Assignment to laboratory sections must be made at the time of registration. Lecture, S, 10. Dairy Building 222. Practice, M W F, 2-5. If registration exceeds the capacity of the laboratory, a second set of sections will be arranged, M W F, 9-12. Dairy Building 122. Professor STOCKING, and Messrs. DOWNS, MOON, and PITTMAN.

The purpose of this course is to give a working knowledge of microbiology and to prepare students for work in the different fields of bacteriology, such as pertain to soils, plant diseases, the household, or dairying. The course includes preparation and care of bacteriological apparatus; preparation of culture media; sterilization; occurrence and distribution of bacteria; methods of study, including morphology, cultural characteristics, chemical changes, and isolation and identification of species. Laboratory deposit, \$4, part returnable.

5. **General Dairy Industry.** First term. Credit four hours. Open only to those who are fitting themselves for teachers of agriculture in high schools. Assignment to laboratory sections must be made at the time of registration. Lectures, T Th, 10. Dairy Building 222. Practice, F, 1-6. Dairy Building. Professor ROSS and Mr. CURRAN.

The purpose of this course is to give prospective teachers of agriculture a general knowledge of the field of dairying. The course will include the testing of milk and dairy products, the care and handling of milk, the manufacture of a limited number of dairy products, and a limited amount of bacteriology as applied to dairying.

This course will not be accepted as a prerequisite for any other course offered by the Department of Dairy Industry.

6. **Market Milk and Milk Inspection.** Second term. Credit four hours. Must be preceded or accompanied by course 1; should be preceded or accompanied by courses 4 and 8. Assignment to laboratory sections must be made at the time of registration. Lectures, W F, 12. Dairy Building 222. Practice, T or Th, 1-6, or S, 8-1. If registration exceeds the capacity of the laboratory another section will be arranged. Dairy Building. Professor ROSS and Mr. CURRAN.

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; clarification; certified milk; milk laws; commercial buttermilk; refrigeration; harvesting and storage of ice; duties of milk inspectors; apparatus and buildings. The practice includes visits to dairies in the vicinity of Ithaca. A required two-day inspection trip in the neighboring counties may be arranged. Laboratory deposit, \$3, part returnable.

7. **Testing and Composition of Dairy Products, Advanced Course.** Second term. Credit two hours. Prerequisite, course 1. Open to juniors, seniors, and graduate students. T Th, 2-5. Dairy Building 202. Professor TROY, Assistant Professor MCINERNEY, and Messrs. BELL and HOLLIS.

This course includes studies of the properties of the constituents of milk and milk products and the application to commercial practice of tests of importance

in dairy work, such as the use of standard acid and alkaline solutions; the Mojonnier and other tests for fat and solids; tests for adulterants and preservatives; and the standardization of concentrated milk products. Laboratory deposit, \$5, part returnable.

**7a. Technical Methods for Testing and Standardizing Dairy Products.** Second term. Credit one hour. Prerequisite, course 1. Registration by permission, and limited to ten students. Practice, W, 2-5. Dairy Building. Professor TROY and Assistant Professor McINERNEY.

Analysis of dairy products by use of the Mojonnier and other methods as applied in factory control work. Problems are assigned which afford practice in the calculation and interpretation of results.

**8. Dairy Bacteriology.** Second term. Credit four hours. Must be preceded or accompanied by course 1, and preceded by course 4 or its equivalent. For regular students, except by special permission. Assignment to laboratory sections must be made at the time of registration. Lecture, T, 10. Dairy Building 222. Practice, M W F, 2-5. If the registration exceeds the capacity of the laboratory, a second section will be arranged, M W F, 9-12. Dairy Building 122. Professor STOCKING and Messrs. DOWNS, MOON, and PITTMAN.

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; the making of starters; effect of straining; separation, pasteurization, and temperature; bacteriological methods of city milk inspection. Laboratory deposit, \$4, part returnable.

**9. Butter, Advanced Course.** Second term. Credit three hours. Must be preceded by a good record in course 2. Lecture, W, 8. Dairy Building 222. Practice, one long period each week, by appointment, T, Th, or S. Laboratory practice will begin at the opening of the creamery in the morning and will close at one o'clock. Dairy Building. Professor GUTHRIE and Assistant Professor JACKSON.

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 from six hundred to one thousand pounds of butter are made daily. The work will include receiving milk and cream; separating; ripening cream; starter culture; the manufacture, wrapping, packing, and judging of butter. If a sufficient number of students desire it, a voluntary trip to large city markets will be arranged for the Easter vacation. Laboratory deposit, \$4, part returnable.

**10. Fancy Cheese.** Second term. Credit two hours. Prerequisite, courses 1 and 3. Practice, T or W, 1-6. Dairy Building 132. Professor FISK and Mr. PRICE.

The manufacture of certain brands of fancy cheese receives attention in the course. Laboratory deposit, \$2, part returnable.

**11. Ice Cream.** Second term. Credit two hours. Prerequisite, course 1, and should be preceded or accompanied by course 6. Lecture, M, 8. Dairy Building 222. Practice, M, 2-4.30, T, 8-10.30, or Th, 8-10.30. Laboratory facilities limited to ten students a section. Assignment to laboratory sections must

be made at the time of registration. Dairy Building E 122. Professor FISK and Mr. TRAVIS.

The topics considered are the manufacture of different kinds of ice cream and sherbets, and types of machinery used. A required inspection trip to ice cream plants will be arranged. Laboratory deposit, \$2, part returnable.

12. **Seminary.** First or second term. Credit one hour. Required of graduate students taking work in the department; open to undergraduate students taking research work. T, 11. Dairy Building. Departmental staff.

13. **Research.** First or second term. Credit one or more hours, by arrangement. For advanced students. Practice hours, by appointment. Dairy Building. Professors STOCKING, ROSS, TROY, GUTHRIE, and FISK, and Assistant Professors MCINERNEY and JACKSON.

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 investigative work. Laboratory deposit, \$2 for each credit hour, part returnable.

14. **General Agricultural Bacteriology.** First term. Credit three hours. Open to regular and special students who desire a general knowledge of bacteria in relation to agricultural problems but cannot spend time for the more thorough courses. Assignment to laboratory sections must be made at the time of registration. Lecture, M, 9. Dairy Building 222. Practice, T Th, 2-5. If registration exceeds the capacity of the laboratory, a second set of sections will be arranged, T Th, 9-12. Dairy Building 122. Professor STOCKING and Messrs. PITTMAN and MOON.

The characteristics of bacteria, their distribution and place 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, and silage. Laboratory deposit, \$4, part returnable.

15. **Bacteriology for the Home.** Second term. Credit three hours. Assignment to laboratory sections must be made at the time of registration. Lecture, M, 10. Home Economics Building 245. Practice, T Th, 9-12 or 2-5. Dairy Building 122. Professor STOCKING and Messrs. MOON and PITTMAN.

This course is intended for students in home economics. The course considers the nature of bacteria and methods for studying them; the relation of bacteria to air and to water, milk, and other foods; canning and preserving; bacteria, molds, and yeasts in their relation to household and public health problems. Laboratory deposit, \$4, part returnable.

19. **Cheddar Cheese, Advanced Course.** Second term. Credit 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. Professor FISK.

This course considers some of the commercial and scientific problems of cheddar-cheese making, starter making, judging, and marketing. A required trip to neighboring cheese factories will be arranged. Laboratory deposit, \$2, part returnable.

20. **Condensed and Powdered Milk.** Second term. Credit three hours. Must be preceded or accompanied by courses 1, 6, and 7. Assignment to labora-



tory sections must be made at the time of registration. Lecture, M, 9. Lecture Room, Dairy Building. Practice, M, T, or W, 1-6. Condensed Milk Laboratory. Assistant Professor JACKSON.

This course considers the principles and practice of condensing and powdering milk. Laboratory deposit, \$3, part returnable.

NOTE: This course will be given provided the new Dairy Building is completed and the necessary equipment is installed.

## DRAWING

The courses in drawing are transferred to the Departments of Floriculture and Ornamental Horticulture and Rural Engineering, and are open to general election as heretofore.

## ENTOMOLOGY, LIMNOLOGY, AND ORNITHOLOGY

### Biology

1. **General Biology.** Throughout the year. Credit three hours a term. First term prerequisite to the second. Not open to students who have had college courses in zoology and botany. Lectures, M W, 9 or 11. Roberts Hall 131. One practice period a week. T F, 8-10.30, or daily except S, 2-4.30. Roberts Hall 302. Additional sections will be provided if necessary. Students must report to the biology office, Roberts Hall 322, for assignment to laboratory sections. Professor HILTON, Assistant Professor CLAASSEN, Mr. COWLES, and assistants.

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.

The work of this course begins with a study of the interdependence of organisms. This is followed by a study of the structure, physiology, and general behavior of a series of plants and animals, ranging from the simple to the more highly developed forms. The study of the simpler plants is closely associated with that of the simpler animals to show common features in the development of plant and animal life. The plants which are next studied include the mosses, liverworts, ferns, and seed plants, and the animals include hydra, earthworm, grasshopper, and frog. This is followed by consideration of organization and phylogeny, heredity and variation, natural selection and adaptation, segregation and mutation, the life cycle, metamorphosis and regeneration, and the responsive life of organisms. Laboratory fee, \$2.50 a term.

[7. **Biology of the Human Species.** First term. Credit two hours. Lectures and classroom exercises, T Th, 11. Roberts Hall 392. Not open to freshmen. Should follow Biology 1 or its equivalent. Professor NEEDHAM and Assistant Professor CLAASSEN.] Not given in 1922-23.

A general and elementary account of the origin and development of man, of the evolution of the responsive life, of the main phenomena of human inheritance, of the effect upon population of the alteration of environment by the processes of civilization, of the evolution of the social organism, and of social control.

## Introductory Entomology

For advanced work in entomology a reading knowledge of French or German is essential. Chemistry 101, 210, and 225, or their equivalents, are highly desirable.

1. See Biology, course 1.

2. **The Ecology of Insects.** First term. Credit three hours. Lecture, Th, 8. Roberts Hall 392. Practical exercises, Th, 2-4.30, and two others by appointment. Assistant Professor CLAASSEN and Mr. SIBLEY.

A general course in the study of the lives of insects in relation to their environment. Practical studies will be made of the activities of insects and of the rôle that they play in different natural associations. Observations will be made on the relations between their structures and instincts and the situations in which they live, and on many of the ways in which they find a living and establish homes. Laboratory fee, \$2.50.

3. **General Entomology.** First or third term. Credit three hours. Prerequisite, course 1, Zoology 1, or Botany 1. First term, lectures, W F, 9. Roberts Hall 392. Professor HERRICK. Practical exercise, Th or F, 2-4.30, or S, 8-10.30. Roberts Hall 392. Professor HERRICK, Miss GRISWOLD, and Mr. ———. Third term, lecture M W, 9. Roberts Hall 392. Assistant Professor MATHESON. Practical exercise, T Th, 2-4.30. Roberts Hall 392. Assistant Professor MATHE-SON and Mr. ———.

This course embraces 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 (two hours) are taken by those who have had courses 4 and 5. Laboratory fee, \$2.50.

3a. **General Economic Entomology.** Second term. Credit three hours. Prerequisite, course 3. Lectures, W F, 9. Roberts Hall 392. Professor HERRICK. Practical exercise, Th or F, 2-4.30, S, 8-10.30. Roberts Hall 392. Professor HERRICK, Miss GRISWOLD, and Mr. ———.

This course includes lectures on the life histories and habits of injurious insects, together with a consideration of the most approved methods of preventing their ravages. The practical exercises include a study of the more important insecticides and as many of the commoner pests as time will permit. Several excursions will be made to observe the insects in the field. Laboratory fee, \$1.50.

4. **Elementary Morphology of Insects.** First, second, or third term. Credit three hours. Hours by appointment. Roberts Hall 391. Professor JOHANNSEN and Mr. SMIT.

(See note under course 5.) Laboratory fee, \$2.

5. **Elementary Systematic Entomology.** First, second, or third term. Credit two hours. Prerequisite, course 4. Hours by appointment. Roberts Hall 391. Professor BRADLEY and Mr. ———.

Courses 4 and 5 are introductory laboratory courses in the structure and classification of insects, required of all students who plan to take advanced work in entomology. The work is individual, and both courses may be taken in one term. Laboratory fee, \$2.

6. **Elementary Insect Taxonomy.** First and second terms. Credit three hours each term. Prerequisite, course 5. M W F, 2-5. Roberts Hall 301.

Professors BRADLEY, NEEDHAM, HERRICK, and JOHANNSEN, and Assistant Professor CLAASSEN.

A survey of the more important species of insects and a study of the characters by which they may be recognized.

### Apiculture

[9. **General Beekeeping.** Second or third term. Credit three hours. Prerequisite, course 3. Lecture, W, 10. Roberts Hall 392. Practical exercise T Th, 2-4.30.] Not given in 1922-23.

### Systematic Entomology

10. **Entomotaxy.** Third term. Credit two hours. Laboratory and field work, M W, 2-5. Roberts Hall 301. Professor BRADLEY.

Methods of collecting insects and preserving them for study and the cabinet, together with other matters of technique. Practice in the identification of the insects of the local fauna. Two all-day field trips will be required. Laboratory fee, \$3.

11. **Advanced Systematic Entomology.** First term. Credit three or more hours. Prerequisite, course 5. Three laboratory periods of three hours each, by appointment. Roberts Hall 301. Professor BRADLEY.

A training course in the identification and interpretation of obscure characteristics of insects. One hundred and thirty-five or more hours a term in the laboratory must be accomplished by students registered for this course. Laboratory fee, \$6.

14. **Entomological Literature and Its Technics.** First term. Credit three hours. Prerequisite, course 3 or 5, or Zoology 5. Lectures and recitations, M W F, 11. Roberts Hall 392. Professor BRADLEY.

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; methods of preparing technical papers for publication. The rules of nomenclature, including the formation of scientific names.

This course is of a technical nature, and intended to aid students, who desire to specialize in entomology or systematic zoology, in their contact with literature.

### Insect Morphology

20. **Morphology and Development of Insects.** First and second terms. Credit two hours a term. Prerequisite, courses 4, and 3 or 5. Lectures, assigned reading, and reports, T Th, 10. Laboratory work to accompany or follow this course is offered under course 21. Roberts Hall 392. Professor JOHANNSEN.

21. **Histology of Insects.** First term. Credit three hours. Must be preceded or accompanied by course 20. Laboratory, W, 2-4.30, and two periods by appointment. Roberts Hall 392. Professor JOHANNSEN.

Technique in histological methods as applied to insects. Laboratory fee, \$4.50.

21a. **Histology of Insects.** Second term. Credit two hours. Must be pre-

ceded or accompanied by course 20. Laboratory, W, 2-4.30, and one period by appointment. Roberts Hall 392. Professor JOHANNSEN.

Comparative study of insect histology from prepared slides. Laboratory fee, \$1.50.

22. **The Nervous System and Sense Organs of Insects.** First term. Credit three hours. Prerequisite, courses 3, 4, and 5. One lecture and two laboratory periods a week, hours to be arranged. Roberts Hall 392. Professor HILTON.

27. **Entomological Reading in Foreign Languages.** German first term, French second term. Two hours a week. Without credit. Hours to be arranged. Open to advanced students in entomology who have an elementary knowledge of the language. Roberts Hall 342. Professor JOHANNSEN.

### Economic Entomology

30. **Parasites and Parasitism.** Second term. Credit two hours. Prerequisite, General Biology I or Zoology I, and course 3. Lecture M, 9. Roberts Hall 392. Practical exercise, M, 2-4.30. Assistant Professor MATHESON and Mr. WEST.

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

31. **Relations of Insects to Disease.** Second term. Credit two hours. Prerequisite, Biology I or Zoology I, and first term of course 3. Lecture, W, 10. Roberts Hall 392. Practical exercise, W, 2-4.30. Assistant Professor MATHESON and Mr. WEST.

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

40. **Advanced Economic Entomology and Insectary Methods.** Second term. Credit three hours. Open only to qualified seniors and graduate students. Lecture, T, 9. Roberts Hall 392. Seminary, T, 2-4.30. Field and laboratory work by appointment. Insectary. Assistant Professor MATHESON.

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

41. **Forest Insects.** Second term. Credit two hours. Prerequisite, first term of course 3. Lectures, Th S, 8. Roberts Hall 301. 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.

### Limnology

50. **General Limnology.** Second or third term. Credit three hours. Open only to students who have taken or are taking courses 1 and 3, or the equivalent. Lecture, Th, 8. Roberts Hall 392. Laboratory, Th, 2-4.30, and one period by appointment. Roberts Hall 492. Professor HILTON. Assistant Professor CLAASSEN, and Mr. SIBLEY.



An introduction to the study of the life of inland waters. Aquatic organisms in their qualitative, quantitative, seasonal, and ecological relations. The course includes one all-day trip, taken on some Saturday in May. Laboratory fee, \$2.50.

**51. Aquiculture.** Second term. Credit three hours. Lectures, M W F, 12. Roberts Hall 392. Professor EMBODY.

A course on the conservation and utilization of the resources of inland waters. A visit to one of the state fish hatcheries and a report on its operations is required. The expense of this trip will not exceed \$7.

**52. Fish Culture.** First, second, and third terms. Credit two or more hours a term. Must be preceded or accompanied by course 51. W F, 2-4.30. Biological Field Station and Experimental Hatching Station. Professor EMBODY.

A laboratory and field course designed to give practice in the methods of fish culture. May be taken one, two, or three terms. Laboratory fee, \$2.50 a credit hour.

### Ornithology

**6. Field Ornithology.** Second term. Credit three hours. Lecture, W, 11. McGraw Hall 5. Field work and laboratory, T Th, 2-4.30, or W F, 2-4.30. Assistant Professor ALLEN and Mr. LEISTER.

This course is intended primarily for students wishing to gain a knowledge of local birds, their habits, songs, nests, and eggs, their relation to agriculture, and the general principles of their conservation. Field work will be supplemented by laboratory studies, and after the first of May, field trips will be taken at 5.30 a.m. Laboratory fee, \$2.

**9. Advanced Ornithology.** First term. Credit three hours. Prerequisite, course 6 or Zoology 5. Lecture, W, 11. McGraw Hall 5. Laboratory and field work, T Th, 2-4.30. Assistant Professor ALLEN.

A consideration of the birds of the world. The lectures will take up the structure and classification of birds; geographical distribution; the literature and institutions of ornithology. Laboratory periods will be devoted to the identification of skins of native and foreign representatives of the different families of birds. The first part of the term will be devoted to field work on the fall migration, and the identification of birds in winter plumage. Laboratory fee, \$2.

**[11. Economic Ornithology and Mammalogy.** First term. Credit three hours. Should be preceded by course 6 or Zoology 5; presupposes an elementary knowledge of botany and entomology. Lecture, W, 11. McGraw Hall 5. Laboratory and field work T Th, 2-4.30. Assistant Professor ALLEN and Mr. LEISTER.] Not given in 1922-23.

This course is designed to assist those planning professional work with birds or mammals. The lectures will take up various phases of the life of birds and mammals in relation to agriculture, with the methods of increasing beneficial species and destroying vermin, together with the elements of game breeding, and fur farming. The laboratory will give practice in the identification of game birds, vermin, the food of birds; the preparation of materials, and the making of skins. The field work will give opportunity for observation of feeding habits, field collecting, methods of attracting birds, and natural-history photography. Laboratory fee, \$2.

**17. Special Problems and Research.** Throughout the year. Credit one or more hours. For seniors and graduates only. Opportunity is given for the pursuit of special phases of ornithological study further than is permitted by the more elementary courses, and for investigation.

Permission necessary for registration.

**100. Research.** Throughout the year. Credit three or more hours a term. Prerequisite, permission to register from the professor under whom the work is to be taken. Roberts Hall. Professors NEEDHAM, HERRICK, CROSBY, JOHANNSEN, BRADLEY, EMBODY, MATHESON, ALLEN, and CLAASSEN.

### Seminary

**Seminary.** Throughout the year. M, 4.45-5.45. Roberts Hall 392.

The work of an entomological seminary is conducted by the Jugatae, an entomological club which meets for discussion of the results of investigations by its members.

### EXTENSION TEACHING

**1. Oral and Written Expression.** First term. Credit two hours. Open to juniors and seniors, and to others by arrangement. Public Speaking I should precede this course. The number in each section will be limited. Students will consult Professor EVERETT for assignment to sections. Lectures and practice, M W, 9, Home Economics Building 245; M F, 11, Roberts Hall 292; W F, 10, Roberts Hall 131; T Th, 10, Home Economics Building 245; T Th 11, Roberts Hall 131. Criticism, by appointment, daily, 8-1. Professors EVERETT and WHEELER and Mr. PEABODY.

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, through demonstrations and the use of graphic material and other forms, to train for effective self-expression in public. Special training will be given to competitors for the Eastman Prizes for Public Speaking. (See page 27.)

**2. Oral and Written Expression.** Second term. Credit two hours. Prerequisite, course 1, of which course 2 is a continuation. Lectures and practice, W F, 10, or T Th, 9, or T Th, 10, Roberts Hall 131; M F, 11, Roberts Hall 292. Criticism, by appointment, daily, 8-1. Professors EVERETT and WHEELER and Mr. PEABODY.

**3. Extension Methods, Organization, and Policy.** First term. Credit two hours. Open to graduate students and seniors, and to juniors by special arrangement. Lectures and written exercises based on field work. W F, 9. Stone Hall 192. Professors BURRITT, WHEELER, and CROSBY.

This course deals with extension agencies, methods, and policies, as exemplified in the State of New York and throughout the United States. It is designed to familiarize students with extension principles as well as practices. It is intended not only for the prospective county agent or other extension worker in agriculture and home economics, but also for those who are preparing for effective service as citizens in rural communities. Students will submit reports based on personal

visits to farm and home bureau offices and committeemen, junior extension leaders, and the college scheduling office, and on attendance at several types of extension meetings. The expense of these visits will vary with the student's own selection of places; it may be kept within \$5 or \$10.

**5. Agricultural Journalism.** First term. Credit three hours. Open only to those who have passed the required hours in English. T Th S, 10. Forestry Building 122. Professor ADAMS.

This course is intended to give the principles of news writing, largely in connection with agricultural extension work and for prospective county agricultural and home demonstration agents; it is also intended to be of value to those who may wish to undertake the writing of agricultural bulletins.

**6. Agricultural News Writing.** Throughout the year. Credit two hours a term. No credit for less than two terms. Prerequisite, course 5 or English 8. F, 2-4. Stone Hall 192. Professor ADAMS.

This course requires the equivalent of laboratory work in practical news writing for publication, on agricultural topics in rural and agricultural journals, and will include criticisms, discussions, and consultations on actual problems in agricultural journalism.

**7. The Country Newspaper.** First term. Credit two hours. Prerequisite, course 5. T Th, 8. Roberts Hall 292. Assistant Professor ATWOOD.

A study of the country newspaper, its problems, its make-up, and its place as a factor in rural life in New York.

**8. Agricultural Information Service.** Second term. Credit two hours. Prerequisite, course 5. M W, 9. Roberts Hall 292. Professor ADAMS.

Advance information, or publicity, in connection with agricultural work; the uses and abuses of publicity; its forms, principles, and effects, including the use of various forms of information in print, such as drawings, photographs, charts, posters, and other similar material in agricultural extension.

## FARM PRACTICE

**1. Farm Practice.** First and second terms. Without credit toward graduation but giving credit toward the farm-practice requirement, depending on the amount and quality of the work done. Hour and place, by appointment. Mr. KIRKLAND and assistants.

A course designed to assist those students who enter with little or no farm experience. Students will have an opportunity to hitch, harness, and drive horses, and to familiarize themselves with the use of the common farm tools. Admission to this course will be determined by the result of the farm-practice tests. This course should be taken by all new students who have had limited farm experience.

**2. Six Weeks Farm Work.** During the summer. Without credit toward graduation, but giving twelve points toward the farm-practice requirement. Hours, daily, 7 a. m. to 5 p. m. for six weeks. Two periods of six weeks each will be given during the summer vacation. Students will not be allowed to take both. Registration for the course limited to twenty-four students. Admission by permission. Application must be made at the Office of Farm Practice not later than May 15. Mr. KIRKLAND and assistants.

The farm practice requirement is forty points, twenty of which must be obtained by actual farm work. (See page 31.)

Students taking courses offered in the various departments of the College which include laboratory periods that familiarize them with the materials and methods of the farm, will be given one point toward the farm-practice requirement for each hour of university credit obtained in such laboratory work.

The Office of Farm Practice will assist students in getting work on farms during vacations and at other times, and will supervise and keep records of the work.

Students should consult the office in regard to work on farms.

The office will also be glad to assist those students who have completed the farm-practice requirement in obtaining places on farms where they can gain wider experience.

## FLORICULTURE AND ORNAMENTAL HORTICULTURE

Instruction in floriculture is planned for the following classes of students: (1) those who intend to make some branch of commercial flower growing their life work; (2) those who plan to enter a retail business; (3) those who are interested in amateur flower growing for pleasure and home decoration; (4) those who plan to take up some line of work on private estates or in city parks. With this object in mind, courses have been outlined that give students a thorough knowledge and training in some one or in several of these features. Courses 4 and 5 should not be elected until courses in botany, soils, plant physiology, plant pathology, plant breeding, and economic entomology have been taken. A broad foundation is thus laid on which to build the scientific principles of commercial flower growing.

Instruction in ornamental horticulture is planned to meet the requirements of students for (1) work in the propagation of all types of ornamental plants; (2) nursery practice; (3) plant materials for ornamental planting about the home grounds, village squares, and other public properties; (4) the use of plants in landscape planting.

**1. Plant Propagation.** First or second term. Credit two hours. Prerequisite for all other courses in this department except drawing and those courses listed without prerequisites. Lectures, W, 8. Landscape Art Building. Practice, M, 2-4.30, or S, 10-12.30. Messrs. HUNN and PRATT.

This course is planned to meet the need of all students in the department. It considers the methods of propagation of all classes of ornamental plants and their special treatment during the first stages of growth. Laboratory fee, \$3.

**2. Principles and Methods of Greenhouse Practice.** First term. Credit two hours. Prerequisite to courses 3, 4, 5, or 8. Lecture, T, 9. Practice, T, 2-4.30. Floriculture Building. Professor WHITE and Assistant Professor NEHRLING.

A course intended to acquaint students with general floricultural methods and the scientific principles governing them. This is an elementary course in commercial flower growing. Laboratory fee, \$2.50.

**3. Greenhouse Construction.** Second term. Credit three hours. Pre-



requisite, courses 1 and 2. Lecture, M, 11. Practice, T Th, 2-4.30. Floriculture Building. Assistant Professor NEHRLING and Mr. PRATT.

The evolution of the greenhouse; present day types; materials and methods of construction; principles and methods of heating. Laboratory practice consists in making detailed drawings and blueprints of greenhouse material, drawing plans for commercial and private ranges, and preparing specifications of these, with estimates of cost of construction. Practical exercises in concrete bench construction, glazing, and other construction problems will be given as facilities allow. Laboratory fee, \$1.

4. **Commercial Floriculture.** First term. Credit four hours. Prerequisite, courses 2 and 3, Botany 1 and 20, Agronomy 1, and the farm-practice requirement. Lectures and recitations, M W F, 10. Floriculture Building. Practice, F, 2-4.30. Greenhouses. Assistant Professor NEHRLING.

Studies in the culture of commercial florists' crops. Methods of packing, shipping, and marketing will be considered. The class will participate in a required excursion to Auburn and Syracuse on October 28. Laboratory fee, \$2.

5. **Commercial Floriculture.** Second term. Credit four hours. Prerequisite, course 4. Lectures and recitations, M W F, 10; Floriculture Building. Practice, F, 2-4.30. Greenhouses. Assistant Professor NEHRLING.

A continuation of course 4, with methods of culture of commercial crops not previously considered. These courses, with their prerequisites, aim to fit students for commercial work. Students taking these courses are advised to work on commercial ranges during one semester and vacations. The class will participate in a required excursion to Elmira on March 23. Laboratory fee, \$2.

6. **Wholesaling and Retailing Flowers.** First term. Credit two hours. Prerequisite, courses 4 and 5 and permission to register. Lecture, Th, 11. Practice, Th, 2-4.30. Greenhouses. Assistant Professor NEHRLING.

This course is planned with the view of giving students a thorough knowledge of methods of retail-store management, store equipment, salesmanship, business methods, delivery, decorating for all functions, flower arrangement and the making of designs, methods of conducting cooperative flower exchanges, and wholesale markets. Other topics of a like nature will be discussed. There will be a required trip to Rochester, to visit a wholesale establishment and retail stores, on November 21. Laboratory fee, \$5.

7. **Floral Arrangement.** Second term. Credit one hour. Registration limited to fifteen students. Preference will be given to students specializing in Floriculture and to seniors in Home Economics. Lectures, demonstrations, and practice, S, 10.30-1. Greenhouses. Professor WHITE.

A study of the principles and methods of arrangement of flowers for home decoration and table decoration, in baskets, vases, and formal designs; also the arrangement of flowers and plants for all types of interior decoration. Laboratory fee, \$5.

8. **Conservatory Plants.** Third term. Credit two hours. Prerequisite, courses 1 and 2. Lectures and demonstrations, T Th, 11. Floriculture Building. Mr. PRATT.

Designed for students interested in work on private estates or in parks. This course should be preceded by courses 1, 2, 3, 4, and 5. A study of such tropical

and subtropical foliage and flowering plants as are used for the ornamentation of glasshouses of decorative type. Laboratory fee, \$1.

9. **Principles and Methods of Nursery Practice.** Second term. Credit one hour. Prerequisite, course 1. Lectures and practice, M or W, 2-4.30. Nurseries. Mr. HUNN.

A practical course to acquaint students with the principles governing the transplanting of trees, shrubs, and herbaceous perennials, and the methods practiced in all types of commercial nursery management.

10. **Amateur Floriculture.** Second or third term. Credit three hours. Lectures, second term, W F, 11; third term, T W, 11. Floriculture Building. Practice, second term, M, 2-4.30; third term, Th, 10.30-1. Greenhouses. Miss MINNS.

The culture, in the home, of potted plants suitable for window gardening and for outdoor home gardening. The course includes a study of containers, soils, fertilizers, and insecticides; also the preparation and planting of flower beds. It is planned primarily for students in home economics, but is open to any one desiring information regarding simple methods of plant culture. Laboratory fee, \$2.

13. **A Brief Introduction to Woody-Plant Materials.** First term. Credit three hours. Lecture, T, 8. Laboratory and field trips, M W, 2-4.30. Floriculture Building. Professor R. W. CURTIS.

A brief study of the characteristics and requirements of trees, shrubs, and vines for landscape planting. This course is an abridgment of course 14 and is intended for general election.

The laboratories and field trips enable the student to recognize common woody plants. The lectures discuss planting areas, planting practices, and plant materials, the last named from the point of view of plants as elements in composition, in order that the student may learn to see plants not only as growing things but as possible units in planting design with which he may be able to improve his surroundings, as outlined in course 17. Laboratory fee, \$1.50.

14. **Woody Plant Materials.** Third term. Credit five hours. Lectures, M W, 8. Laboratory and field trip, M F, 10-12.30, M W F, 2-5. Floriculture Building. Professor R. W. CURTIS.

A study of the characteristics and requirements of trees, shrubs, and vines for landscape planting, and a discussion of them as elements in landscape composition. Laboratory fee, \$1.50.

15. **Garden Flowers.** Second or third term. Credit three hours. Prerequisite, courses 1 and 2, and Botany 1. Assignment to laboratory section in second term must be made at time of registration. Lectures, second term, T Th, 9; third term, T W Th, 9. Floriculture Building. Practice, T or Th, 2-4.30. Greenhouses and gardens. Miss MINNS.

A study of the identification and culture of annuals, herbaceous perennials, and roses. The aim is to give the student an intimate knowledge of those forms of annual and herbaceous plants that may be used in garden planting, either on home grounds or in public parks. An excellent collection of plant material is available for demonstration work in this course. All members of the class will be required to participate in excursions to the Thompson estate at Canandaigua, on June 1 and on August 11. Laboratory fee, \$2.

**16. Grouping and Arrangement of Annuals and Herbaceous Perennials.** Second or third term. Credit two hours. Prerequisite, course 15. Lectures and practice: second term, S, 9-1; third term: lecture, F, 8; practice, S, 8-1. Floriculture Building. Miss MINNS.

A study of the principles and methods of arrangement of garden flowers in the border and in the flower garden. The planting of borders for a continuous display of bloom throughout the season. Aesthetic taste in color arrangement will also be studied. Laboratory fee, \$2.50.

**17. A Brief Introduction to Planting Design.** First term. Credit two hours. Prerequisite, course 13. Intended for general election. Lecture, Th, 8. Practice, Th, 2-4.30. Landscape Art Building. Professor R. W. CURTIS.

A study in composition of trees, shrubs, and vines, including actual planting arrangements in the nursery and the drawing of simple planting plans for gardens, small residential properties, and school grounds. The purpose of the course is threefold: (1) to give the student a point of view regarding the use and arrangement of plants; (2) to teach him to prepare simple planting plans; (3) to enable him to execute these plans by actual planting practice.

**18. Planting Details, Elementary Course.** First or second term. Credit first term, three hours; second term, one hour. Prerequisite, course 14. Intended primarily for third-year students in landscape architecture. First term, lecture, F, 8; drafting and outdoor practice, M W, 8-10.30; Floriculture Building. second term, hours to be announced. White Hall. Professors R. W. CURTIS and DAVIS.

A preliminary study of the use, adaptation, and arrangement of plants with reference to problems of landscape design.

**19. Planting Details, Advanced Course.** Throughout the year. Credit first term, three hours; second term, one hour. Hours to be announced. Prerequisite, course 18. White Hall. Professors DAVIS and R. W. CURTIS.

**20. A Brief Introduction to Landscape Design.** First or second term. Credit three hours a term. Lectures, T Th, 10. Room to be announced. Recitation, F, 11. Professors DAVIS and R. W. CURTIS.

A discussion of the first principles involved in landscape planning, with special application to small city and suburban homes, farmsteads, and cottage grounds. The course is intended for students who desire an intelligent point of view in landscape work but do not intend to take the more technical courses in theory.

**21. Free-Hand Drawing.** First and second terms. Credit from two to four hours a term. Students must consult the professor in charge before registering for the course. Lectures during practice. Practice by appointment, daily except S, 9-1, and Th F, 2-4.30. Dairy Building 371. Professor BAKER and Miss GARRETT.

An elementary course for the development of graphic expression applicable to scientific studies. Of special value to those who expect to enter the field of teaching, nature study, or biological research. The course aims to develop also the student's appreciation of pictures. As this course is laid out for two terms, students are advised against planning to take the work of the first term only.

Since there are no lectures nor required reading in this course, one hour of credit in free-hand drawing means three hours of actual practice. The drawing periods must be at least two actual hours in length.

**22. Outdoor Sketching.** Third term. Credit from two to four hours. Prerequisite, four hours of course 21 or its equivalent. Students must consult the professor in charge before registering for the course. Lectures during practice. Practice by appointment, T W Th, 9-1. Dairy Building 371. Professor BAKER.

Out-of-door study, in pencil, pen and ink, and water-color, of foliage, tree growth, and architecture.

**23. Free-Hand Drawing, Advanced Course.** First or second term. Credit from two to four hours. Prerequisite, four hours of course 21 or its equivalent. Students must consult the professor in charge before registering for the course. Lectures during practice. Practice by appointment, daily, except S, 9-1 and Th F, 2-4.30. Dairy Building 371. Professor BAKER and Miss GARRETT.

Personal instruction in pencil, pen and ink, wash, and water-color drawing.

**24. Perspective.** First term. Credit one hour. Prerequisite, four hours of course 21 or its equivalent. Students must consult the professor in charge before registering for the course. Drafting period, to be arranged. Dairy Building 371. Professor BAKER.

A course in appearance representation from plan and elevation.

**25. Graphic Expression.** First term, without credit. Open to all who are interested. Hour and place, to be announced. Professor BAKER.

A weekly talk on the graphic arts, principles of photography, book illustration, methods of reproducing drawings, pictorial photography, and some of the elements of art. This course will be given only if a sufficient number of students apply for it. Students should register with the professor in charge.

**28. The History and Literature of Ornamental Horticulture.** First term. Credit two hours. Lectures, M 9; W, 11. Floriculture Building. Designed primarily for seniors, and required of graduate students. Professor BEAL.

A comprehensive study of the evolution of gardening, the introduction of plant material, and the development of floricultural ideals. Beginning with the earliest records, these are traced through the centuries to the present time. The unusually large library collection of herbals and European works of late date offers exceptional facilities for presenting this course.

**29. Investigation in Floriculture and Ornamental Horticulture.** Throughout the year. Credit one or two hours a term. Prerequisite, permission to register. Designed primarily for upperclassmen and graduate students. Consultation by appointment. Professors WHITE, BEAL, and R. W. CURTIS, and Assistant Professor NEHRLING.

The investigation of problems in materials for ornamental planting and in the commercial culture of cut flowers and potted plants, exotics, garden flowers, and the like.

**30. Seminary.** First and second terms. Credit one hour a term. Required of advanced students who elect course 29, and of all graduate students in the department. F, 9. Floriculture Building. Departmental staff.

## FORESTRY

The Department of Forestry has three principal aims: to give instruction at the University; to conduct research; and to advise and assist the owners of forest lands in New York State.



An important part of the work of the department is its effort to be of direct help to owners of forest lands in New York State. This is accomplished by correspondence, publications, lectures, personal inspection of woodland or of land to be planted to forest, and cooperative care of forest lands.

The instruction in forestry is designed to meet the needs of several classes of students: (1) students of general agriculture 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 life 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.

The courses offered are designed not only to prepare students for a professional career in general forestry, but also to provide opportunity for advanced study and research in silviculture, forest management, forest mensuration, forest entomology, forest pathology, extension work in forestry, and in other lines in which specialists will be useful. The entrance requirements are the same as for general agriculture.

Adequate preparation for the profession of forestry requires at least a year of graduate study in addition to the four-year undergraduate course. The undergraduate work in forestry leads to the degree of bachelor of science; the graduate work leads to the degree of master in forestry.

During the four years the student is registered in the College of Agriculture his work must include: (a) all the courses required of general agricultural students; (b) solid geometry and plane trigonometry, unless accepted for entrance; (c) such other courses as the Department of Forestry believes to be best adapted to meet the needs of the individual student; and (d) at least four months experience in forestry work or in a forest industry, one month of which, in the summer following the junior year, must be spent in the forestry camp conducted by the Department of Forestry in a forest in New York State. This period of practice is demanded of all professional forestry students, in lieu of the farm-practice requirement. On the following page is a recommended sequence of studies that will prove desirable for most students specializing in this field, but 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 it has been 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. Professional students must register with the department in order that their standing as such may be recognized.

In the year in the Graduate School, the student registers 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 work.

Persons who have already attended some college or university and desire to

enter with advanced standing may register in the Graduate School as candidates for the degree of master in forestry, if the following requirements have been fulfilled: (1) the candidate's training must be accepted as substantially equivalent to the first four years of the professional forestry course given at Cornell University; (2) the candidate must have had at least three months experience in forestry work or in a forest industry, proof of which is to be by a signed statement or by an examination in woodsmanship, or by both.

A student entering the Graduate School as a candidate for the degree of master in forestry should enter at the beginning of the first (autumn) term. Otherwise it will be difficult to arrange his work satisfactorily. It may often be advisable that such students attend the forestry summer camp. Students who enter as graduates without having had undergraduate instruction in forestry should be able to complete the work for the master's degree in two years if they have had substantially the equivalent of most of the courses, other than forestry, listed in the sequence of courses on the following page. If they lack much of the fundamental science work there listed, a correspondingly longer time will be required for such students to qualify for the master's degree. Work for the degree of doctor of philosophy may also be done in forestry.

Further details regarding the professional course may be obtained through correspondence with the Department of Forestry. All new students who plan to specialize in forestry are urged to communicate with the department. Freshmen who are planning to take the professional forestry course must register with the Department of Forestry at the beginning of the college year.

### Recommended sequence of studies for professional students in forestry

#### Freshman Year

	Hours		Hours
	1st term		2d term
Freshman Orientation Course.....	1	English 1.....	3
English 1.....	3	Botany 1.....	3
Chemistry 101.....	6	Geology 1.....	3
Botany 1.....	3	Rural Engineering 51.....	3
Meteorology 1.....	3	Sibley Forge Work 101.....	1
Mathematics 3*.....	3	Forestry 5.....	2

#### Summer following freshman year

Period of required field experience, thirteen weeks

#### Sophomore year

	Hours		Hours
	1st term		2d term
Civil Engineering 110 (Elementary Surveying).....	3	Physics 3†.....	6
Botany 2.....	3	Botany 20.....	4
Entomology 3.....	3	Civil Engineering 211A (Advanced Surveying).....	3
Forestry 6.....	2	Entomology 41.....	2
Economics 51.....	5	Geology 11.....	3
Elective.....			

\*Mathematics 3 must be taken this term if plane trigonometry has not been offered for entrance.

†Required of students who do not present physics for entrance. Other students should elect Agronomy 1 this term.

## Summer following sophomore year

C. E. summer camp, six weeks. Civil Engineering 13 (Surveying), credit six hours.

## Junior year

Hours		Hours	
1st term		2d term	
Botany 4.....	2	Forestry 7.....	3
Forestry 13.....	3	Forestry 8.....	3
Plant Pathology 1.....	3	Forestry 11.....	3
Agronomy 1§.....	5	Forestry 14.....	3
Civil Engineering 214a.....	2	Plant Pathology 9.....	2
Elective.....		Zoology 5.....	3
		Elective.....	

## Summer following junior year

Department of Forestry summer camp, four weeks, August and September. Professional forestry students must attend this camp to satisfy in part the requirement for forestry practice demanded of forestry students, in lieu of farm practice.

## Senior year

Hours		Hours	
1st term		2d term	
Forestry 9.....	3	Forestry 12.....	3
Forestry 10.....	2	Forestry 16.....	3
Forestry 13a.....	1	Forestry 18.....	3
Forestry 15.....	4	Forestry 19.....	3
Geology 15.....	1	Electives.....	
Electives.....			

## Graduate year

First term	Second term
Forestry 20 (Forest Organization)	Forestry 22 (Seminary)
Forestry 21 (Forest Administration)	Forestry 23 (Advanced Work)
Forestry 22 (Seminary)	Forestry 24 (Research)
Forestry 23 (Advanced Work)	

**Courses intended primarily for students who do not expect to make forestry their major work. Standing as professional students may not be gained by taking courses 1-5.**

1. **The Farm Woodlot.** First or second term. Credit two hours. Lecture, M, 9. Practice, M, 2-4.30. Forestry Building 118. Assistant Professor GUISE.

A course covering those phases of forestry that are applicable to the farm woodlot. Identification of the principal trees of this region; measurement of logs, trees, and stands; nursery work, forest planting, thinnings, and improvement

§Students who have not had Agronomy 1 in the sophomore year should elect it this term.

cuttings; the preservative treatment of farm timbers. Laboratory fee, 50 cents.

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

2. **Elements of Forestry: Mensuration and Management.** Second term. Credit three hours. Lectures, T Th, 9. Forestry Building 122. Practice, T, 2-4.30. Forestry Building 118. Professor BENTLEY.

An elementary course including estimating and measuring the amount of standing timber and its value; measurement of logs and other forest products; rate of growth of timber in diameter, height, and volume; value increment; 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.** First term. Credit three hours. Lectures, T Th, 9. Forestry Building 122. Practice, T or W, 2-4.30. Forestry Building 118. Professor SPRING.

An elementary course covering 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, seeding, and nursery work; natural reproduction of the forest; care of the crop during its growth, including thinnings; protection from fire and other enemies; identification of a few of the principal timber trees of this region. (See course 2.) 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 woodland management than is given in course 1, but do not wish the professional courses.

4. **Forest Resources of New York State.** Second term. Credit two hours. Lectures, M W, 10. Forestry Building 122. Professor RECKNAGEL.

The place of the forests in the economic and social welfare of New York State. Forest regions and important forest trees. The forest industries of the State. State and private forest holdings and their development, with special emphasis on the utilization of products from farm woodlots.

5. **Conservation of Natural Resources.** Second term. Credit two hours. For others than professional forestry students, Economics 51 is prerequisite. Lectures, T Th, 10. Forestry Building 122. Professor ADAMS.

The conservation of natural resources in the United States; the interrelation of the uses and wastes of the forests with those of various resources. The influence of the physical equipment of America on human life and on American civilization, with especial reference to the natural resources, including the human element, as the basis of national strength and power.

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

6. **The Field of Forestry.** First term. Credit two hours. The course is limited to 125 students. Registration at the department is required. Lectures, M W, 10. Forestry Building 122. Professor HOSMER.

The place of forestry in the life of a nation; its nature, aims, and importance; national, state, communal, and private forestry.

7. **Timber Treatment.** Second term. Credit three hours. Prerequisite, Botany 4. Not open to freshmen. Lectures, T Th, 8. Forestry Building 122.



Practice, W, 2-4.30. Forestry Building 118. Assistant Professor GUISE.

The natural and artificial drying and seasoning of wood; kiln drying; grading of lumber; wood preservation; methods of treating timber for farm and commercial uses with chemical preservatives. Laboratory fee, \$2.

8. **Wood Technology.** Second term. Credit three hours. Prerequisite, Botany 4. Lectures, W F, 11. Forestry Building 118. Practice, T, 2-4.30. Forestry Building 210. Professor RECKNAGEL.

Macroscopic structure of wood; physical, chemical, and mechanical properties of wood; technical uses of wood (paper pulp, destructive distillates, and the like); identification, qualities, and uses of the wood of important trees. Laboratory fee, \$1.

9. **Forest Utilization.** First term. Credit three hours. Lectures, M W F, 10. Forestry Building 118. Professor RECKNAGEL.

Logging methods and equipment; logging in representative regions; manufacture of lumber; determination of stumpage values; timber sale contracts; timber sale administration, including marking, brush disposal, and scaling in practice; minor industries; the organization of the lumber industry; markets.

Field studies in forest utilization are made during the required month of camp, immediately preceding the fall term of the senior year.

### Courses intended primarily for professional forestry students

Professional forestry students should not elect courses 1, 2, 3, and 4, as the following required professional courses cover the same ground in greater detail.

10. **Forest Engineering.** First term. Credit two hours. Prerequisite, plane trigonometry and courses in surveying. Lectures, T Th, 11. Forestry Building 122. Professor BENTLEY.

The construction of trails, roads, telephone lines, and the like, especially as applied in work on the national forests.

Opportunity for practice is afforded during the required month in camp.

11. **Forest Mensuration.** Second term. Credit three hours. Lectures, W F, 9. Forestry Building 118. Practice F, 2-4.30. Forestry Building 118. Professor BENTLEY.

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

Opportunities for additional training in methods of forest mensuration are secured during the month of required work in camp.

12. **Forest Management.** Second term. Credit three hours. Prerequisite, courses 11, 14, and 15. Lectures, T Th, 9. Forestry Building 118. Practice, T, 2-4.30. Forestry Building 122. Assistant Professor GUISE.

The organizing of a forest property for management, with special attention to forest working plans; forest finance, including forest valuation and forest statics. Advanced work in forest management is given in course 20.

13. **Timber Trees and Forest Regions.** First term. Credit three hours. Lectures, M F, 8. Practice, T, 2-4.30. Forestry Building 122. Professor BENTLEY.

A 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 2.) Laboratory fee, \$1.

**13a. Forests of Foreign Countries.** First term. Credit one hour. Prerequisite, course 13 or its equivalent. Lecture, M, 11. Forestry Building 122. Professor BENTLEY.

Lectures and assigned readings on the forest trees and resources of foreign countries.

**14. Silviculture: Forest Ecology.** Second term. Credit three hours. Prerequisite, course 13 and Botany 2, or their equivalents. Lectures, T Th, 11. Forestry Building 122. Practice, M, 2-4.30. Forestry Building. Professors SPRING and ROWLEE.

The study of the biological characteristics of trees and of the forest in relation to the factors of site; influence of the forest on site; forest description. Laboratory fee, 50 cents.

Additional opportunity for a study of the forest is afforded during the required month of forestry practice in camp.

**15. Silviculture: Natural Reproduction and Care of the Forest.** First term. Credit four hours. Prerequisite, courses 13 and 14. Lectures, M W F, 9. Field work, F, 2-4.30. Forestry Building 122. Professor SPRING.

A technical discussion of the silvicultural methods of reproducing forests by natural seeding, the application of these in each of the forest regions of the United States; cleanings, improvement cuttings, and thinnings; marking timber for cutting. Laboratory fee, 50 cents.

Field studies in silviculture will be made during the required month of forestry practice as a foundation for this course.

**16. Silviculture: Forest Planting and the Forest Nursery.** Second term. Credit three hours. Lecture, W, 8. Forestry Building 122. Practice, S, 8-1. Forestry Building 118. Professor SPRING and Mr. LUMSDEN.

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 semi-arid conditions; great forestation enterprises of the world. Laboratory fee, \$1.50.

**18. Forest Protection.** Second term. Credit three hours. Open only to professional forestry students. Lectures, M W F, 9. Forestry Building 122. Professor HOSMER.

The protection of forests from fire and other enemies. Emphasis is placed on the principles underlying forest-fire prevention, detection, and control, especially as these are put in practice through the forest fire plan. (Protection from injury by insects and fungi is covered in Entomology 41 and Plant Pathology 1 and 9, respectively.)

**19. Forest Policy, Forest Law, and History of Forestry.** Second term. Credit three hours. Should not be elected by others than professional forestry students unless they have had courses 2 and 3, or course 6. Lectures, M W F, 11. Forestry Building 122. Professor HOSMER.

The historical development and present status of forestry in the leading coun-

tries of the world; the forest policies of the Nation and of the several States, with especial reference to the principles underlying them, and to the economic basis of forestry; the elements of forest law, including forest taxation.

20. **Advanced Forest Management.** First term. Credit three hours. Prerequisite, course 12. Open only to graduate students. Lectures, T Th, 10. Practice, S, 10-12.30. Forestry Building 118. Professor RECKNAGEL and Assistant Professor GUISE.

The organizing of a forest property for management. An important part of this course is the critical study of working plans.

The forest as an investment, including forest valuation (the ascertainment of values) and forest statics (the comparison of values).

The data used in making a working plan are secured during the required month in camp.

[21. **Forest Administration.** First term. Credit two hours. Lectures, W F, 11; Forestry Building 118. Professor RECKNAGEL] Not given in 1922-23.

The administrative organization and business practice in federal, state, and private forestry.

22. **Seminary.** First and second terms. Two hours a term. Open only to graduate students. Hours to be arranged. Forestry Building 118. Professors HOSMER, SPRING, RECKNAGEL, BENTLEY, and ROWLEE, and Assistant Professor GUISE.

Field and classroom conferences on important phases of forestry.

23. **Advanced Work.** Throughout the year. Credit two or more hours a term. Open to graduate and undergraduate students who have had the necessary training. Hours by appointment. Professors HOSMER, SPRING, RECKNAGEL, BENTLEY, and ROWLEE, and Assistant Professor GUISE.

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. Hours by appointment. Professors HOSMER, SPRING, RECKNAGEL, BENTLEY, and ROWLEE, and Assistant Professor GUISE.

## HOME ECONOMICS

Instruction in home economics is planned to meet the needs of two main classes of students, as follows: (1) students in general home economics, or those who do not wish to specialize in any phase of the subject nor intend to use this knowledge professionally but who desire some understanding of the principles underlying such of the problems of human welfare as are dealt with in these courses; (2) students who wish to specialize in some particular phase of home economics and make vocational or professional use of the training they receive. For this group various suggestive outlines for arrangement of courses throughout the four years have been made, and these may be obtained by application to the School of Home Economics. These outlines are to be considered, not as inflexible, but as indicating possibilities in combining courses during the four years. They include suggestive courses of study for students who are preparing to become (a) teachers of general home economics subjects, (b) teachers of special home economics sub-

jects, such as food or clothing, (c) extension workers, (d) dietitians in hospitals and other institutions.

### **Foods and Nutrition**

**1. Foods, Introductory Course.** First or second term. Credit two hours. This course or its equivalent is required of all home economics students and should be taken in the freshman year. Lecture and conference, first term, M W, 10; practice, Th, 2-4.30, two sections, or F, 10.30-1, two sections; second term, lecture and conference M, 11-1; practice, W, 10.30-1, one section. Home Economics Building 205, 265, 270, and 310. Professor MONSCH, Assistant Professor HENRY, and Misses FLEMMING and ROBERTS.

An introductory course in foods and cookery, preparatory to other food courses. Laboratory fee, \$10.

**3. Foods, General Course.** First and second terms. Credit four hours a term. Should be taken in the sophomore year. Must be preceded or accompanied by organic chemistry. Lectures, M F, 11. Home Economics Building 245. Practice, M, 2-4.30 and T, 10.30-1, two sections; W, 2-4.30 and Th, 10.30-1, one section; or F, 2-4.30, and S, 8-10.30, one section. Home Economics Building 200, 205, and 270. Assistant Professor MOSES and Miss ROBERTS.

A course establishing a fundamental knowledge of foods. The lectures include a discussion of the composition and character of foodstuffs; sources and methods of manufacture; principles of selection; methods of preparation, preservation, and conservation; comparative nutritive and economic values of foods. Laboratory practice consists in applying scientific principles of food preparation. Laboratory fee, \$14 a term.

**9. Food Preparation, Advanced Course.** First or second term. Credit three hours. Open to seniors only. Prerequisite, course 3. Lecture, first term, Th, 8; second term, M, 11. Home Economics Building 265. Practice, M W, or T Th, 2-4.30. Home Economics Building 270. Assistant Professor BOYS.

The purpose of this course is to give the student technique in cookery and an understanding of the history and development of methods of cookery and of the food habits of different nations represented by residents in this country. Practice and demonstrations will be given to develop technique and to train the student to organize and carry through independent problems of food preparation. Making and classification of recipes will be considered. Laboratory fee, \$14.

**19 Food Preparation, Survey Course.** First term. Credit three hours. Designed especially for students in other colleges. Lecture, W, 12. Home Economics Building 245. Practice, F, 2-4.30, and S, 8-10.30. Home Economics Building 270. Assistant Professor BOYS.

A general survey of the history and development of cookery, with laboratory practice in the preparation and serving of the different types of food. Laboratory fee, \$14.

**22. Nutrition and Dietetics.** Second term. Credit five hours. Should be taken in the junior year. Prerequisite, course 3, Chemistry 375, and Biochemistry 14. Lectures and recitations, T Th, 9. Home Economics Building 100. Practice, T Th, 10.30-1, one section, or T Th, 2-4.30, one section, or W F, 2-4.30, one section. Oral questioning period by appointment. Home Economics Building



200, 205, and 270. Professors ROSE and MONSCH, Assistant Professor HENRY, and Miss FLEMMING.

A course for developing a working knowledge of dietetics. A study of methods of investigating dietary problems, and of practical means of applying scientific principles in the planning of dietaries for the family. Several weeks will be spent on the problems of feeding infants and children. Laboratory fee, \$10.

23. **Seminary in Nutrition.** First term. Credit two hours. Open to seniors in Home Economics only. Prerequisite, course 22 or its equivalent. W, 2-4. Home Economics Building 100. Assistant Professor HENRY.

24. **Diet in Relation to the Treatment of Disease.** First term. Credit three hours. Should be taken in the senior year. Required of those specializing in dietetics. Prerequisite, course 22 or its equivalent. Lectures, M, 9, F, 12. Home Economics Building 265. Practice, M, 10-12. Home Economics Building 200. Professor MONSCH. Laboratory fee, \$14.

31. **Nutrition of School Children.** First or second term. Credit two hours. Required of students preparing to teach. Prerequisite, course 22. Lecture or conference, W, 12. Home Economics Building 100. Practice, first term, T, 2-5; second term, M, 2-5. Home Economics Building 200. Professor MONSCH.

This course will give special consideration to conditions of nutrition of the school child, with possible methods of affecting the nutrition and welfare of the child and family through the direction of nutrition classes in the school. Laboratory fee, \$5.

35. **Dietetics, Survey Course.** Second term. Credit two hours. Open to students in other colleges. Lectures and recitations, W F, 9. Home Economics Building 100. Professor ROSE.

[35a. **Dietetics, Survey Laboratory Course.** Second term. Credit one hour. Prerequisite, course 1 or its equivalent. Must be accompanied by course 35. Practice, F, 2-4.30. Home Economics Building 200. Professor MONSCH.] Not given in 1922-23.

A course designed to give the student practical application of nutrition problems in the feeding of individuals and groups of varying ages and conditions of health. Laboratory fee, \$7.

### Clothing and Textiles

60. **Clothing Selection.** First or second term. Credit three hours. Should be taken in the freshman year. Required of all students in home economics. Practice: first term, M W F, 10.30-1, M W F, 2-4.30; second term, M W F, 8-10.30, M W F, 2-4.30, T Th, 2-4.30, and S, 8-10.30. Home Economics Building 300. Assistant Professor BLACKMORE and Miss JAKWAY.

This course emphasizes the economical and appropriate selection of clothing. The planning of the wardrobe is considered and a comparison is made between commercially made garments and garments made in the home. Laboratory practice includes hand and machine sewing, the use of commercial patterns, modeling and adapting of patterns, and household mending. Students provide all dress materials subject to the approval of the instructors. Estimated cost of dress materials, \$10. Laboratory fee, to cover cost of laboratory materials, \$3.

[61. **Dressmaking, Survey Course.** First term. Credit three hours. Lecture, F, 9. Practice, Th S, 10.30-1. Home Economics Building 305. Miss JAKWAY.] Not given in 1922-23.

This course is adapted to meet the needs of students in other colleges who desire a general knowledge of clothing selection and design. Laboratory practice includes machine sewing, the use of commercial patterns and the modeling of patterns. Students provide all dress materials subject to the approval of the instructor. Estimated cost of dress materials from \$15 to \$25. Laboratory fee, to cover cost of laboratory materials, \$3.

65. **Constructive Clothing Design.** First or second term. Credit three hours. Should be taken in the sophomore year, parallel with course 107. Prerequisite, courses 60 and 105. First term, lecture, Th, 9; practice, T Th, 10.30-1. Second term, lecture W, 12, practice, T Th, 8-10.30 or W F, 2-4.30. Home Economics Building 305. Assistant Professor HUNTER.

This course applies the principles of design to the making of clothing. Preliminary sketches are worked out in pencil and water-color and models are made on the dress form. Patterns are modeled for use in a later dressmaking course. Students provide all practice materials subject to the approval of the instructor. Estimated cost of practice materials, \$10. Laboratory fee, to cover cost of laboratory materials, \$3.

70. **Principles and Practice in Clothing Construction and Design, Teachers' Course.** First and second terms. Credit four hours a term. Should be taken by juniors. Open only to students preparing to teach. Prerequisite, courses 60, 65, 90, 105, and 107. Prerequisite or parallel, Rural Education 2 and 4. First term: lecture, T, 9; practice, M W F, 8-10.30, or M W F, 2-4.30. Second term: lecture, T, 11; practice, M W F, 8-10.30, or T Th, 2-4.30 and S, 8-10.30. Home Economics Building 305. Assistant Professors BLACKMORE and HUNTER.

The technique of dressmaking construction is emphasized. Problems are presented from the standpoint of the organization of subject matter for teaching purposes. The lectures include discussions on dress design, applied design in dress decorating, and a study of the clothing budget. Students provide all materials, subject to the approval of the instructor. One laboratory period each week is spent in the Costume Shop.

75. **Commercial Clothing Construction.** First and second terms. Credit three, four, or five hours. Not less than three hours may be taken by students registering in this course for the first time. Open only to students preparing to teach. Prerequisite, courses 60, 65, 70, 90, 105, and 107. Prerequisite or parallel, Rural Education 2 and 4. Laboratory practice, by arrangement. Home Economics Costume Shop, Home Economics Building. Mrs. McILROY and Miss BROOKINS.

The students work under instructors experienced in commercial work. Dressmaking problems in designing, construction, fitting, and finishing are considered. A shop with a number of paid workers is maintained and the students are given experience in meeting customers, in shopping, and in shop organization and management. Students specializing in clothing will be given an opportunity to make a trip to New York City to visit shops and openings the second week in March. Probable cost of trip, \$50 to \$75.

**80. Elementary Millinery.** First or second term. Credit two hours. Prerequisite, course 60 or its equivalent. Practice: first term, M W, 2-4.30, T Th, 10.30-1, F, 2-4.30 and S, 8-10.30; second term, M W, 2-4.30; T Th, 10.30-1, or T Th, 2-4.30. Home Economics Building 310. Miss STANNARD.

This course considers the methods of manipulation of materials in the construction of hat frames; the use and renovating of old materials; the preparation of trimmings; the study of color, shape, and trimmings as to suitability, becomingness, and income; comparison with commercially made hats. Students provide all hat materials. Estimated cost, from \$6 to \$10. Laboratory fee, to cover cost of laboratory materials, \$3.

**81. Advanced Millinery.** First or second term. Credit two hours. Prerequisite, courses 60 and 80. Practice: first term, T Th, 2-4.30; second term, M W, 8-10.30. Home Economics Building 310. Miss STANNARD.

Advanced practice in making frames, finished hats, and trimmings. Students provide all materials, estimated cost from \$10 to \$15. Laboratory fee, to cover cost of laboratory materials, \$3.

**90. Textiles.** First or second term. Credit two hours. May be taken second term of freshman year or first term of sophomore year. Required of all students in home economics. First term: lecture, W, 9; practice, M, 2-4.30, W, 2-4.30, or F, 2-4.30. Second term: lecture, W, 11; practice, M, 2-4.30 or F, 2-4.30. Home Economics Building 400. Miss JAKWAY.

This course includes the intensive study of fabrics with a view to their appropriateness in clothing. A study is made of the history of the processes of manufacture of fabrics. Analysis of weave, microscopic identification, chemical and physical testing of fabrics. Estimated cost of materials, from \$3 to \$5. Laboratory fee, to cover cost of laboratory materials, \$3.

### Housing and Design

[100. **Housing.** First term. Credit one hour. Required of all students in home economics. May be taken in either the junior or senior year. Lecture, Th, 9. Home Economics Building 245. Professor ———.] Not given in 1922-23.

A course dealing with fundamental phases of the housing problem and the trend of housing progress. The subjects under discussion include the following: Housing in its relation to the home, to health, to community problems, to industry, to finance, to town planning; city housing; rural housing; housing standards; housing laws; types of housing; a housing program.

[101. **House Planning.** First term. Repeated or continued second term. Credit two hours. Elective for juniors. Registration limited to forty-five students. First term: lecture, S, 11, Home Economics Building 245; practice, M or W, 2-4.30, Home Economics Building 415. Second term: lecture, F, 11; practice, M, 2-4.30, one section for advanced work, W, 2-4.30, one section for beginners. Professor ———.] Not given in 1922-23.

A study of the arrangement of dwellings from the standpoint of economy, convenience, and design. Laboratory fee, \$1.

**102. Environmental Art.** Second term. Credit one hour. Should be taken in the junior year. Required of all students in home economics. Lecture, M, 9. Home Economics Building 415. Professor WARNER.

A course dealing with the artistic ordering of home and community surroundings. The purpose of the discussion is to suggest how environment may be made to contribute to the life and work of the individual.

**105. Color and Design.** First or second term. Credit two hours a term. Should be taken in the sophomore year. Required of all students in home economics. Prerequisite, course 60. Practice: first term, T Th, 8-10.30, or T Th, 10.30-1, or T Th, 2-4.30, or W F, 8-10.30, or F, 2-4.30 and S, 8-10.30; second term, T Th, 8-10.30, one section. Home Economics Building 415. Professor WARNER and Acting Assistant Professor WETHERBEE.

A course intended to give the student an understanding of the elementary principles of color and design. The work includes experiments with water colors, dyes, and fabrics, and practical applications are made to problems in everyday life. Laboratory fee, \$5.

**107. Clothing Design.** Second term. Credit two hours. Should be taken in the sophomore year. Required of all students who are planning to teach clothing. Prerequisite, courses 60 and 105. Practice, T Th, 10.30-1, or W F, 8-10.30. Home Economics Building 415. Professor WARNER and Acting Assistant Professor WETHERBEE.

A course dealing with color and design as applied to clothing. Laboratory fee, \$4.

**110. Home Decoration and Furnishing.** Second term. Credit two hours. Should be taken in the junior year. Prerequisite, course 105. Practice, M W, 2-4.30 or T Th, 2-4.30. Home Economics Building 415. Professor WARNER.

A course dealing primarily with the decoration and furnishing of the house. The object of the work is to develop good judgment and taste in the selection and arrangement of house furnishings, to the end that students may learn to express themselves in their environment. Laboratory fee, \$5.

**112. Special Problems in Design.** Second term. Credit two hours. Should be taken in the senior year. Prerequisite, courses 100, 102, 105, and 110. Practice hours, by arrangement. Home Economics Building 415. Professor WARNER.

This course is open to students who have a talent or a special inclination to continue work in design. The nature of the problems will be determined by the needs of the students and by the possibilities for practical application that may develop. Laboratory fee, \$3, or more, according to problem.

### Household and Institution Management

**120. Household Management.** First term. Credit four hours. Prerequisite, Economics 51. Required of seniors in home economics. Lectures, T Th S, 11. Home Economics Building 100. Practice, T, W, Th, or F, 2-4.30. Acting Assistant Professor KELLOGG.

This course includes a study of the source and the division of the income; the making of the budget; the cost of food, shelter, and clothing; cost and choice of equipment; study of household duties, methods of cleaning, and study of practical housewifery problems in general; elimination of waste, and greater efficiency in the use of materials, time, and money; standards of living; methods of saving; problem of domestic service; marketing; personal and household accounts, bank accounts, savings, and investments. Laboratory fee, \$3.

**130. House Practice, Laboratory Course.** First or second term. Credit



two hours. Practice consists of four consecutive weeks in the practice house, time to be arranged. Misses FLEMMING and ROBERTS.

This course furnishes an opportunity for the student to test her ability to apply theoretical knowledge in solving household problems. Laboratory fee, \$24, including room and board for the four weeks in the practice house.

**140. Institution Practice.** First or second term. Credit three hours a term. Elected preferably in the junior year. May be taken in the senior year. Required of all students specializing in institution management or as dietitians. Lecture, S, 8. Home Economics Building 265. Practice, M W F, 11.30-1.30, or T Th S, 11.30-1.30. Misses FARMER and DAHLBERG.

Discussion of types of institutions; practice work in counter service and supply; office and storeroom work. Laboratory fee, \$5.

**141. Marketing and Large-Quantity Cookery.** First or second term. Credit three hours a term. Prerequisite or parallel, course 140. Open to seniors in home economics. Required of all students specializing in institution management or as dietitians. Lecture, T, 8. Home Economics Building 265. Practice W F, 8-12. Misses FARMER and DAHLBERG.

Laboratory work in large-quantity cooking. A study of marketing and buying in large quantities; the principles underlying the purchase of foods; production, grading, and distribution of various classes of foods; methods of purchase and storage. The class will be given an opportunity to make a trip to New York City to visit markets, kitchens, and institutions. Probable cost of trip, \$75. Laboratory fee, \$5.

**142. Institution Management.** Second term. Credit two hours. Prerequisite, courses 140 and 141. Open to seniors in home economics. Required of all students specializing in institution management or as dietitians. Lectures, T Th, 10. Home Economics Building 265. Miss FARMER.

A study of the organization and management of institutions; the rise of present-day institutional problems; opportunities and openings in the institutional field.

**150. Institution Accounts.** First or second term. Credit four hours. Open to juniors and seniors only. Should be taken in junior year by students in institution management. Lectures, first term, M W F, 10; second term, M W F, 8. One practice period, to be arranged. Home Economics Building 100. Mrs. GEORGIA.

A study of the principles of accounting and the application of these principles in keeping institution accounts. Practice work will be based on cafeteria accounts.

**155. Health in the Home.** First term. Credit three hours. Required of students in home economics, in the junior or senior year. Prerequisite, Bacteriology. Lectures, T Th, 9. Home Economics Building 100. Practice, M, W, or F, 2-4.30. Assistant Professor REYNOLDS.

This course includes a consideration of the principles necessary for the maintenance of healthful individual and family life.

**Bacteriology for the Home.** See Dairy Industry 15.

**Household Mechanics.** See Rural Engineering 10.

**Civic and Industrial Relations of Women**

190. **Woman and the Family.** Second term. Credit three hours. Lectures, T Th S, 11. Home Economics Building 100. Professor VAN RENSSELAER.

This course embraces a study of woman and the family through early ages to the present time. It treats of 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 conditions are studied with reference to the home and to society; the opening of occupations and professions to women; laws governing the family; the family a basis of civilization; a study of modern problems of women and the home, such as suffrage, education, and the economic function of woman and the family.

215. **Child Training.** Second term. Credit three hours. Lectures, M W, 10. Conferences, M, 12, T, 10 or 12, W, 9. Acting Assistant Professor BINZEL.

This course aims at an understanding of the proper technique in the care and management of children. Knowledge of the changing attitude toward child life, of the native reactions of children, and of the modification of these by environmental factors will serve as a basis for the visioning of behavior possibilities and for the interpretation of behavior problems peculiar to the parent-child relationship.

**Special Problems**

220. **Special Problems.** First and second terms. Credit and hours by arrangement. Open only to seniors and graduate students in home economics and to other qualified persons by special consent. Prerequisite, a fundamental knowledge of home economics. Instruction by members of the departmental staff and others.

A course intended for the development of the individual student in particular lines of work. It includes not only the acquisition and discussion of subject matter, but also consideration of the logical organization of subject matter by teachers and extension workers, and the proper presentation of findings by research workers.

**Extension**

260. **Extension in Home Economics.** First and second terms. Credit three hours a term. Open to seniors, and to others who have given evidence of their ability to develop this work satisfactorily. Preliminary courses recommended are Extension Teaching 1 and 5, Public Speaking 1, and Rural Social Organization 1. Lecture, W, 11. Practice, W F, 2-5. Home Economics Building 265. Miss MORTON.

This course includes a study of home economics extension plans in the United States; legislation, national and state, under which extension is promoted; county agent system; method of approach by survey of needs; method of organization of home economics subject matter to be extended, and means by which it may reach the community; possibilities of cooperation with agencies already established; preparation of material for printing and for public addresses; office

management; organization of groups for a study of home economics. Laboratory fee, \$3 a term. Field trips will be arranged for the study of extension activities in the State. Probable cost to student, \$15 to \$25.

**270. Extension in Home Economics, Advanced Work.** Throughout the year. Credit two or more hours a term. Open to graduate and undergraduate students who have had the necessary training and experience. Hours by appointment. Students will be given opportunity to do field work under supervision. Miss MORTON.

## LANDSCAPE ARTS

The courses dealing with plant materials and planting design are organized in the Department of Floriculture and Ornamental Horticulture. The more technical course dealing with the design and construction phases of landscape architecture have been transferred to the College of Architecture.

## METEOROLOGY

**1. Elementary Meteorology.** First or second term. Credit three hours. Lectures, T Th, 11. Roberts Hall 292. Laboratory, T, W, or Th, 2-4.30. Dairy Building 341. Students must consult the department in regard to laboratory assignments. Professor W. M. WILSON and Assistant Professor MORDOFF.

This is a course designed to acquaint the student with the principles of the general and secondary circulation of the atmosphere; the elements of weather and climate; practical weather forecasting from weather maps and local observations. The laboratory periods include demonstrations, recitations, practice, and comparative studies of general and local weather. Laboratory fee, \$2.

**2. General Climatology.** Second term. Credit two hours. Prerequisite, course 1. Lectures, T Th, 9. Dairy Building 341. One conference period a week, by appointment. Assistant Professor MORDOFF.

This course is designed to give a general knowledge of climatology and of the various climates of the United States with emphasis on those of New York State. During the conference hours there will be general discussions of all subjects which are taken up in the course.

**6. Meteorology and Climatology.** Second term. Credit two hours. Lectures, T Th, 9. Dairy Building 341. One conference period a week, by appointment. Registration limited to upperclassmen. Not open to students who have had course 1 or 2. Students must consult the department before registering for the course. Assistant Professor MORDOFF.

A brief course covering only the more essential phases of meteorology and climatology, and their relations to agriculture.

**11. Research.** First and second terms. Credit one or more hours a term. Prerequisite, permission to register. Hours, by appointment. Professor W. M. WILSON and Assistant Professor MORDOFF.

A course designed for advanced and graduate students. Original investigations in meteorology and climatology.

**PLANT BREEDING**

**1. Genetics.** First term. Credit four hours. Prerequisite, Botany 1 and 20, or equivalents in zoology and physiology. Assignment to sections must be made at the time of registration. Lectures, T Th S, 8. Forestry Building 210. One conference period, to be arranged. Laboratory, T or Th, 2-4.30, or S, 9-11.30. Forestry Building 212. Assistant Professor FRASER, and Messrs. DORSEY and BRUNSON.

A general introductory course and survey of the field of genetics, designed to acquaint the student with the laws of variation and heredity, with some suggestions of their application to the improvement of plants and animals, and their bearing upon eugenics. Laboratory studies of variations in certain species, of hybridization and selection, and of the laws of segregation and recombination illustrated by breeding experiments with plant and animal materials. Laboratory fee, \$3.

**8. Principles and Methods of Plant Breeding.** Second term. Credit two hours. Prerequisite, course 1. Lectures, T Th, 9. Forestry Building 210. Assistant Professor BUSSELL.

A study of the application of genetic principles to plant breeding with special reference to the rôle of hybridization and selection in plant improvement; consideration of methods, technique, and results of plant-breeding investigations.

Trips to the departmental greenhouses, gardens, fields, and seedhouse will be made to acquaint the student with the methods and technique of plant-breeding work.

**Advanced and Graduate Courses**

**10. Taxonomy of the Cereal Crops.** Third term. Credit two or more hours. Primarily for graduate students who have had adequate training in botany and whose primary interest is in the cereals. Prerequisite, permission to register. Lectures and laboratory periods to be arranged. Assistant Professor WIGGANS.

A large part of the work consists of field laboratory studies in the gardens of the department on the identification and classification of the cereal crops.

**11. Biometry.** First term. Credit two hours. For graduate students only. Lecture, M, 11. Forestry Building 212. Laboratory, M, 2-4.30. Forestry Building 212. Professor LOVE.

A discussion of statistical methods as applied to problems in biology and genetics. The course is designed primarily to develop methods for the study of variation, correlation, curve fitting, and probable error.

**13. Genetics, Advanced Course.** Second term. Credit three hours. Primarily for graduate students. Prerequisite, course 1 or its equivalent, Botany 1, 10, and 20, and permission to register. Lectures, T Th, 11. Forestry Building 210. Laboratory, Th, 2-4.30. Forestry Building 212. Assistant Professor FRASER.

An advanced course dealing with special topics in genetics with particular reference to the physical basis of heredity. Consideration of the present status and mode of attack of the more important problems in Mendelism, linkage,



sex inheritance, and mutation. Laboratory analyses of Mendelian phenomena. Laboratory fee, \$3.

**16. Research.** Throughout the year. Hours by appointment. Forestry Building. Professors EMERSON, LOVE, and MYERS, and Assistant Professors BUSSELL, FRASER, and WIGGANS.

Investigations of problems in plant breeding, heredity, and variation.

**17. Seminary.** First and second terms. For graduate students only. Th, 10. Forestry Building 210. Professors EMERSON, LOVE, and MYERS, and Assistant Professors BUSSELL, FRASER, and WIGGANS.

A seminary for the discussion of current genetical literature and for the presentation of reports on research problems.

## PLANT PATHOLOGY

**1. General Plant Pathology.** First or second term. Credit three hours. Prerequisite, Botany 1 or its equivalent. Assignment to laboratory sections must be made at time of registration. Lecture, W, 8. Stone Hall 192. Practice, first term, W F, 2-4.30, or Th, 2-4.30 and S, 10.30-1; second term, W F, 2-4.30. Bailey Hall, West Basement. Professor WHETZEL and Messrs. HONEY and DICKSON.

A fundamental course treating of the nature, cause, and control of plant diseases, illustrated by studies of the commoner diseases of cultivated crops. The practice sections must be taken in the couplets announced above, and are limited to twenty-four students each. Admission, if registration is in excess of twenty-four, on the basis of average scholastic standing to date. Laboratory fee, \$4.50; breakage deposit, \$3.

**2. Principles of Plant-Disease Control.** Second term. Credit three hours. Prerequisite, course 1. Lecture, Th, 8. Stone Hall 192. Conferences (one a week) by arrangement during practice periods. Practice, Th, 2-4.30, S, 8-10.30. Bailey Hall, West Basement. Professor WHETZEL.

A consideration of the principles and methods of controlling plant diseases. This will include studies on: exclusion by laws, regulations, quarantine, and inspection; eradication, by pruning, seed selection, tree surgery, rotation, disinfection, and other means; protection, by spraying, dusting, wound dressing, and the like; immunization, by selection, breeding, and feeding. Number taking the course limited to twenty-four. Admission, if registration is in excess of this number, on the basis of average scholastic standing to date. Breakage deposit, \$3.

**6. Comparative Morphology of Fungi.** First term. Credit four hours. Prerequisite, Botany 1 or its equivalent. Lectures, M W, 9. Bailey Hall, West Basement. Practice, T Th, 2-4.30. Bailey Hall, East Basement. Professor FITZPATRICK and Mr. WELCH.

A synoptical course designed to acquaint the student with the general field of mycology. Emphasis will be placed on morphology and phylogeny, rather than on taxonomy. Laboratory fee, \$6; breakage deposit, \$3.

**9. Forest Pathology.** Second term. Credit two hours. Prerequisite, course 1. Lectures, M W, 10. Bailey Hall, West Basement. Professor WHETZEL and Mr. DICKSON.

A course designed for students in forestry, dealing primarily with fundamental principles of forest pathology and tree-disease control.

10. **Advanced Plant Pathology.** First and second terms. Credit three hours. Prerequisite, courses 1 and 2. Students should consult the professor in charge before registering. Lecture, F, 8. Practice, T F, 10-12.30. Bailey Hall, Basement. Professor MASSEY.

A presentation and analysis of the experimental and empirical knowledge of plant diseases. The phenomena of infection, susceptibility, host reactions, and symptomatology will be critically considered. Laboratory fee, \$4.50; breakage deposit, \$3.

12. **Mycology:** First and second terms. Credit four hours. Prerequisite, Botany 1 or its equivalent, and permission to register. Lectures, M W, 11. Bailey Hall, West Basement. Practice, M W, 2-4.30. Bailey Hall, East Basement. Professor FITZPATRICK and Mr. WELCH.

An advanced course designed especially for students who wish to specialize in plant pathology or mycology. An intensive study of the morphology, taxonomy, and phylogeny of the fungi. (Phycomycetes and Ascomycetes.) Laboratory fee, \$6; breakage deposit, \$3.

[14. **Mycology.** First and second terms. Credit four hours. Prerequisite, Botany 1 or its equivalent. Professor FITZPATRICK.] Not given in 1922-23.

An advanced course, alternating with course 12, dealing with the Basidiomycetes, Fungi Imperfecti, Myxomycetes, and identification of miscellaneous fungi.

17. **History of Plant Pathology.** First and second terms. Credit one hour. Prerequisite, course 1 and reading knowledge of French and German. Conference hour by appointment. Bailey Hall, Basement. Professor WHETZEL.

19. **German Phytopathological Reading.** First and second terms. Without credit for undergraduate students. Two one-hour periods a week, to be arranged with the professor in charge. Stone Hall 192. Professor WHETZEL.

20. **Research.** Throughout the year. Not less than three laboratory periods of three clock hours a week. Professors and assistant professors on the departmental staff.

Laboratory fee, \$1.50 a credit hour; breakage deposit, \$3.

25. **Seminary.** First and second terms. Required of graduate students taking work in the department. Biweekly, Tuesday, 7.30-10 p. m.

## POMOLOGY

1. **Pomology.** Second term. Credit three hours. Prerequisite, Botany 1, Chemistry 101, and, for those who have not met the farm-practice requirements, permission to register. Lectures, T Th, 8. Dairy Building 222. Laboratory, to be assigned at the time of registration, M T W Th or F, 2-4.30. Roberts Hall 202. Professor CARRICK and Messrs. HOWLETT and ———.

A study of the general practices in pomology; propagation and care of orchard trees and small fruits; harvesting, storing, and marketing fruit. Practical work in budding, grafting, pruning, and planting; study of varieties, nursery trees, and fruit buds. Laboratory fee, \$3; deposit, \$1, to be refunded provided all tools lent to the student are returned in good condition.

8. **Fruit Varieties: Identification, Judging, Exhibits.** First term. Credit

one hour. Prerequisite, course 1. Laboratory, to be assigned at time of registration, F, 2-4.30, S, 8-10.30, or 10.30-1. Roberts Hall 202. Assistant Professor MACDANIELS and Mr. HOWLETT.

A study of the most important varieties of apples, pears, peaches, plums, and grapes, chiefly from the standpoint of their identification. Some emphasis is also given to tree characters, regional adaptation, season of ripening, storage quality, and other matters of a similar nature. A part of the time is given to the judging of exhibition fruit, and the Farmers' Week fruit exhibit will be set up by the students of this course. Two students may be chosen, by competition, to judge the Fruit Show at Rochester. Laboratory fee, \$3.

**9. Packing Fruit for Market.** First term. Credit one hour. Prerequisite, courses 1 and 8, and permission to register; must be preceded or accompanied by Entomology 3, Plant Pathology 1, and Agricultural Economics and Farm Management 10 or 13. S, 8-1. Roberts Hall 202. Professor OSKAMP and Assistant Professor PECK.

Particular emphasis is placed on packing apples in barrels, boxes, and other retail packages, but the work covers also such fruits as peaches, plums, pears, and grapes, in so far as these are available. The effect of grades and packages on distribution and marketing is fully discussed and consideration will be given to some of the problems of operating a central fruit-packing house. Laboratory fee, \$3.

**10. Economic Fruits of the World.** First term. Credit three hours. Prerequisite, course 1 and permission to register; must be preceded or accompanied by course 8. Lectures, W F, 8. Laboratory, W, 2-4.30. Roberts Hall 202. Assistant Professor MACDANIELS and Mr. HOWLETT.

A study of all species of fruit-bearing plants of economic importance, such as the date, the banana, citrus fruits, nut-bearing trees, and newly introduced fruits, with special reference to their cultural requirements in the United States and its insular possessions. All fruits not considered in other courses are considered here. Emphasis is placed on botanical relationships and fruit structure. Laboratory fee, \$2.50.

**11. Orchard Field Trip.** Credit one hour. Prerequisite, courses 1 and 8, and permission to register. To be taken during the three weeks preceding the opening of the first term. Students who wish to take trip must signify their intention by July 20 preceding. The expense of this trip must be met by the individual student. Students may register for this course in third or first term. Professors HEINICKE and CARRICK and Assistant Professor MACDANIELS.

The course is designed to give the students who specialize in pomology an intimate knowledge of practical orchard conditions.

**12. Experimental Pomology.** First term. Credit three hours. Prerequisite, courses 1 and 8, Botany 20, and permission to register; must be preceded or accompanied by course 10, Plant Pathology 1, Entomology 3, and Agronomy 1. Discussions, M W F, 10. Roberts Hall 292. Professors CHANDLER and HEINICKE.

A systematic study of the sources of knowledge and opinion as to practices in pomology; methods and difficulties in experimental work in pomology, and results of experiments that have been concluded or are being conducted.

**13. Pomology, Advanced Laboratory Course.** First or second term, or both. Credit one hour a term. For seniors only. Prerequisite, permission to register.

S, 8-1. Professors HEINICKE and CARRICK, Assistant Professor MACDANIELS, and Messrs. HOWLETT and ———.

During the first term opportunity is given to gain greater familiarity with varieties and experience in judging than can be given in course 8; during the second term this course is designed to give more extended practice in the various nursery and orchard operations than can be given in course 1. It is intended for students doing their major work in pomology. Laboratory fee, \$2 a term.

19. **Research.** Throughout the year. Credit one or more hours a term. Prerequisite, course 12, and permission to register. Professors CHANDLER, HEDRICK, HEINICKE, CARRICK, and OSKAMP, and Assistant Professors MACDANIELS and PECK.

20. **Seminary.** Throughout the year, without credit. Required of students taking course 19 and of graduate students in pomology. M, 11. Stone Hall 192. Members of the departmental staff.

Undergraduates who are interested will be welcome to attend but will not receive credit toward graduation.

### POULTRY HUSBANDRY

1. **Farm Poultry.** Second or third term. Credit three hours. Second term, lectures, W F, 9. Poultry Building 375. Practice, T, W, Th, or F, 2-4.30, or S, 8-10.30. Poultry Building 300. Third term, lectures, M W F, 11. Poultry Building 375. Practice, T, 2-4.30. Poultry Building 300. Professors RICE and KENT, Assistant Professors HEUSER and BOTSFORD, and Messrs. WEAVER, BRADLEY, and SANDFORD.

A brief general course dealing with the practical application of the principles of poultry husbandry to general farm conditions.

2. **Poultry Feeds and Feeding.** First term. Credit two hours. Prerequisite, course 1, and Animal Husbandry 1. Lecture or recitation, W, 11. Practice, W or Th, 2-4.30; also reporting three times daily, including Sunday, for four weeks, 7.45-8.30, 12.45-1.15, 4.30-5. Poultry Building 325. Assistant Professor HEUSER.

A study of feeds suitable for poultry; the principles of feeding for egg production, fattening, and rearing; the compounding of poultry rations.

Daily practice for four weeks in flock management.

3. **Poultry Incubation and Brooding.** Second term. Credit two hours. Prerequisite, course 1. Lecture, M, 11. Practice, M, 2-4.30; also reporting three times daily, including Sunday, for eight weeks, 7.45-8.30, 12.45-1.15, 4.30-5. Poultry Building 300. Assistant Professor WEAVER.

Principles and practice of incubation and brooding. Daily practice for four weeks in operating incubators and in the management of a brooder and a flock of chickens.

4. **The Breeds of Poultry and Judging.** First term. Credit two hours. Prerequisite, course 1. Lecture or recitation, F, 11. Poultry Building 325. Practice, F, 2-4.30. Breed Observation House. Professor KENT.

The origin, history, and classification of breeds of domestic poultry; judging the principal breeds for fancy and production points by score-card and comparison methods; fitting fowls for exhibition. A required trip will be made to



one of the leading poultry shows the second or third week of January. Trips to nearby farms will also be made.

5. **Poultry Breeding.** Second term. Credit two hours. Prerequisite, course 4 and Plant Breeding 1. Lecture or recitation, T, 10. Poultry Building 375. Practice, T, 2-4.30. Poultry Building 325. Professor KENT.

The principles and practice of poultry breeding.

6. **Poultry-House Design and Construction.** Second term. Credit two hours. Prerequisite, course 1, and permission to register. Lecture or recitation, F, 11. Poultry Building 325. Practice, F, 2-4.30. Poultry Building 325. Assistant Professor BOTSFORD.

A study of principles of poultry-house construction; planning, arranging, and designing poultry houses; estimating the cost of buildings; studying building plans; practice in erecting and remodeling houses and in making appliances. An excursion to neighboring farms will be made.

7. **Marketing Poultry Products.** First term. Credit two hours. Prerequisite, course 1. Lecture or recitation, M, 11. Poultry Building 325. Practice, M, 2-4.30. Poultry Building 100. Mr. POWELL.

This course deals with the preparation of poultry and eggs for market, and with storage and preservation. A class trip to New York, following the Christmas holidays, is required of all students. This trip gives the students an opportunity to become familiar with the live- and the dressed-poultry markets, and with wholesale dealers. The total necessary expense is about \$35.

8. **Poultry Farm Management.** Second term. Credit two hours. Prerequisite, course 1. Lecture or recitation, W, 11. Poultry Building 325. Practice, W, 2-4.30. Poultry Building 375. Professor RICE and Assistant Professor BOTSFORD.

The principles of farm management as applied to the poultry farm; selection of the farm; use of poultry-farm score cards; farm layout and arrangement of buildings; study of farm records. As a final problem, each student will work out plans for the management of a poultry enterprise that seems most adaptable to his personal needs. The course will include several required excursions, one of which will be a two-day trip, to representative poultry plants in April and May, at an approximate cost of \$15.

9. **The Field of Poultry Husbandry.** First term. Credit two hours. Prerequisite, course 1. Lectures, T Th, 11. Poultry Building 375. Professor RICE.

A study of the general field of poultry husbandry, for students specializing in the department. The course includes a study of the bibliography of poultry husbandry and of the history, the scope, and the opportunities of the poultry industry.

10. **Seminary.** Throughout the year. For graduate students only; required of all graduate students in poultry husbandry. Time to be arranged. Poultry Library. Members of the departmental staff.

A discussion of advanced work in poultry husbandry.

11. **Research.** First, second, or third term, or throughout the year. Credit one to three hours a term. Prerequisite, permission to register; must be preceded or accompanied by course 8. Time arranged by appointment. Poultry Building. Members of the departmental staff.

An original investigation of a problem in poultry husbandry to be presented as a written thesis. Frequent conferences are required of all students electing this course.

## RURAL EDUCATION

The undergraduate courses in the Department of Rural Education, with the exception of courses 9, 60a, 60b, 63, and 65, are provided for under the Federal Vocational-Education Act and are open to only a limited number of students besides those who are following the prescribed courses for vocational teachers of agriculture and homemaking. Students must arrange with the department before registering for any of the courses, and receive assignment to sections and laboratory periods. Sections are limited to twenty-five students.

1. **Introduction to the Problems of Public Education.** Second term. Credit two hours. Not open to first-term freshmen. Lectures, T Th, 9. Caldwell Hall 100. Professor STEWART.

An introduction to the study of the problems and movements in modern education, particularly as they appear in New York State. What opportunities boys and girls have for educational training; the growing responsibility of the school as a social institution, particularly with reference to vocational education; the opportunities and difficulties in teaching as a profession; these are some of the typical problems considered.

2. **Educational Psychology.** First or second term. Credit four hours. Alternate third terms. Credit three hours. Given in third term 1922. Open to juniors and seniors. First term: Section 1, lectures, M W F, 11. Caldwell Hall 143; laboratory, T, 2-4.30, Caldwell Hall 282. Section 2, lectures, T Th S, 8, Home Economics Building 100; laboratory, W, 2-4.30, Caldwell Hall 282. Second term: section 1, lectures, M W F, 11, Caldwell Hall 143; laboratory, T, 2-4.30, Caldwell Hall 282. Section 2, lectures, T Th S, 8, Caldwell Hall 143; laboratory, W, 2-4.30, Caldwell Hall 282. Third term: Lecture, T Th S, 11-12.30. Professors KRUSE, BRIM, and EATON, and Assistant Professor FERRISS.

The original nature of man; instincts and capacities; the laws of learning; habit formation; practice and improvement; transfer of training; mental fatigue; individual differences. The materials and the methods of the course are intended to serve the needs of the class as students and as prospective teachers.

4. **Principles of Teaching.** First or second term. Credit three hours. Open to juniors and seniors who have completed course 2 or its equivalent. Lectures: first term, M W F, 11, Home Economics Building 100; second term, Section 1, M W F, 11, Caldwell Hall 100; Section 2, M W F, 8, Caldwell Hall 143. Professors STEWART and BRIM.

A course given to the consideration of the problems of teaching in the light of social and psychological principles. Practical schoolroom questions, such as selection of subject matter, developing and directing purposes and instincts, organizing materials, planning class work, questioning, drilling, teaching methods, assigning lessons, managing the class, measuring results. Principles will be utilized as a basis for evaluating and improving practice.

5a. **Teaching Agriculture in the High School.** First and second terms.

Credit three hours a term. Open to students who have completed course 2 and who have met the farm-practice requirements. Lecture, M, 8. Laboratory, M, 2-4.30. Caldwell Hall 282. A half-day teaching period, to be arranged. Professor STEWART.

The purpose of this course is to study the problems of teaching agriculture by means of practice teaching, supplemented by laboratory exercises, practicums, and discussions. The problems described under courses 4, 6, and 8a are reorganized into a unit course for students preparing to teach agriculture. See these courses for descriptions.

[6. **Teaching Agriculture in the High School.** Second and third terms. Credit three hours. Professor STEWART.] Course 5a is given instead of course 6 in 1922-23.

A study of the problems confronting the teacher of agriculture: the purpose of the instruction; the curriculum in departments of agriculture; the determination of the courses of study; forms of teaching, including a consideration of the use of the project and the survey, the determination and utilization of texts, materials, and equipment; the relation of the teacher to the community, to the school, and to the Division of Vocational and Extension Education.

7. **Teaching Home Economics in the High School.** Second term. Credit three hours. Should be taken by juniors. Lectures, T Th, 8. Home Economics Building 100. Laboratory, S, 10.30-12. Home Economics Building 200. Acting Professor BINZEL.

This course is particularly concerned with modern methods of education as related to the field of home economics. Problems treated: types and purposes of homemaking courses; the needs and native interests of the high-school girl and the project as one means of meeting these needs; the socialized curriculum; the socialized class hour and assignment; supervised study; the plant and equipment; textbooks; the school lunch; the relation of the home economics department to the school and to the community. A one-day excursion is part of the course.

8a. **Teaching.** First or second term. Credit from two to five hours, amount to be determined by work done. If facilities for teaching become limited only students registered in course 6 will be accepted. Students planning to take this course should arrange with the department during their junior year. Professor STEWART.

This course is designed to give students opportunity for observation and teaching under the guidance of the department.

8b. **Teaching.** First or second term. Credit two to five hours, amount to be determined by work done. Open to students preparing to teach home economics. Students planning to take this course should arrange with the department during the junior year. General conferences, S, 9. Home Economics Building 265. Acting Professor BINZEL.

This course is designed to give students opportunity for observation and teaching under the guidance of the department. A week-end trip for the purpose of studying equipment is a part of the course.

9. **Junior Extension.** Second term. Credit two hours. Must be preceded or accompanied by courses 2 and 4. Lecture, M, 9. Laboratory, M, 2-4.30. Poultry Building 325. Professor WRIGHT and Miss JOHNSON.

This course is designed for those who wish to prepare for local or county leadership in extension work with boys and girls (junior project work). Topics considered are: organization; cooperating agencies; relationship of leader to cooperating agencies; types of projects; enrollment; supervision; demonstrations; exhibits; records; and reports. Field and inspection trips, not to exceed \$10 in cost, will be taken in May.

**10. Educational Measurement.** Second term and alternate third terms. Credit two hours. Given in third term 1922. Open to graduate students only. Second term, F, 2-4; third term, M W, 4.30-6. Caldwell Hall 282. Professor KRUSE and Mr. BAYNE.

The place, the means, the method, and typical results of measurement in education in preparation for intelligent reading of current pedagogical and psychological literature, cooperation in giving tests, conducting of educational experimentation, and development of tests; scales and standards for rural schools; elementary statistical terms and methods. Students whose special problems require quantitative treatment of data will be expected to have this course or its equivalent. Rural school survey work conducted by the department will furnish the specific problems and materials of the course.

**12. Principles of Method.** First term. Credit three hours. Designed for graduate students. Professor STEWART.] Not given in 1922-23.

The purpose of this course is to evaluate the principles of educational method, particularly as they appear in agricultural education. The typical forms of teaching are tested in the light of typical teaching situations. Special attention will be given to the project and the survey as methods of teaching, to the socialized assignment and recitation, to supervision of study, and to similar forms, in the light of modern educational philosophy and current practices.

**14. The Training of Teachers of Agriculture.** First term. Credit three hours. Open to graduate students only. Lectures, M W, 11-12.30. Caldwell Hall 282. Professor EATON.

A course based upon a study of the work of teachers of agricultural vocations in secondary schools. In the light of such study will be discussed: the demands upon the teacher in terms of capacities and abilities; current and ideal standards of qualification in teachers; the aims, admission requirements, course-content, methods, and administrative organization of institutions for the training of teachers of agricultural vocations.

**15. Problems of Training Teachers of Home Economics.** First term. Credit four hours. Open to graduate students only. Lectures, M W F, 10. Laboratory, Th, 2-4.30. Caldwell Hall 143. Acting Professor BINZEL.

This course is designed to meet the needs of persons who have had both technical preparation in home economics and teaching experience, and who desire to prepare for the special problems involved in the professional work of preparing teachers of home economics subjects on a vocational basis. It treats of collegiate and secondary curricula in home economics with reference to the technical preparation of teachers, their professional needs, supervised teaching experience, and the organization and content of the special-method courses in home economics.

**16. Rural Secondary Education.** First term and every third year in the third term. Credit four hours in the first term and three hours in the third



term. Given in the third term of 1922. Designed primarily for graduate students. First term, M W F, 9, and a period to be arranged. Caldwell Hall 282. Third term, daily, 11. Caldwell Hall 100. Assistant Professor FERRISS.

A course to consider some of the more basic problems in the nature, organization, curriculum, and extension of secondary education in its adaptation to rural needs. Among the topics treated are: the functions of rural secondary education; present demands upon the rural secondary school; the junior high school as adapted to rural conditions; the rural senior high school; the problems of curriculum building and subject matter; a comparative study of existing types of curricula and courses of study; prevocational and vocational work; pupil guidance; the rural secondary school and the adult.

[17. **The Rural and Village Principalship.** Second term. Credit two hours. Open to undergraduates by special permission only. Lectures, T Th, 11. Caldwell Hall 143. Assistant Professor FERRISS.] Not given in 1922-23.

A course designed primarily for those preparing to be principals of schools containing both the high school and the elementary grades. Attention is given to the needs of those combining the work of principal and teacher of agriculture. The course deals with such practical problems as: the preliminary organization of the school; the keeping and use of school records; the testing, grading, and promotion of pupils; school government and problems of discipline; direction and control of pupil activities; pupil guidance, and the supervision of pupils' study; aims and methods of supervision; teachers' meetings; measurement of teachers' efficiency; the problems of school exercises; the principal and the community.

18. **Principles of Rural School Administration.** First term. Credit three hours. T Th S, 10. Caldwell Hall 282. Professor BUTTERWORTH.

The purpose of this course is to develop the principles that govern the organization and administration of education in a State, particularly with reference to the rural situation. The chief problems to be considered are: functions of local, state, and intermediate units of school control; an evaluation of different types of local and intermediate units—county, township, district, community; forms of organization for the most effective functioning of each unit; federal leadership; functions of laymen and professional officers; sources of school funds; methods of distributing them; state regulation of school finances; budget making. An application of the principles developed will be made to several fundamental problems.

19. **Administrative Problems of District and County Superintendents.** First term. Credit three hours. M W F, 10. Caldwell Hall 282. Professor BUTTERWORTH.

This course will consider some of the chief problems of the superintendent as the responsible rural-school leader: ideals of such leadership and methods of securing community cooperation in making leadership effective; an evaluation of the legal responsibility and authority of the superintendent; the school plant—measuring it, remodeling old buildings, development of plans for a consolidated school; standard rural schools; problems in the financial support of rural education; consolidation—difficulties, methods, plans for local consolidation surveys; pupil accounting—elimination and retardation in rural schools; evaluation of New York and other free-tuition and compulsory-education state laws; a

system of records for the rural-school administrator; or similar problems according to the needs of the class. Considerable field work in the rural schools near Ithaca will be done in connection with this course.

**20. Administration and Supervision of Vocational Agriculture.** Second term. Credit three hours. Open to graduate students only. Lectures, M W, 11-12.30. Caldwell Hall 282. Professor EATON.

A course designed for persons fitting themselves for state supervision of agricultural education. It treats of: administration and supervision of agricultural education under the Federal Vocational Education Act; state legislation relating to agricultural education; curriculum and course-of-study problems; supervision and comparative study of types of schools. Visits to schools in New York State and to adjacent States are required as a part of the course.

**21. Supervision of Home Economics.** Second term. Credit four hours. Open to graduate students only. Lectures, M W F, 10. Roberts Hall 292. Laboratory, hours to be arranged. Acting Professor BINZEL.

This course is intended for supervisors and for teachers of experience who are preparing for supervisory positions in the field of home economics. The course is concerned with the analysis of the supervisor's job and with methods of supervision. Among the problems presented for study and investigation will be the organization and the administration of homemaking departments; principles underlying the present-day changes in home economics education; principles underlying the organization of courses; evaluation of teaching; improvement of teachers in service; teachers' conferences and study classes.

**22. Educational Psychology.** First term. Credit four hours. Designed for graduate students. Open to other mature students by permission of the instructor. Lectures, T Th S, 11-12.30. Caldwell Hall 282. Professor KRUSE.

The topics treated in this course are similar to those in course 2. The method will be modified to meet the needs of more mature students.

**24. Principles of Teaching and Supervision.** Second term. Credit three hours. Designed for graduate students. T Th S, 9. Caldwell Hall 282. Professor BRIM.

A course intended primarily for those who are going into the field of supervision. It includes the study of the principles of education as these apply to curriculum making, standards of effective teaching, problems of method—(such as the problem of project, questioning, assignments, and supervised study). The function of the supervisor will be considered and the principles that should control his procedure.

**25. Research in Rural Education.** Throughout the year. For graduate students only. Hours to be arranged. Professors WORKS, STEWART, KRUSE, BUTTERWORTH, EATON, and BRIM, Acting Professor BINZEL, and Assistant Professors FERRISS and PALMER.

**26. Seminary.** First and second terms, without credit. Required of graduate students. Hours to be arranged. Caldwell Hall 282. Professors WORKS, STEWART, KRUSE, EATON, and BRIM, Acting Professor BINZEL, and Assistant Professors FERRISS and PALMER.

**[27. Seminary in Rural School Administration.** Second term. Credit two hours. Open to graduate students only. F, 10-12. Professor BUTTERWORTH.] Not given in 1922-23.

Designed for those who wish to make a more intensive study of certain problems of rural school administration than is possible in courses 18 and 19. A specific problem involving research will be required of each student.

**29. Rural Elementary-School Curriculum.** First term. Credit two hours. T Th S, 9. Caldwell Hall 282. Professor BRIM.

This course is designed as a fundamental course for any who are to work with the elementary school. The present tendencies and practices will be studied and evaluated in the light of modern principles. The function of the elementary school, the nature of the curriculum, the organization of school work, the selection of content, and the nature of school activity will be considered.

**30. Preparation of Teachers for Rural Elementary Schools.** Second term. Credit two hours. Hours to be arranged. Caldwell Hall 294. Professor BRIM.

A course designed for those who are in teacher-training work or who are preparing for such work. This course will be devoted to a consideration of the practical problems of the rural teacher as these have been expressed by rural teachers in the fields and by district superintendents. The training course will be examined with a view to discovering means of preparing teachers to meet these difficulties successfully. The following topics are suggested: problems of school organization and management; the daily program; adjustment of courses of study to rural needs and conditions; preparation of the teacher for community leadership; observation of rural schools as a means of preparation.

**35. The Making of Courses of Study in Vocational Agriculture.** First term in alternate years. Given in 1922-23. Credit three hours. Lectures, T Th, 8.30-10. Poultry Building 325. Professor EATON.

The course will consist of problems and discussions of the determination and organization of agricultural content appropriate to regional needs, community needs, and pupils' needs in secondary schools professing vocational objectives in agriculture.

**[45. The Theory of Vocational Education.** Second term, in alternate years. Credit three hours. T Th S, 10. Caldwell Hall 282. Professor EATON.] Not given in 1922-23.

This course will consist of discussions of questions arising under the following general heads: the meaning of vocation; its origin and evolution; conservation and progress in economic society; the function of education in vocation; the criteria of content and method in vocational education; the agencies of vocational education.

**60a. Field Nature Study.** First term. Credit one hour. Field trip Monday afternoon and additional sections if necessary. Forestry Building 16. Professor PALMER and Mrs. HAUSMAN.

This course is designed to meet the needs of rural and other elementary-school teachers, high-school science teachers, camp counsellors and directors, leaders in scout organizations and junior project workers. Instruction is based on field work, and consideration is given to special methods of teaching nature in the field.

**60b. Nature Study.** Second term. Credit three hours. Lecture, W, 12. Forestry Building 16. Practical exercises, M, 2-4.30, and W, 2-4.30. Professor PALMER and Mrs. HAUSMAN.

Laboratory and field practice with those subjects in plant and animal life that

are best fitted for nature study in the elementary schools. Special attention is given to the methods of study, manner of presentation, and relation of the topics to agriculture. A brief history of the nature study movement and a study of present-day practices in nature study are given. The New York State Nature Study Syllabus and the correlation of nature study with other subjects are given consideration.

63. **Science in the Rural Secondary Schools.** Second term. Credit two hours. M W, 10. Forestry Building 16. Professor PALMER.

This course is designed to help high-school science teachers in the organization of their material, to help them to introduce scientific ideas to high-school students, and to point out to teachers useful sources of information and supply.

65. **Conference on Nature Study.** Second term. Credit two hours. Prerequisite, courses 4 and 60b. T Th, 11. Forestry Building 16. Professor PALMER and Mrs. HAUSMAN.

Discussions of graded courses in nature study for public schools of New York and other States. This includes not only a study of what is being done at present, but a consideration of the influence which various writers in prose, poetry, science, education, fiction, and other fields have had on present-day practices.

## RURAL ENGINEERING

For students in agriculture who are not specializing in rural education, courses in shop work are given in the Sibley School of Mechanical Engineering. In forge work, 101, one or more hours may be taken; in wood working, 102, the minimum registration is two hours, and more work may be taken if desired.

[1. **Farm Field Machinery.** First term. Credit three hours. Prerequisite, course 3 and course 51, or reasonable and approved proficiency in drawing. Lectures, M W, 11. Caldwell Hall 100. Practice, W, 2-5. Rural Engineering Building. Professor RILEY, Assistant Professor FAIRBANKS and Mr.——]. Not given in 1922-23.

A study of the principles of operation, the details of construction, and the practical operation and care of those classes of farm field machinery that are of the greatest importance in New York State, the instruction being, however, always of such a nature as to give fundamental training in the study of agricultural implements in general. Laboratory fee, \$2.

2. **Farm Power Machinery.** Second term. Credit three hours. Intended for seniors or juniors and not open to freshmen. Prerequisite, course 3 and course 51, or reasonable and approved proficiency in drawing, and permission to register. Lectures, W F, 8. Caldwell Hall 100. Practice, Th or F, 2-5. Rural Engineering Building. Assistant Professor FAIRBANKS and Mr.——.

A study of multi-cylinder gas engines, electric-light plants, tractors, and tractor plows. Laboratory fee, \$5.

3. **Farm Mechanics.** First or second term. Credit four hours. Intended for sophomores or juniors but open to freshmen. It is recommended but not required that students take course 51 in preparation for this course. Lectures, T Th, 10. One recitation, by appointment. Caldwell Hall 100. Practice, M, T, or W, 2-5. Rural Engineering Building. Work begins with the student's



first exercise, whether recitation, lecture, or laboratory period. Professor RILEY, and assistants.

A course intended to develop ability to think and to reason in terms of mechanical devices, the machines used for this purpose being mowers, binders, single-cylinder gas engines, pumps, water-supply systems, spray machinery, and walking plows. Planned to meet the needs of the general student and to serve as an introduction to further study in mechanics. Laboratory fee, \$2.

[4. **Dairy Mechanics.** First term. Credit two hours. Lecture, W F, 10. Caldwell Hall 143. Practice, F, 2-5. Rural Engineering Building. Professor RILEY, Assistant Professor FAIRBANKS and Mr. ———.] Not given in 1922-23.

A study of the properties of steam and the principles and practice in its generation and use in boilers, engines, pumps, and other appliances, including milk pumps and power separators. The practice work will be devoted to steam boilers, pumps, injectors, piping, valves, soldering, babbitting, power transmission, engines, and cream separators. Laboratory fee, \$3.

10. **Household Mechanics.** Second term. Credit two hours. Intended for students in home economics. Lecture, Th, 12. Caldwell Hall 143. Practice, F, 8-11, or S, 10-1. Rural Engineering Building. Professor ROBB and assistants.

19. **Research in Rural Engineering.** First or second term. Credit one or more hours. Prerequisite, adequate ability and training for the work proposed, and permission to register. Professors and Assistant Professors of the department.

Special work in any branch of rural engineering on problems under investigation by the department or of special interest to the student, provided, in the latter case, that adequate facilities can be obtained.

20. **Farm Engineering.** First or second term. Credit three hours. It is recommended but not required that students have training in mechanical drawing. Lectures, M W, 9. Caldwell Hall 143. Practice, M or T, 2-5. Caldwell Hall 400. Professor ROBB and Assistant Professor McCURDY.

A study of the practical solution of the elementary problems involved in connection with surveying and mapping the farm; leveling for farm drainage; laying out building foundations and water supply. From data obtained in the field a contour map will be drawn of one of the fields near the College. Farm sanitation and sewage disposal are studied. Attention is given to concrete construction, including the design of simple concrete structures and estimates of their cost. Laboratory fee, \$2.

[21. **Drainage.** Second term. Credit two hours. Prerequisite, course 20 and Soils 1, or their equivalent. Lecture, M, 10. Caldwell Hall 143. Practice, Th, 2-5. Caldwell Hall 143 and field. Professor ROBB and Assistant Professor McCURDY.] Not given in 1922-23.

A course covering the principles and practice of drainage. One two-day excursion to drainage projects at some distance from Ithaca will be taken some time in May. Laboratory fee, \$1.

28. **Farm Engineering, Advanced Course.** First term. Credit three hours. Prerequisite, course 20 or its equivalent. Lecture, T, 9. Caldwell Hall 143. Field work, S, 8-1. Assistant Professor McCURDY.

A course in topographic surveying and mapping; leveling, including cross-

section and earthwork computations; a study of the use and adjustments of the better class of levels and the transit.

**30. Farm Structures.** First or second term. Credit three hours. Laboratory periods, M W, 10-11, and three two-hour practice periods by appointment. Caldwell Hall 400. Assistant Professor REYNA. Laboratory fee, 50 cents.

A study of the principles of design, including lighting, ventilation, sanitation, equipment, floor spacing, and construction, for barns, stables, and other farm buildings, and the application of those principles in the drafting room.

**41. Farm Shop Work.** First or second term. Credit three hours. Open only to prospective teachers of high-school agriculture. Lecture, S, 8. Practice, S, 9-1, and one period by appointment. Rural Engineering Building. Assistant Professor ROEHL.

Practice in woodworking, metal repairing, harness repairing, tinsmithing, and ropework, together with a study of the selection, care, and use of tools suitable for the farm shop, and practice in drawing as it applies to shop problems.

**42. Farm Shop Work, Advanced Course.** First or second term. Credit three hours. Prerequisite, course 41 or its equivalent. M F, 11. One shop period, to be arranged. Rural Engineering Building. Assistant Professor ROEHL.

Visits to farms and schools to ascertain farm-shop needs, consideration of different kinds of shop exercises suitable to various types of farming, special emphasis upon advanced shop work for additional knowledge and improved skill.

**51. Mechanical Drawing.** First or second term. Credit three hours. Lectures during laboratory periods. Laboratory, W F, 2-4.30, or Th, 2-4.30, and S, 10.30-1. Two additional practice periods to be arranged to suit the schedule of the student. Caldwell Hall 400. Work will begin with the first laboratory period. Students must consult the department before that period regarding materials required. Assistant Professor REYNA.

A course dealing with the principles and practices involved in the art of conveying information by graphical methods. The work includes use of instruments; lettering; orthographic projection involving plans, elevations, and sections; isometric drawing or conventionalized perspective; and the practical applications of these principles to simple problems. This course may well be taken early in the course of any one interested in taking further work in any phase of rural engineering.

## RURAL SOCIAL ORGANIZATION

**1. The Social Problems of Rural Communities.** First, second, or third term. Credit four hours. Lectures, reports, and discussions, T Th S, 9. First term, Stone Hall 192; second term, Roberts Hall 292. Laboratory and excursions, M, 2-4.30. Animal Husbandry Library. Third term: hours and place to be announced. Professors SANDERSON and ———.

An introductory study of the social problems of rural communities as a basis for the social organization of rural life. Students will make individual studies of selected communities. Laboratory fee, \$1.50.

**2. The Rural Family.** Second term. Credit three hours. Prerequisite, course 1. Lectures, T Th S, 10. Caldwell Hall 282. Professor ———.

This course is introduced by a brief historical survey of the evolution of family life, particularly during the past century, and a study of the differences between family life in the country and in the city. It considers the problems of family life which are most significant in rural communities, and the position of the rural family and the farm home in their relation to other social institutions and forces of rural life.

[3. **The Organization of Agriculture in the United States.** Credit three hours. Professor SANDERSON.] Not given in 1922-23.

A discussion of the organization of the agricultural work of the federal, state, and county governments, and of farmers' organizations.

4. **Rural Leadership.** First term. Credit two hours. Prerequisite, courses 1 and 8, or permission of instructor. W, 2-4. Animal Husbandry Building 31. Professor SANDERSON.

A seminary course for the study of the psychology of rural leadership and the means for discovering and developing local leadership.

5. **The Rural Community.** First or third term. Credit three hours. A seminary course primarily for graduate students. Prerequisite, course 1 and Economics 55a and 55b, or their equivalent. T Th, 2.30-4.30. Animal Husbandry Building 31. Third term, hours to be announced. Professor SANDERSON.

A detailed study of the nature of the rural community; its historical development; a comparative study of types of rural communities; their social psychology and the methods of community development and organization.

8. **The Social Psychology of Rural Life.** Second term. Credit three hours. For advanced students. Prerequisite, permission to register. T Th, 2.30-4.30. Stone Hall 192. Professor ———.

A course to help the student to a better understanding of the forces at work in a rural environment molding the attitudes of mind of rural people. It will open with a brief discussion of some of the general aspects of social psychology. The body of the course will consist of the study of the influences of a rural environment upon the mental development of its inhabitants. Some of the topics considered are: the psychological effects of physical environment and of occupation; class consciousness; local custom and tradition; social habits; social control in rural communities; and behavior of groups.

10. **Field Work.** Throughout the year. Open only to advanced students by special permission. Hours and credit to be arranged. Professor SANDERSON.

15. **Research in Rural Social Organization.** Throughout the year. For graduate students only. Hours and credit to be arranged. Professors SANDERSON and ———.

## VEGETABLE GARDENING

1. **Principles of Vegetable Gardening.** Second term. Credit three hours. Prerequisites, Chemistry 101 and Botany 1; Agronomy 1 should precede or accompany this course. Assignment to laboratory section must be made at time of registration. Lectures, M W, 11. Poultry Building 375. Laboratory, W or F, 2-4.30. Poultry Building, vegetable greenhouses, and East Ithaca gardens. If necessary, an additional section will be arranged, Th, 2-4.30. Assistant Professor SCHNECK.

A general study of the principles of vegetable gardening, giving a comprehensive survey of the industry. This course is intended for the general agricultural student who desires a brief course concerning the subject, and as an introductory course for the student who wishes to specialize in commercial vegetable gardening. Lectures and laboratories consider the history, the economic importance, the cultural requirements, and the marketing, storage, and uses, of the important vegetables. Laboratory fee, \$2.

**2. Special Crops.** Second term. Credit three hours. To be preceded or accompanied by Agronomy I, and Botany I. Lectures, T Th, 11. Laboratory, Th or F, 2-4.30. Poultry Building 350. Assistant Professor HARDENBURG and Mr. ———.

A special study of those crops which are grown in New York State principally as cash crops for the wholesale market, such as potatoes, field beans, field cabbage; and the principal canning crops, namely, tomatoes, sweet corn, garden beans, and peas. About one-half of the term's work is devoted to potatoes. Lectures consider the history, economic importance, classification, culture, marketing, and uses of these crops. Laboratory work devoted chiefly to studies of types and varieties. Laboratory fee, \$2.

**3. Vegetable Forcing.** First term. Credit three hours. Lectures, M W, 9. Poultry Building 325. Practice, S, 8-10.30. If necessary a second section will be arranged, M, 2-4.30. Poultry Building 350 and vegetable greenhouses. Assistant Professor SCHNECK.

Growing vegetables under glass; greenhouses for vegetables; management problems; the greenhouse crops, their requirements and culture. Laboratory work will consist chiefly of practical work in crop production. The class will participate in a required one- or two-day excursion to Rochester, in January, to visit greenhouses; cost, about \$9. Laboratory fee, \$2.

**4. Systematic Vegetable Crops.** Offered in summer term if as many as five students register. Credit two hours. Prerequisite, course I. Lecture, T, 10. Poultry Building 325. Laboratory, T or Th, 2-4:30. Vegetable greenhouses and East Ithaca garden. Professor WORK.

Lectures cover origin, history, characteristics, and adaptation of kinds, varieties, and strains of vegetables. The leading varieties of all vegetables are grown each year, and the laboratory work consists chiefly of field studies of this material. Some attention is given to exhibition and judging. Laboratory fee, \$2.

**5. Vegetable Gardening. Advanced Course.** Second term. Credit two hours. Prerequisite, course 1. Lectures, T Th, 10. Poultry Building 325. Professor H. C. THOMPSON.

This course is intended for students wishing to specialize in vegetable gardening. Lectures are given on the principles of production and handling of vegetables, based largely on experimental evidence. The problems of the market gardener, the truck grower, the muck-land farmer, and the producer of canning crops, are considered. A two-day trip to one or more important commercial-gardening centers will be required; cost of trips, \$10 to \$15.



6. **Research.** Throughout the year. Credit three or more hours a term. For graduate students only. Hours by appointment. Poultry Building. Students will usually be required to remain during at least one summer in order to work out experimental problems. Professors WORK and H. C. THOMPSON and Assistant Professors SCHNECK and HARDENBURG.

7. **Seminary.** First term. Required of graduate students taking either a major or a minor in this department. Time to be arranged. Poultry Building 325. Members of department staff.

### WILD-LIFE CONSERVATION AND GAME FARMING\*

The instruction in wild-life conservation and game farming is intended to afford opportunity for the training essential to those who look forward to taking positions as managers of game preserves, technical assistants to state fish and game commissions, secretaries to sportsmen's clubs and Audubon societies, or assistants to state ornithologists, and to those who hope to find employment with the United States Biological Survey and the Bureau of Fisheries, or to engage in work at zoological gardens and public parks that make a specialty of wild life.

Beginning with the rearing of upland game birds and waterfowl to replace in some measure these rapidly vanishing wild groups, it is expected that this work will be extended to the conservation and care of fur-bearing animals, of aviary birds, of valuable song birds, of wild flowers and useful native shrubbery, and of every wild thing that gives promise of being used for the material or educational betterment of the people. Agriculture has grown by selection and care of the best that nature offers; and this work is initiated in the firm belief that the sources of our benefits in nature are by no means exhausted.

Besides the courses that are required of all regular students (p. 32), those specializing in wild life conservation and game farming are expected to take the courses outlined below and to choose elective courses mainly from contributory fields. These elective courses should be chosen with the approval of the student's faculty adviser, who will ordinarily be a member of the staff of course 1.

1. **The Conservation of Wild Life.** First term. Credit two hours. Lectures T Th, 11. McGraw Hall 5. Professors NEEDHAM, HOSMER, WIEGAND, ADAMS, and EMBODY, Assistant Professors WRIGHT and ALLEN, and cooperating specialists.

This is an introductory lecture course given cooperatively by specialists within and without the College. It is intended to show the relations of the various conservation interests to one another, and to give the student who plans to fit himself for work in game farming, ornithology, fish culture, or other lines of conservation, a general view of the field and a basis for the selection of subsequent elective courses.

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\*The State Legislature having withheld appropriations, all work in this field, except course 1 is suspended.

[2. **Game Farming.** First term. Credit two hours.] Not given in 1922-23.

A lecture course by resident and nonresident specialists. It covers the theory and practice of the various branches of game farming and aims to prepare students for managing game farms, and for teaching and investigation in game farming.

[3. **Game Farming, Laboratory Course.** Second term. Credit one hour. Prerequisite, course 1. Should be preceded by as much ornithology as possible.] Not given in 1922-23.

Studies of species; feeding, incubation, rearing, and breeding methods; anatomy, diseases; game-farm equipment and management. Trips will be made to the Cornell Game Farm and an optional trip will be made to near-by game and fur farms and private estates. Probable cost of trips, \$25.

[4. **Fur Farming.** First term. Credit one hour. Prerequisite course 1 and Zoology 5 or 11. Lectures, practice, and field work. Assistant Professor ALLEN and Mr. LEISTER.] Not given 1922-23.

The identification, care, and management of fur-bearing animals.

[10. **Wild Waterfowl.** Second term. Credit one hour. Must be preceded or accompanied by courses 1 and 2, and Animal Husbandry 1, or Poultry Husbandry 2 or 10. Registration by permission of the department only. Practice, four weeks beginning about April 1, including three daily fifteen-minute periods between 8.45-9.15, 4.30-5, and during the last week, also 12.45-1.15.] Not given in 1922-23.

Practice in the natural hatching, handling, and rearing of a small flock of waterfowl.

[11. **Upland Birds.** Second term. Credit one hour. Must be preceded or accompanied by courses 1, 2, and 10, and Animal Husbandry 1, or Poultry Husbandry 2 or 10. Registration by permission of the department only. Practice, four weeks beginning about May 1, including three daily fifteen-minute periods between 8.45-9.15, 4.30-5, and during the last week, also 12.45-1.15.] Not given in 1922-23.

Practice in artificial hatching, handling, and rearing of a small flock of representative upland game birds, the species depending on the students' experience.

[15. **Research in Game Farming.** Registration by permission.] Not given in 1922-23.

Individual research problems to be undertaken on the game-farm poultry plant, or in the laboratory. There will be meetings to review the work and a thesis must be presented.

## EXTENSION WORK

The extension work of the College of Agriculture is designed to help persons directly on their farms, and to aid those who desire definite instruction but who cannot take a long or a regular course in agriculture at the University. The work supplements the teaching and experimenting of the College. It is professedly a popular work. It endeavors to reach the common problems of the people, to quicken the agricultural occupations, and to inspire a greater interest in country life. It is also a bureau of publicity, whereby there is an exchange of all important matters connected with the progress of the agriculture of the State.

The Office of Farm Bureaus is located on the second floor of Roberts Hall. This office represents the New York State Department of Agriculture, the College of Agriculture, and through the Dean, the State Relations Service in the United States Department of Agriculture, in the administration and supervision of farm-bureau work in New York State. It has general charge of the organization and supervision of farm bureaus and of the cooperative relations of the institutions represented by the bureaus, and receives weekly work reports and monthly financial reports from the different counties. Its equipment consists mainly in files and records of the fifty-five farm bureaus in the State.

### WINTER COURSES

The Winter Courses are eight in number, all opening on November 8, 1922, and closing on February 17, 1923. They are:

- |                       |  |
|-----------------------|--|
| 1. Agriculture.       | [5. Home Economics.] Not given in        |
| 2. Dairy Industry.    | 1922-23.                                 |
| 3. Poultry Husbandry. | 6. Flower Growing.                       |
| 4. Fruit Growing.     | 7. Vegetable Gardening.                  |
|                       | [8. Game Farming.] Not given in 1922-23. |

A special program describing these courses will be sent on application to Robert P. Sibley, Secretary, New York State College of Agriculture, Ithaca, New York.

### SUMMER SCHOOL

The Summer School is a six-weeks summer session beginning early in July. It is designed to meet the needs of teachers, supervisors, superintendents, extension workers, and others concerned with activities of an educational nature.

College students desiring to use the summer for additional study are advised to enter either the summer session in Cornell University or the summer term in agriculture (p. 28).

### COURSES IN OTHER COLLEGES THAT MAY BE OFFERED TO MEET THE SPECIFIC REQUIREMENTS OF REGULAR STUDENTS IN THE COLLEGE OF AGRICULTURE

1. **English. Introductory Course.** First and second terms. Credit three hours a term. Students who have not taken the course in the first term may enter in the second term in sections provided for them. Open only to underclassmen who have satisfied the entrance requirement in English. Sections at the following hours: M W F, 8, 9, 10, 11, 12, 2, or T Th S, 8, 9, 10, 11, 12. Rooms to be announced. Assistant Professor SMITH, and Messrs. BALDWIN, LONG, MANNING SMITH, HOTCHKISS, SANDERS, MARX, NELSON, REEVES, VAN ALLEN, FRENCH, JONES, HALE, LAPE, MITCHEL, GREENE, JOHNSON, BLODGETT, and CARROLL.

A study of composition in connection with the reading of representative works in English literature, including four plays of Shakespeare, two modern novels, selected essays, and poems of Browning and Tennyson.

Students who elect English 1 must apply at Goldwin Smith A on Wednesday, Thursday, Friday, or Saturday of registration week for assignment to sections. Registration in the course is in charge of Professor SMITH.

**101. Introductory Inorganic Chemistry.** First or second term. Credit six hours. Lectures: first term, three sections, M W F, 9, 10, or 11; second term, one section, M W F, 10. Rockefeller A. Recitations, one hour a week, to be arranged. Laboratory, two periods a week; M F, 2-4.30, T Th, 2-4.30, W, 2-4.30, and S, 8-10.30. Professor BROWNE, Mr. MCKINNEY, and assistants.

**1. Elementary Geology.** First or second term. Credit three hours. Lectures, first term, T Th, 11; second term, T Th, 9. Sibley Dome. Laboratory period, M T W Th or F afternoon, or S morning. Students must register for laboratory assignments at elementary geology laboratory, McGraw Hall, before the beginning of the course. Professor RIES, Messrs. BOWEN, BELL, Miss ST. JOHN, and ———.

This course is planned to give beginners the fundamental principles of this branch of science. Those desiring additional work in geology are advised especially to take one or more of courses 1a, 2, 11, 21, and 32.

**2. Elementary Physical Geography.** First and second terms. Credit three hours a term. Lectures, M W, 9. McGraw, Geological Lecture Room. Laboratory, W or Th, 2-4.30. Students must register for laboratory assignments at the physical geography laboratory before the beginning of the course. Professor VON ENGELN and Mr. STUCKEY and Assistant Professor HOWE.

High-school courses are not the equivalent of this course and will not be so considered as a prerequisite for advanced courses. All students are required to go on one all-day excursion to Enfield Gorge and Falls and Connecticut Hill.

**3. Introductory Experimental Physics.** First or second term. Credit six hours. Three lectures, two recitations, and one two-hour laboratory period a week. Lectures, T Th S, 9 or 11. Rockefeller A. Professors MERRITT and GIBBS. Classroom and laboratory work, hours to be arranged. Assistant Professor HOWE, Messrs. FISHER, HOUSMAN, JOLLIFFE, MCCORKLE, MAY, MOON, NORTHROP, NOYES, PIERCE, RICHMOND, WILBER, and WOLFF.

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

**1. General Zoology.** First and second terms. Credit three hours a term. Lectures, section 1, T Th, 9; section 2, T Th, 11. Goldwin Smith B. Laboratory, M T W and F, 2-4.30, F, 9-11.30, or S, 8-10.30. McGraw 2. Registration with the department before instruction begins is necessary for the assignment of laboratory and lecture sections. Professor REED, Assistant Professor YOUNG, and Misses FISHER, MEKEEL, and McMULLEN.

A comprehensive view of the subject, including the fundamentals of animal biology, the principles of structure, function, origin, and perfection of animal life, and a consideration of the generalizations in zoological theory which seem to be the best founded. Animal types and their classification are employed as a service-base from which study may proceed.

**10. Veterinary Physiology.** First or second term. Credit three hours. Lectures, M W F, 10. Veterinary College. Professor FISH.

A course designed for students in agriculture and in veterinary medicine, relating to the physiology of nutrition and secretion in domesticated animals. A brief introduction to the general principles of animal physiology, with specific



and extended discussions of salivary, gastric, pancreatic, and intestinal digestion; the liver, with its specific secretions and functions; the glands of internal secretion and their relation to the vital processes of the body; the circulatory and respiratory processes; physiology of milk secretion. The lectures are illustrated with experiments, lantern slides, and diagrams.

**3. Elementary Human Physiology.** First or second term. Credit three hours. First term, M W F, 10, Professor SIMPSON and assistants. Second term, section A, M W F, 10, Professor SIMPSON and assistants; section B, M W F, 12. Dr. BURLAGE. Stimson Hall. In registering for this course in the second term, students are required to specify the section which they desire to attend.

An introductory course for students of the biological sciences, and for students who expect to teach physiology in secondary schools. The lectures are fully illustrated by experiments, lantern slides, and diagrams.

**51. Elementary Economics.** First or second term. Credit five hours. Daily except S, 8, 9, 10, 11, 12.

Section assignments will be made at Goldwin Smith 260 on registration days. In the first term the registration will be limited to four hundred.

An introduction to economics, including a survey of the principles of value; money, banking, and prices; international trade; protection and free trade; wages and labor conditions; the control of railroads and trusts; socialism; principles and problems of taxation.

**1. Solid Geometry.** First or second term. Credit three hours. First term, T Th S, 10; second term, M W F, 10.

**3. Plane Trigonometry.** First or second term. Credit three hours. First term, M W F, 10; second term, T Th S, 10.

## UNIVERSITY REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE AND RELATED ELECTIVE COURSES

### HYGIENE AND PREVENTIVE MEDICINE

All freshmen and sophomores are required to take lectures in hygiene. These lectures will cover (a) General Hygiene, (b) Individual Hygiene, (c) Group Hygiene, (d) Intergroup Hygiene. The lectures will be given once a week at times and places to be announced.

### MILITARY SCIENCE AND TACTICS, AND PHYSICAL TRAINING

**1. Practical and Theoretical Training.** Throughout the year. Every able-bodied male student a candidate for a baccalaureate degree, who is required to take five, six, seven, eight, or more terms in residence, must take in addition to the scholastic requirements for the degree, one, two, three, or four, terms, respectively, in the Department of Military Science and Tactics. Three hours a week. Two hours on either M T W or Th, 3.15-5.15 p. m. as student may elect; and F, 4.45-5.45 p. m. New York State Drill Hall.

The requirements in Military Science and Tactics must be completed in the first terms of residence; otherwise the student will not be permitted to register again in the University without the consent of the University Faculty.

The course of training is that prescribed by the War Department as basic for units of the Reserve Officers, Training Corps, and includes physical drill, infantry

drill, field artillery, machine gun drill, rifle shooting, personal hygiene, first aid, camp sanitation, signaling, bayonet combat, map reading, military history, construction of intrenchments and obstacles, and the fundamental principles of strategy and tactics to include the detachment and the regiment.

2. **Elective Military Training.** Throughout the year, credit two hours a term. Hours by assignment. New York State Drill Hall.

This is the advanced course prescribed by the War Department for units of the Reserve Officers, Training Corps, and includes three hours each week in the performance of the duty of officer or non-commissioned officer with organizations undergoing the training given under course 1, and two hours each week of theoretical instruction in preparation for such duties. Prerequisite, course 1.

Course 2 may be elected only by permission of the Dean of the College and the Professor of Military Science and Tactics, and at least the first four hours of registration will be counted in the twenty elective hours allowed outside of the College of Agriculture (page 32). To enjoy the benefits offered by the Federal Government the student must agree to continue the course for four terms, and to attend a summer camp having a duration of about six weeks.

1. **Physical Training for Men Excused from Drill (Freshmen).** Throughout the year, three periods a week. Class and squad work and prescribed exercises. Mr. AUER and assistants.

2. **Physical Training for Men Excused from Drill (Sophomores).** Throughout the year, three periods a week. Class and squad work and prescribed exercises. Mr. AUER and assistants.

3. **Physical Training for Men (Juniors and Seniors).** Building-up and corrective exercises as prescribed by the medical examiners as a result of the term's physical examination required of all students in the University. Mr. HUTCHINSON.

4. **Boxing and Wrestling.** Instruction for a small fee at hours to be arranged. Messrs. O'CONNELL and FALLON.

5. **Swimming.** Instruction, M T W Th F, 4-6. Mr. GRAY.

6. **Physical Training for Women (Freshman).** Throughout the year, three periods a week. Misses BATEMAN, CANFIELD, RYAN, READ, and CASHO.

7. **Physical Training for Women (Sophomores).** Throughout the year, three periods a week. Misses BATEMAN, CANFIELD, RYAN, READ, and CASHO.

The work of the two years consists of outdoor games and exercises from the beginning of the year to Thanksgiving, and from the Easter vacation to the end of the year. From Thanksgiving to Easter the work is in large part indoors, and consists of floor exercises, folk and aesthetic dancing, and indoor games, in all of which certain prescribed tests must be met at the end of each period.

For further information as to the required work in physical training, see the handbook issued by the department.

8. **Physical Training for Women (Juniors and Seniors).** Building-up corrective exercises as prescribed by the medical examiners as a result of the term physical examination required of all students in the University. Miss CASHO.

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## CORNELL UNIVERSITY OFFICIAL PUBLICATION

Entered as second-class matter, December 14, 1916, at the post office at Ithaca, New York, under the Act of August 24, 1912.

Issued at Ithaca, New York, twice a month from December to June inclusive, and monthly from July to November inclusive.

This series of pamphlets is designed to give prospective students and other persons information about Cornell University. No charge is made for the pamphlet unless a price is indicated after its name in the list below. Requests for pamphlets should be addressed to the Secretary of the University at Ithaca. *Money orders should be made payable to CORNELL UNIVERSITY.*

The prospective student should have a copy of the  
*General Circular of Information*

and a copy of one or more of the following Announcements:

*Announcement of the College of Arts and Sciences.*

*Announcement of the College of Engineering.*

*Announcement of the College of Law.*

*Announcement of the College of Architecture.*

*Announcement of the New York State College of Agriculture.*

*Announcement of the Winter Courses in the College of Agriculture.*

*Announcement of the Summer Term in Agriculture.*

*Announcement of the New York State Veterinary College.*

*Announcement of the Department of Chemistry.*

*Announcement of the Graduate School.*

*Announcement of the Summer Session.*

*Program of the Annual Farmers' Week.*

*Annual Report of the President.*

Special departmental announcements, a list of prizes, etc.

Other periodicals are these:

*The Register*, published annually in September, and containing, not announcements of courses, but a comprehensive record of the University's organization and work during the last year. Price, 50 cents.

*Guide to the Campus*. Illustrated. Price, 50 cents.

*Directory of the University*. Price, 10 cents.

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