

# CORNELL UNIVERSITY OFFICIAL PUBLICATION

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## NEW YORK STATE COLLEGE OF AGRICULTURE ANNOUNCEMENT 1918-1919

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## INDEX

	Page		Page		Page
Admission .....	23	Farm Crops.....	44	Ornithology .....	43
Regular students.....	23	Farm Management.....	46	Plant Breeding .....	65
Special students .....	24	Farm Practice .....	47	Plant Pathology .....	66
Agricultural Chemistry .	29	Fellowships .....	21	Pomology .....	68
Animal Husbandry.....	30	Floriculture .....	47	Poultry Husbandry ....	69
Biology .....	39	Forestry .....	49	Prizes .....	22
Botany .....	32	Game Breeding.....	78	Required courses.....	27
Citizenship.....	79	Graduated credit.....	28	Rural Economy.....	72
Conservation of Wild Life	78	Home Economics .....	55	Rural Education.....	73
Dairy Industry .....	35	Honor system .....	22	Rural Engineering .....	75
Degree, requirements for	25	Landscape Art.....	60	Scholarships.....	21
Drawing .....	38	Limnology .....	42	Soil Technology.....	77
Entomology.....	39	Meteorology .....	65	Special students .....	24
Equipment of departments	10	Natural History of the		Summer courses .....	80
Expenses .....	19	Farm, The.....	44	Vegetable Gardening...	45
Extension Teaching .....	43	Nature Study .....	74	Winter courses.....	80

## CALENDAR

### First Term, 1918-19

Sept. 27	Friday,	University entrance examinations begin.
Oct. 7	Monday,	Academic year begins. Registration of new students.
		All special students in the College of Agriculture must first present themselves at the office of the Secretary, Roberts Hall, unless permission to register has previously been sent to them by the Registrar.
Oct. 8	Tuesday,	Registration of new students.
Oct. 9	Wednesday,	Registration of old students.
Oct. 10	Thursday,	Instruction begins. President's annual address to the students.
Oct. 12	Saturday,	Registration of graduate students.
Oct. 29	Tuesday,	Last day for payment of tuition.
Nov. 6	Wednesday,	Registration of winter-course students.
Nov. 28	Thursday,	Thanksgiving recess.
Dec. 21	Saturday, 1 p. m.	Instruction ends in regular and winter courses.
Dec. 30	Monday, 1 p. m.	Instruction resumed in regular and winter courses. } Christmas recess.
Feb. 1	Saturday,	Term examinations begin.
Feb. 10-15		Farmers' Week.
Feb. 14	Friday,	Instruction ends in winter courses.

### Second Term, 1918-19

Feb. 11	Tuesday,	Registration of undergraduates.
Feb. 12	Wednesday,	Instruction begins in regular courses.
Feb. 17	Monday,	Registration for winter course in game breeding.
Feb. 18	Tuesday,	Instruction begins in winter course in game breeding.
Mar. 3	Monday,	Last day for payment of tuition.
May 9	Friday,	Instruction ends in winter course in game breeding.
May 12	Monday,	Practice begins on game farm.
May 28	Wednesday,	Instruction ends in regular courses.
May 29	Thursday,	Term examinations begin.
June 9	Monday,	Fifty-first Annual Commencement.

# NEW YORK STATE COLLEGE OF AGRICULTURE

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## STAFF OF INSTRUCTION AND EXTENSION WORK

- Jacob Gould Schurman, A.M., D.Sc., 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.  
Henry Hiram Wing, M.S. in Agr., Professor of Animal Husbandry.  
Thomas Lyttleton Lyon, Ph.D., Professor of Soil Technology.  
John Lemuel Stone, B.Agr., Professor of Farm Practice.  
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.  
Elmer Otterbein Fippin, B.S.A., Extension Professor of Soil Technology.  
George Frederick Warren, Ph.D., Professor of 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., Professor of Entomology and Limnology.  
Rollins 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.  
Edward Gerrard Montgomery, M.A., Professor of Farm Crops.  
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 and Entomologist of the Experiment Station.  
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, B.S., Ph.D., Professor of Botany.  
William Henry Chandler, M.S. in Agr., Ph.D., Professor of Pomology.  
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, M.S.A., Ph.D., Professor of Animal Husbandry.  
Kenneth Carter Livermore, M.S. in Agr., Professor of Farm Management.  
Edward Albert White, B.Sc., Professor of Floriculture.  
Alvin Casey Beal, Ph.D., Professor of Floriculture.  
Herbert Andrew Hopper, B.S.A., M.S., Extension Professor of Animal Husbandry.  
Edward Sewall Guthrie, M.S. in Agr., 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, B.A., Ph.D., Professor of Chemistry in its Relations to Agriculture.  
Oskar Augustus Johannsen, A.M., Ph.D., Professor of General Biology.



Clyde Hadley Myers, Ph.D., Professor of Plant Breeding.  
 Bristow Adams, B.A., Professor, Editor and Chief of Publications.  
 Dick J. Crosby, M.S., Professor in Extension Service.  
 Asa Carlton King, B.S.A., Professor of Farm Practice.  
 Cornelius Betten, Ph.D., Professor, Secretary and Registrar.  
 George Abram Everett, A.B., LL.B., Professor of Extension Teaching.  
 Frederick Llewellyn Griffin, B.S., M.S., Extension Professor of Rural Education.  
 Lewis Knudson, B.S.A., Ph.D., Professor of Botany.  
 E. Gorton Davis, B.S., Professor of Landscape Art.  
 Ralph Wright Curtis, M.S.A., Professor of Landscape Art.  
 Claude Burton Hutchison, M.S. in Agr., Professor of Plant Breeding.  
 Ralph Waldo Rees, A.B., B.S., Extension Professor of Pomology.  
 Jacob Richard Schramm, A.B., Ph.D., Professor of Botany.  
 Harry Oliver Buckman, M.S.A., 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.  
 Paul Work, A.B., M.S. in Agr., Acting Professor of Vegetable Crops.  
 John Bentley, jr., B.S., M.F., Professor of Forest Engineering.  
 Paul J. Kruse, A.B., Ph.D., Professor of Rural Education.  
 Rolland Maclaren Stewart, A.B., Ph.D., Professor of Rural Education.  
 James Ernest Boyle, Ph.D., Extension Professor of Rural Economy.  
 James Chester Bradley, Ph.D., Assistant Professor of Systematic Entomology.  
 George Charles Embury, Ph.D., Assistant Professor of Aquiculture.  
 Mrs. Helen Binkerd Young, B.Arch., Assistant Professor of Home Economics.  
 Mrs. Anna Botsford Comstock, B.S., Assistant Professor of Nature Study.  
 Harry Morton Fitzpatrick, Ph.D., Assistant Professor of Plant Pathology.  
 Byron Burnett Robb, B.S. in Agr., M.S. in Agr., Assistant Professor of Rural Engineering.  
 Walter Warner Fisk, M.S. in Agr., Assistant Professor of Dairy Industry.  
 Annette J. Warner, Assistant Professor of Home Economics.  
 Royal Gilkey, B.S.A., Assistant Professor in Extension Service, and Supervisor of Reading Course for the Farm.  
 Charles Truman Gregory, Ph.D., Assistant Professor of Plant Pathology.  
 Lex Ray Hesler, Ph.D., Assistant Professor of Plant Pathology.  
 William Howard Rankin, Ph.D., Assistant Professor of Plant Pathology.  
 Earl Whitney Benjamin, B.S. in Agr., M.S. in Agr., Ph.D., Assistant Professor of Poultry Husbandry.  
 Arthur Johnson Eames, A.B., A.M., Ph.D., Assistant Professor of Botany.  
 James Kenneth Wilson, B.S., Ph.D., Assistant Professor of Soil Technology.  
 Elmer Eugene Barker, Ph.D., Assistant Professor of Plant Breeding.  
 Edward Mowbray Tuttle, B.S. in Agr., A.B., Assistant Extension Professor of Rural Education.  
 Robert Matheson, M.S. in Agr., Ph.D., Assistant Professor of Economic Entomology and Assistant Entomologist of the Experiment Station.  
 Blanche Evans Hazard, A.B., M.A., Assistant Professor of Home Economics.  
 David Lumsden, Assistant Professor of Floriculture.  
 John Hall Barron, B.S.A., Assistant Extension Professor of Farm Crops.  
 Gad Parker Scoville, B.S. in Agr., Assistant Extension Professor of Farm Management.  
 Arthur Augustus Allen, Ph.D., Assistant Professor of Ornithology.  
 Leonard Amby Maynard, A.B., Ph.D., Assistant Professor of Animal Husbandry.  
 Forest Milo Blodgett, Ph.D., Assistant Extension Professor of Plant Pathology.  
 Howard Edward Babcock, Ph.B., Assistant Professor, and State Leader of County Agents.  
 Edward Riley King, B.S., Assistant Professor of Entomology.  
 Frank Elmore Rice, A.B., Ph.D., Assistant Professor of Chemistry in its Relations to Agriculture.  
 Lester Wayland Sharp, B.S., Ph.D., Assistant Professor of Botany.  
 John Clarence McCurdy, B.S., C.E., Assistant Professor of Rural Engineering.  
 Clarence A. Boutelle, Assistant Extension Professor of Animal Husbandry.



- Charles Howard Royce, M.S.A., Assistant Extension Professor of Animal Husbandry.
- George Harris Collingwood, B.S., A.M., Assistant Extension Professor of Forestry.
- Montgomery Robinson, Litt.B., B.S., Assistant Professor in Extension Service.
- Wesley Worth Warsaw, B.S. in A.E., Assistant Extension Professor of Soil Technology.
- Otis Freeman Curtis, A.B., Ph.D., Assistant Professor of Botany.
- Thomas Joseph McInerney, M.S. in Agr., Assistant Professor of Dairy Industry.
- Eugene Davis Montillon, B.Arch., Assistant Professor of Landscape Art.
- Juan Estevan Reyna, E.E., Assistant Professor of Drawing.
- Leslie Eugene Hazen, B.S. in Agr., M.E., Assistant Professor of Farm Mechanics.
- Earl Long Overholser, B.S.A., M.A., Assistant Professor of Pomology.
- Arthur John Heinicke, B.S.A., M.A., Ph.D., Assistant Professor of Pomology.
- Olney Brown Kent, B.S., Ph.D., Assistant Professor of Poultry Husbandry.
- Henry William Schneck, B.S., M.S.A., Assistant Professor of Vegetable Gardening.
- Karl John Seulke, M.S.A., Ph.D., Assistant Professor of Animal Husbandry.
- Louis Melville Massey, A.B., Ph.D., Assistant Professor of Plant Pathology.
- Ellis Lore Kirkpatrick, B.S.A., Assistant Professor of Vegetable Gardening.
- Beulah Blackmore, B.S., Assistant Professor of Home Economics.
- Bernard Albert Chandler, B.S., M.F., Assistant Professor of Forest Utilization.
- Edward Gardner Misner, B.S., Assistant Professor of Farm Management.
- Mary Frances Henry, A.B., Assistant Professor of Home Economics.
- Sarah Lucile Brewer, B.S., Assistant Professor of Home Economics.
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- John Haring Voorhees, B.S., Assistant Extension Professor of Farm Crops.
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- John Thomas Lloyd, A.B., Instructor in Entomology.
- Earle Volcart Hardenburg, B.S., M.S. in Agr., Instructor in Farm Crops.
- Richard Alan Mordoff, B.S. in Agr., Instructor in Meteorology.
- Oliver Wesley Dynes, B.S., M.S. in Agr., Instructor in Farm Crops.
- James Lewis Strahan, B.S. in Agr., M.S. in Agr., Instructor in Farm Structures.
- Allan Cameron Fraser, B.S., Instructor in Plant Breeding.
- Lua Alice Minns, B.S., Instructor in Floriculture.
- George Cornell Supplee, M.S.A., Instructor in Dairy Industry.
- DeVoe Meade, B.S., Instructor in Animal Husbandry.
- Winfred Enos Ayres, Extension Instructor in Dairy Industry.
- Clark Leonard Thayer, B.Sc., Instructor in Floriculture.
- Ralph Sylvanus Moseley, Extension Instructor in Poultry Husbandry.
- Lewis Merwin Hurd, Extension Instructor in Poultry Husbandry.
- William Irving Myers, B.S., Instructor in Farm Management.
- Albert Reiff Bechtel, B.S., A.M., Instructor in Botany.
- James Marshall Brannon, B.A., M.A., Instructor in Botany.
- Frank Burkett Wann, A.B., Instructor in Botany.
- Clara Louise Garrett, B.S., Instructor in Drawing.
- Clarence Vernon Noble, B.S., Instructor in Farm Management.
- Charles Parsons Clark, B.S., Extension Instructor in Farm Management.
- Anna Jane Hancy, A.B., M.A., Instructor in Botany.
- Walter Gernet Krum, Extension Instructor in Poultry Husbandry.
- Howard Campbell Jackson, B.S., Instructor in Dairy Industry.
- Julia Gleason, Instructor in Home Economics.
- Winifred Moses, B.S., Instructor in Home Economics.
- Gustave Frederick Heuser, B.S., M.S. in Agr., Instructor in Poultry Husbandry.
- Edwina Maria Smiley, A.B., Instructor in Plant Pathology.
- George Clayton Dutton, Extension Instructor in Dairy Industry.

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 Peter Walter Claassen, M.A., Instructor in Biology.  
 Roy Glen Wiggans, B.S.A., M.S.A., Instructor in Farm Crops.  
 Marshall Evarts Farnham, B.S., Instructor in Floriculture.  
 Frank Pores Bussell, B.A., Extension Instructor in Plant Breeding.  
 Roy Lewis Gillett, B.S., Instructor in Farm Management.  
 Mrs. Jessie Austin Boys, B.S., Instructor in Home Economics.  
 Charles Chupp, A.B., Ph.D., Extension Instructor in Plant Pathology.  
 Benjamin Dunbar Wilson, M.S., Instructor and Analyst in Soil Technology.  
 Gertrude Elizabeth Douglas, A.B., A.M., Ph.D., Instructor in Botany.  
 John Phineus Benson, B.S., Instructor in Botany.  
 Ralph Simpson Nanz, B.S., Instructor in Botany.  
 Harry Earl Bremer, B.S., Instructor in Dairy Industry.  
 Gladys Elizabeth Smith, B.S., Instructor in Home Economics.  
 Paul Berwig Schumm, M.L.D., Instructor in Landscape Art.  
 Frances Remington Kelley, B.A., Instructor in Home Economics.  
 Nancy Hill McNeal, Ph.B., Extension Instructor in Home Economics.  
 Walter Sprague Frost, B.S., Extension Instructor in Agricultural Chemistry.  
 Victor Ferdinand Tapke, B.S., Extension Instructor in Plant Pathology.  
 Joseph Pullman Porter, B.S., Extension Instructor in Landscape Art.  
 Lawrence Paul Wehrle, B.S., M.S., Extension Instructor in Entomology.  
 Robert Bier, B.S., Extension Instructor in Vegetable Crops.  
 Ernest Charles Young, B.S., Instructor in Farm Management.  
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 Jean Paul Griffith, B.S., Instructor in Vegetable Crops.  
 Charles Loring Allen, B.A., Instructor in Animal Husbandry.  
 George Haines, B.S., Instructor in Animal Husbandry.  
 Ralph Waldo Emerson Cowan, B.S., Instructor in Dairy Industry.  
 Walter Housley Wellhouse, M.A., Instructor in Entomology.  
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 John Hallock Bromley, B.S., Soil Surveyor.  
 Roy A. Olney, B.S., Critic Teacher in Rural Education.  
 Joseph Brackin Kirkland, B.S., Instructor in Farm Practice.  
 John Churchill Maddy, B.S., Instructor in Animal Husbandry.  
 J. Norma Anderson, B.S., Instructor in Plant Pathology.  
 Erford Lynn Banner, B.S., Instructor in Poultry Husbandry.  
 Wayland Patterson Frost, B.S., Extension Instructor in Animal Husbandry.  
 Harold Eugene Botsford, B.S., Extension Instructor in Poultry Husbandry.  
 Mary Godiva Ingersoll, Supervisor of Shop Work in Home Economics.  
 Louis Michael Roehl, Supervisor of Farm Shop Work.  
 Emmons William Leland, B.S.A., Superintendent of Field Experiments in Soil Technology.  
 Charles Edward Hunn, Assistant in Plant Propagation.  
 William Thomas Craig, Assistant in Plant Breeding Investigations.  
 Ernest Gustaf Anderson, B.Sc., Assistant in Plant Breeding.  
 Mrs. Edith Fleming Bradford, B.S., Assistant in Home Economics.  
 Rodney Wesson Pease, Assistant in Extension Service.  
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 Raymond Arnold Perry, B.S., Assistant in Dairy Industry.  
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 John D. Detweiler, B.A., M.A., Assistant in Entomology.  
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 Emily Eveleth, B.S., Assistant in Entomology.

Jay R. Traver, A.B., Assistant in Entomology.  
Katharine Glover, Special Extension Assistant in Home Economics.  
Dane Lewis Baldwin, A.B., M.A., Secretary to Dean and Director.  
Olin Whitney Smith, B.S., Assistant Registrar.  
Clara Frances Sykes, A.B., B.S., Secretary of the Department of Home Economics.  
Willard Waldo Ellis, A.B., LL.B., Librarian.  
George Wilson Parker, Executive Assistant.



## THE NEW YORK STATE COLLEGE OF AGRICULTURE

Cornell University is composed of eight 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 appropriations to supplement 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 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 economic and social status of agriculture, lectures, publications 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."

### 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 administration and classroom building, an agronomy building, and a dairy building, the three being connected by covered loggias. 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, and a classroom building and stock judging pavilion 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, and an addition to the cafeteria in the Home Economics Building have been completed, and a heating plant has been installed.

Other buildings included in the present equipment are a frame building that temporarily houses the Department of Rural Engineering, an insectary, a biologi-

cal station in the marsh at the south end of Cayuga Lake, a fish breeding house in Cascadilla Creek, a seed storage house, and other small buildings on the farms.

**The farms.** The College of Agriculture has 933 acres of land, and it rents 195 acres additional, 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, and 39 are retained for other uses.

Of the tillable area, 45 acres have been laid out in permanent experiment plots for the use of the Departments of Soil Technology 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 breeding and wild life conservation, in 1917 New York State established a state game farm in Tompkins County as part of the New York State College of Agriculture and under the control of the Board of Trustees of Cornell University. It is administered as part of the Department of Poultry Husbandry, and there is cooperation with the New York State Conservation Commission. The farm comprises about one hundred and seventy acres of land well adapted to game breeding and equipped with barns and a dwelling house. It lies east of and adjacent to the present university farm, and is within easy walking distance of the College. It has been stocked with pheasants and other game birds, largely through donations of breeding stock. The American Game Protective Association has given, in addition to breeding stock, a considerable number of breeding coops and pens.

Breeding of ring-necked pheasants and mallard ducks will be carried on during the first season the farm is operated, and in succeeding years the work will be gradually enlarged to include other species of useful game birds, fishes, and other animals. Game breeding as a farm enterprise will be studied, and students will be afforded ample opportunity to engage in practical game breeding on this farm. Experimental work in the breeding and rearing of game is an important part of the enterprise.



### 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 30,000 volumes; the Agricultural College Library in the basement of the Agronomy Building, with a working and a reference collection of approximately 8000 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 300 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 50,000 volumes are available for the instructing staff and the students of the College of Agriculture—including the Craig library and the duplicates carried by the various laboratories—all of which, except the Craig and laboratory collections, are regularly cataloged at the University Library and are under its general rules and supervision. The Agricultural College Library and the Entomological Library are practically branches of the University Library and enjoy the services of its purchasing and cataloging departments.

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 nearly three 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 Saturdays, when it is closed at one o'clock in the afternoon.

### FACILITIES AND EQUIPMENT OF THE DEPARTMENTS

#### Agricultural Chemistry

The chemical laboratory in which instruction in agricultural chemistry was given was destroyed by fire on February 13, 1916. Ample facilities are temporarily provided in other buildings in the University.



### Animal Husbandry

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

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

The College maintains an imported Percheron stallion and a pure-bred Hackney stallion. Eight pure-bred 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.

About ten brood sows of the Cheshire breed, "the New York Farmer's Hog," are kept to utilize waste dairy products and to illustrate a profitable early maturing butcher's hog of a semi-bacon type.

2. **Herd books and flock books.** The library of herd books and flock books is large, comprising more than 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 size, 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 field of plant response and behavior.

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

### **Dairy Industry**

The Department of Dairy Industry occupies the building east of Roberts Hall and is 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. The manufacturing rooms are thoroughly sanitary, fully equipped, and well adapted for instruction and for commercial work. Sufficient amounts of the different products are handled to give satisfactory laboratory practice.

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. These suits may be bought by the student, or they may be rented from the Department at fifty cents a term. Lockers for these suits, as well as for equipment used by individual students in the laboratories, are provided without charge.

### **Drawing**

The drafting rooms and office of the Department of Drawing occupy the third floor of the Dairy Building. Skylights in the roof furnish abundant light, and the quarters are very satisfactory for the study of drawing.

There are two drafting rooms. The one for mechanical drawing is equipped with thirty specially designed desks, each holding the materials of two students, thus providing accommodations for a total of sixty students. For instruction in this subject there is a small collection of simple machine parts, wooden models, and demonstration apparatus. The free-hand drawing room is equipped with thirty-five Cleaves drawing desks. For study there are provided a number of casts, copies of classic sculpture, artificial plant forms, and a collection of insects, shells, skulls, and stuffed birds and animals, together with a series of reproductions, in color and in black and white, of good examples of graphic art; the aim being to develop the student's appreciation of good art as well as to teach him how to draw.

### **Entomology**

The Department of Entomology, Limnology, and Ornithology occupies 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, unrivalled facilities are afforded by the field laboratory, located in the midst of the Renwick marshes and provided with breeding cages, running water, and aquaria; and by a hatching station on the university grounds in the gorge of 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 a room on the second floor of the Dairy Building. The offices of the Cornell Reading Course for the Farm are in the basement of Roberts Hall.

### **Farm Crops**

Instruction in farm crops is given by means of lectures, recitations, and field and indoor laboratory work. The Department is provided with a lecture room and a large, well-lighted laboratory. 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 equipment of the Division 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.

### **Farm Management**

In the Farm Management Building are two laboratories, and rooms for research work.

### **Farm Practice**

The Department of Farm Practice is located on the first floor of the Agronomy Building. This Department 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 may 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 Department in assisting students to obtain places for farm work.

To those students entering with little or no farm experience the Department 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

The equipment of the Department of Floriculture 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 the experimental areas in the field.

1. **Classrooms and laboratories.** Lectures are given on the second floor of the Floriculture Building. The lecture room is provided with a stereopticon, and has a seating capacity of seventy-five persons. On this floor are also 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 administrative rooms, on the second floor of Roberts Hall, consist of four offices and a filing room. Large display cases in the corridor are filled with floricultural implements and appliances.

2. **Forcing houses and gardens.** The greenhouses, completed in 1915, 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 equipment is used by all the classes in floriculture and affords space for advanced and graduate students investigating special problems.

The Department has been assigned twenty acres of land for its large collection of 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 ordinary equipment, the garden herbarium, with more than twelve thousand sheets, is an important aid in the study of plant variation. There is also a good collection of negatives showing the growth of flowers, which is being added to continually and which furnishes a bountiful source for lantern slides illustrating recent methods in the management and construction of forcing houses and the growing of flowers in the field and under glass. The Department has a collection of five hundred lantern slides, to which additions are constantly being made.

### Forestry

The Department of Forestry occupies two and one-half floors in the Forestry Building, which was recently built and equipped by the State 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. One floor and one-half of another floor are being occupied

temporarily by the Department of Plant Breeding, but the entire building is planned for the Department of Forestry and is to be used exclusively by that Department as soon as a Plant Industry Building is provided. 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. 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 over fourteen hundred bound volumes, including extensive files of forestry periodicals, is included in the University Library. There is an excellent collection of forestry instruments.

### Home Economics

The Department of Home Economics moved into its new and well-equipped building in February, 1913. In the basement of the building is a cafeteria, with kitchens and laundry. 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 Department, public lectures, and social functions of the College and of the Department. Opposite the assembly room are a large family kitchen and a dining room for serving. At both ends of the hall are thoroughly equipped food laboratories for teaching the principles of food preparation and nutrition. The third floor is devoted to sewing laboratories. At the east end of the hall on this floor are a chemistry laboratory, not yet equipped, and offices which have been given over to the temporary use of the Department of Rural Economy. On the fourth floor are taught house planning and house furnishing, for which there is provided a large drafting room, well lighted by means of a skylight. In front of the drafting room is a loggia. At the west end of this floor is the household-management laboratory; at the east end, the recreation room for students.

The Home Economics Lodge, west of the Home Economics Building, is a small house which has been reconstructed and redecorated, in which students of the Department, together with an instructor, keep house. The principles of food preparation, household management, and house furnishing are taught here in a practical way.

The Department has a good equipment of reference books, lantern slides, illustrative material, and labor-saving devices.

### Landscape Art

The Department of Landscape Art occupies its own building, a frame structure remodeled and enlarged for its use. On the first floor are the departmental offices, and a lecture room equipped with stereopticon lantern and having a seating capacity of seventy persons. The second floor is devoted to a single large drafting room, approximately twenty-five by sixty feet in size. In addition



to providing accommodation for about thirty-five students in design and other drafting courses, this room has a section devoted to the work of making plans for the college campus. In the basement—which is well lighted, owing to its hillside location—are the departmental library, and a large exhibition room used for the hanging and judging of student problems in design and other courses, and for the occasional placing of special exhibitions.

The equipment of the Department, in addition to providing the usual and needed materials and facilities for teaching, includes a constantly increasing collection of lantern slides, which now numbers about four thousand. An herbarium, included as a part of the library, is also being increased in its number of specimens.

### **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, in addition to general works on meteorology contains many publications bearing on the climate of various parts of the United States and of many foreign countries, is open to students.

### **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 and seminary room 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. An herbarium of variations is being built up. 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 large 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 outfit, microtomes, incubators, sterilizers, ovens, reagents, and so forth, for teaching



and investigation. An extensive collection of prepared slides and of photographs is available to students. There is also a growing collection and museum of pathological specimens, and a departmental 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 English walnuts. 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.

Two old orchards operated by the Department furnish fruit for variety studies and packing. Each year a large assortment of fruit from various parts of this State and other States, which is used for purposes of instruction, is brought together at the College. The Department is supplied with all necessary packing tables and other orchard equipment and tools.

### **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 have been erected north of the Poultry Building, in order to 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, ducks, and geese. These houses include a pipe-system brooder house, thirty-four New York State gasoline-heated colony brooder houses, and summer houses for rearing five thousand or more chickens annually.

### **Rural Economy**

The Department of Rural Economy is located on the third floor, east end, of the Home Economics Building. The equipment includes a large room for elementary work, a smaller room for advanced work, much statistical and historical data, original as well as printed, and a series of representative calculating machines.

### **Rural Engineering**

The Department of Rural Engineering is housed in the Rural Engineering Building, a temporary one-story structure forty by ninety-six feet in area, which provides laboratory space for the work in farm mechanics, stock room, and offices. Drafting room space for the work in farm structures and the indoor work in farm engineering is provided in Caldwell Hall.

Equipment for the work in farm mechanics includes gasoline and kerosene engines, steam machinery, an electric-light plant, pumps, hydraulic rams, water supply systems, plows, mowers, grain binders, separate binder attachments, and other implements and tools; together with a recording traction dynamometer for draft tests, and the sprayograph, a machine devised by the Department for testing spray nozzles. For the work in farm engineering, the equipment includes twelve farm levels for elementary class work, and five levels and transits of precision for the use of advanced students and members of the staff in extension work in irrigation, drainage, and sanitary engineering throughout the State. Equipment for class work in farm structures includes three models of plank frame barns, to which there will soon be added a set of models illustrating the classification and development of barn frame trusses.

### **Soil Technology**

The Department of Soil Technology is housed in Caldwell Hall, a new 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 amount and effect of organic matter, and other important physical and chemical relations. Each student has the use of a desk and a locker containing a stock equipment.

The mechanical 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 of use 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.



**EXPENSES, FELLOWSHIPS, SCHOLARSHIPS, AND PRIZES**

Tuition is free to students pursuing full, special, and short courses in the College of Agriculture 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. No student shall be allowed to transfer from any such course to another course where tuition is charged without first paying the regular tuition fees for the hours for which he may receive credit in the latter course.

Tuition is free to graduate students for work in the State College of Agriculture. For each Graduate School minor subject taken outside the College of Agriculture, when the major subject is taken in the College of Agriculture, one-sixth of the regular tuition rate will be charged.

Members of the instructing staff registered in the Graduate School and having their major subject in the college or line of work in which they are instructing, or already having a degree and registered for work leading to the first degree in the college in which they are instructing, shall be exempt from the payment of tuition, 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 taking work for which they are not entitled to free tuition shall be charged tuition in proportion to the amount of work for which they are registered.

The annual tuition fee\* of undergraduate students from outside the State is \$150 for the first and second terms. The tuition charge for the third, or summer, term is \$75. Students upon registering become liable for the tuition fee for the term. The tuition fee is payable in installments of \$85 at the beginning of the first term and \$65 at the beginning of the second term.

A matriculation fee of \$5 is charged all students on entering the University.

Every student is charged an infirmary fee of \$3 a term, payable at the beginning of each term. Students in the winter courses in agriculture are required to pay the infirmary fee for one term. In return for the infirmary fee, any student who is ill, is on his physician's certificate admitted to the Infirmary, 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 refused 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. Students in the University Summer Session and in the Summer School in Agriculture have all the privileges of admission to the Infirmary. They pay no fee in advance, but are liable for regular charges for services rendered.

Each male undergraduate student registered in the University shall be charged a locker fee of \$2 per term, which fee shall cover the use of a locker in the university gymnasiums, or in the State Drill Hall, or in Schoellkopf Memorial Building, with the use of bathing facilities and towels therein and the use of the Cornell University gymnasium and playgrounds.

A graduation fee of \$10 is required of each person taking a first, or undergraduate, degree, and one of \$20 of each person taking an advanced degree. When

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\*All tuition and other fees may be changed or increased by the Trustees to take effect at any time without previous notice.



the degree is to be conferred at Commencement, this fee must be paid at least ten days prior to Commencement Day. When the degree is to be conferred at another time than Commencement (September or February), the graduation fee must be paid at least ten days prior to the date on which it is to be conferred. The amount paid will be refunded should the degree not be conferred.

Every person taking laboratory work or courses in which a fee is charged must pay to the Treasurer the required fee or the required deposit for the materials and the like to be used in the work; inquiry concerning these should be made before registration. Students are liable to a special charge for breakage or damage resulting from their own carelessness. Attention is called to the expenses of excursions required in various courses.

A student desiring to be reinstated after having been dropped from the University for delinquency in scholarship or 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.

A student desiring to file his registration of studies after the date set by his college for filing the same shall 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 having been absent without excuse from his Dean from any class or exercise occurring during the two days immediately preceding or immediately following the Thanksgiving, the Christmas, or the Easter recess, shall pay a fee of \$5 for each day on which an absence occurred.

All students in the University are held responsible for any injury done by them to its property.

A student who fails to pay his indebtedness to the University within twenty days after the last registration day for the term, unless granted by the Treasurer an extension for good cause, is thereby dropped from the University.

The expense for textbooks, instruments, and other necessary articles varies from \$10 to \$75 a year.

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.

### Residential Halls

The University has five residential halls for men students situated on the campus and furnishing accommodations for about 420 men. For particulars address the University Treasurer, Ithaca, New York. There are also many private boarding and rooming houses near the university campus. In these the cost of board and furnished room, with heat and light, varies from \$6 to \$12 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 in Sibley, and one is maintained 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 rooming houses. 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 engage room and board before the opening of the academic year. The Freshman Advisory Committee offers its assistance to new students in the selection of rooming 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 \$350 for the year 1918-19. Owing to the unsettled condition of prices for food and labor the University reserves the right to increase this charge during the year, if in its opinion such increase is necessary. The halls are heated by steam and lighted by electricity. The University Adviser 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 Adviser and subject to her direction. Prospective women students should write to the Adviser 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, New York.

### **Scholarships and Fellowships in Agriculture**

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.

Eighteen University Undergraduate Scholarships, continuing for two years and of an annual value of \$200 each, are offered each year to members of the incoming freshman class. The award is made on the basis of a special competitive examination held in Ithaca beginning October 7, 1918. For a full description of these scholarships and examinations, see the General Circular of Information, which may be obtained from the Secretary of Cornell University.

Special attention is called to the State Scholarships established by the Legislature of 1913. Under the terms of the law, five State Scholarships shall be awarded annually to each county for each assembly district therein. Such scholarships shall entitle the holder thereof to the sum of one hundred dollars annually during a period of four years when he is in attendance at an approved college in this State. The holder may use the money to meet expenses incurred in his college



course. Regulations governing the award of these scholarships may be obtained from the University of the State of New York, Albany, New York.

A graduate fellowship is awarded annually in Agriculture. 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, and the like, who 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.

### **The Eastman Prize 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 an annual prize of \$100 for public speaking on country-life subjects in the College of Agriculture. This prize is designated as the Eastman Prize for Public Speaking. Competition is open to any regular or special student. The contest takes place in February.

### **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 Dairy Industry, course 6, soon after the course opens in February.

## **HONOR SYSTEM**

With the consent of the faculty, examinations for agricultural students are conducted under the honor system, which is administered by a Committee on Student Honor. New students are given an opportunity to become thoroughly acquainted with the regulations of the system. The regulations are printed in the Handbook of Information for students in the College of Agriculture, copies of which are available at the Secretary's office.

## **GENERAL INFORMATION CONCERNING COURSES**

The regular instruction in the College of Agriculture constitutes a 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 28). There is a Summer School in Agriculture, six weeks in length, designed especially for teachers, school principals and superintendents, and college students. Aside from these there are winter courses, not leading to credits in the University, and opportunities for students to pursue special work. Circulars describing the winter courses and the summer school may be 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 until late September. It is coordinate with the present fall and spring terms. It is open only to students who have completed the required work of the freshman and sophomore years 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 others 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 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 25 and 47).*

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

### Entrance Requirements 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 . . . . .	(1 ½)	5a. First Year French . . . . .	(1)
1b. English No. 2 . . . . .	(1 ½)	5b. Second Year French . . . . .	(1)
2a. First Year Greek . . . . .	(1)	5c. Third Year French . . . . .	(1)
2b. Second Year Greek . . . . .	(1)	6a. First Year Spanish . . . . .	(1)
2c. Third Year Greek . . . . .	(1)	6b. Second Year Spanish . . . . .	(1)
3a. First Year Latin . . . . .	(1)	6c. Third Year Spanish . . . . .	(1)
3b. Second Year Latin . . . . .	(1)	7a. First Year Italian . . . . .	(1)
3c. Third Year Latin . . . . .	(1)	7b. Second Year Italian . . . . .	(1)
3d. Fourth Year Latin . . . . .	(1)	7c. Third Year Italian . . . . .	(1)
4a. First Year German . . . . .	(1)	8a. Ancient History . . . . .	(½-1)
4b. Second Year German . . . . .	(1)	8b. Modern and Medieval His-	
4c. Third Year German . . . . .	(1)	tory . . . . .	(½-1)

8c. American History, Civics . . . . .	( $\frac{1}{2}$ -1)	12. Physical Geography . . . . .	( $\frac{1}{2}$ -1)
8d. English History . . . . .	( $\frac{1}{2}$ -1)	13. Biology* . . . . .	(1)
9a. Elementary Algebra . . . . .	(1)	14. Botany* . . . . .	( $\frac{1}{2}$ -1)
9b. Intermediate Algebra . . . . .	( $\frac{1}{2}$ )	14a. Zoology* . . . . .	( $\frac{1}{2}$ -1)
9c. Advanced Algebra . . . . .	( $\frac{1}{2}$ )	15. Bookkeeping** . . . . .	( $\frac{1}{2}$ -1)
9d. Plane Geometry . . . . .	(1)	16. Agriculture (including home economics)** . . . . .	( $\frac{1}{2}$ -4)
9e. Solid Geometry . . . . .	( $\frac{1}{2}$ )	17. Drawing . . . . .	( $\frac{1}{2}$ -1)
9f. Plane Trigonometry . . . . .	( $\frac{1}{2}$ )	18. Manual Training . . . . .	(1)
9g. Spherical Trigonometry . . . . .	( $\frac{1}{2}$ )	19. Any high school subject or subjects not already used	( $\frac{1}{2}$ -1)
10. Physics . . . . .	(1)		
11. Chemistry . . . . .	(1)		

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

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

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

### 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.

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

### Other Details of Admission

For other details as to subjects and methods of admission, see the General Circular of Information, which may be obtained on application to the Secretary of Cornell University, Ithaca, New York.

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

\*\*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.



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

For admission as a special student, communications should be addressed to the Secretary of the College of Agriculture, and attention is called to the paragraphs on pages 28 and 29 of the General Circular of Information.

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

### **Requirements for the Degree of Bachelor of Science**

The requirements for the degree of bachelor of science are residence for eight terms, and, in addition to the prescribed work in the Departments of Physical Training and Military Science and Tactics, the completion of one hundred and twenty hours of required and elective work as outlined on pages 26-28.

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, orcharding, gardening, machinery, and the like, as they are found on a general farm. Exemption from this requirement is allowed only to students specializing in the Departments of Botany, Home Economics, Forestry, Entomology, or Landscape Art. 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.

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 in no case later than September 27, 1918, 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 27 to October 3, 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 afterward 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 seven hours.

A student admitted to the College of Agriculture from another college in Cornell University, or from any other institution of collegiate rank, will be regarded as having completed the number of terms and hours to which his records entitle him, and will receive all the privileges of students who have completed the same number of terms and hours by residence in the College. In order, however, to 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 for those admitted before September, 1917**

Freshman year	Number of course	Hours 1st term	Hours 2d term
English .....	1....	4....	4
Chemistry .....	1....	6....	—
Chemistry .....	85 or 6..	—....	4 or 5
Biology .....	1....	3....	3
Physics** .....	2....	—....	5
The Natural History of the Farm.....	1....	2....	—
Electives†.....	....	0-3..	4-7
Total .....		15-18	15-18
Sophomore year	Number of course	Hours 1st term	Hours 2d term
Geology‡ .....	1....	3....	—
Chemistry .....	85....	—....	4
Physiology, one of the following:			
Physiology of Domestic Animals.....	10...	3....	—
Human Physiology.....	3....	—....	3
Plant Physiology.....	20 or 21...	—....	4-5

\*The required courses given in other colleges than Agriculture are announced on pages 80-82.  
\*\*May be taken in second term of sophomore year.  
‡Professional students in forestry who do not offer solid geometry and plane trigonometry for entrance are required to take these subjects in their freshman year.  
†Optional for students taking a major in home economics.

Sophomore year (continued)		Number of course	Hours 1st term	Hours 2d term
Botany	}	1....	6....	—
or				
Zoology	}	1....	5....	—
Electives		....	7-10....	6-11
Total.....			15-18	15-18

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

Political Science 51 may be taken this year.

Junior year		Number of course	Hours 1st term	Hours 2d term
Political Science.....		51....	3....	3

### Required courses for those admitted September, 1917, and later

Freshman year		Number of course	Hours 1st term	Hours 2d term
English .....		1....	3....	3
Chemistry .....		1....	6....	—
Biology* .....		1....	—....	3
Zoology .....		1....	3....	3
Botany .....		1....	3....	3
The Natural History of the Farm.....		1....	1 or	1
Electives .....		....	0-2..	2-5
Total.....			16-18	15-18

Sophomore year		Number of course	Hours 1st term	Hours 2d term
Geology† .....		1....	3....	—
Physics .....		2....	—....	5
Physiology, one of the following:				
Physiology of Domestic Animals .....		10....	3....	—
Human Physiology.....		3....	—..	3
Plant Physiology.....		20....	4 or	4
At least five hours in the following subjects:				
Chemistry .....		....	....	
Mathematics .....		....	....	
Bacteriology .....		....	....	

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

Political Science 51 may be taken this year.

Junior year		Number of course	Hours 1st term	Hours 2d term
Political Science .....		51....	3....	3

\*May be taken in sophomore year by students who have a major in home economics.

†Optional for students taking a major in home economics.

### Elective Courses

The remainder of the work—seventy 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 advice and approval of a professor or an assistant professor 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 recommended to consult the Professor of Rural Education as well as their Faculty Adviser before filing their term schedules.

### GRADUATED CREDIT

Beginning with the first term of 1916-17 the passing grades are designated A, B, C, D, and P. Beginning with the class of 1920 students receiving grade C are to 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

A regular student may be registered in both the College of Agriculture and the New York State Veterinary College with the following restrictions:

1. Completion of all the required work of his course.
2. Credit of ninety hours, none of which is in the Veterinary College.
3. Permission of both the faculties concerned.

Such a student may be recommended for his degree in the College of Agriculture when he has met the following requirements:

1. Completed thirty hours of which not less than twelve shall be taught in the New York State College of Agriculture.
2. Has met both the group and agricultural elective requirements of the College of Agriculture.

On completion of the remaining three years if he meets the requirements of the State Veterinary College, he will receive the degree of doctor of veterinary medicine.



## DEPARTMENTS OF INSTRUCTION

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

#### ELECTIVE COURSES OPEN TO FRESHMEN

Dairy Industry 1, 2, 3, 6, 14; Drawing 1, 2; Floriculture 9; Forestry 1, 2, 3; Landscape Art 2, 3, 13; Home Economics 2; Meteorology 1; Nature Study 61; Poultry Husbandry 1, 3, 3a, 10; Rural Economy 1; Rural Engineering 3, 4, 20, 30; Farm Crops 11.

#### SPECIAL NOTICE

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

Unless otherwise noted, all courses are given in the buildings of the College of Agriculture. Courses enclosed in brackets will not be given in 1918-19.

#### AGRICULTURAL CHEMISTRY

83. **Agricultural Organic Chemistry.** First term, credit three hours. Prerequisite Chemistry 1. Lectures, M W F, 12. Caldwell Hall 100. Professor CROSS.

84. **Agricultural Organic Chemistry, Laboratory Course.** First term, credit two hours. Prerequisite Chemistry 6. T Th, 2-4.30. Caldwell Hall 250. Assistant Professor RICE and ———.

This course is designed to accompany course 83.

85. **Agricultural Chemistry.** Second term, credit three hours. Prerequisite course 83. Lectures, T Th S, 12. Morse Hall 18. Professor CAVANAUGH.

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

85a. **Agricultural Chemistry, Laboratory Course.** Second term, credit two hours. Prerequisite Chemistry 6 and 84. T Th, 2-4.30. Caldwell Hall 250. Assistant Professor RICE and ———.

This course is designed to accompany course 85. Students expecting to take further work in chemistry should take one hour of Chemistry 93 in addition.

86. **Agricultural Chemistry, Advanced Course.** First term, credit three hours. Prerequisite course 85a. Lectures, M T W, 10. Caldwell Hall 143. Professor CAVANAUGH.

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

87. **Agricultural Chemistry, Laboratory Course.** First term, credit three hours. Prerequisite courses 84 and 85a. T Th, 2-5.45. Caldwell Hall 250. Assistant Professor RICE.

This course is designed to accompany course 86.

88. **Agricultural Chemistry, Advanced Course.** Second term, credit three hours. Prerequisite course 85 or 92. M T W, 10. Caldwell Hall 100. Professor CROSS.

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

89. **Agricultural Chemistry, Laboratory Course.** Second term, credit three hours. Prerequisite courses 84, 85a, and 93. T Th, 2-5.45. Caldwell Hall 250. Assistant Professor RICE.

This course is designed to accompany course 88.

90. **Advanced Agricultural Analysis.** Throughout the year, credit three or more hours a term. Prerequisite courses 87 and 89. Lectures: fertilizer section, T, 9; food section, T, 11. Caldwell Hall 100. Laboratory, M T W Th. Caldwell Hall 341. Hours by arrangement in Morse Hall with Professor Cavanaugh. Professors CAVANAUGH and CROSS, and Assistant Professor RICE.

Students may elect work in any branch of soil, fertilizer, or insecticide analysis, or in food analysis, or they may do research.

91. **Agricultural Chemistry, Advanced Course.** First term, credit two hours. Lectures, T Th, 11. Morse Hall C. Professor CAVANAUGH.

A course dealing with the history and development of agricultural chemistry and treating of special topics.

92. **Household Chemistry.** Second term, credit two hours. Prerequisite course 83. Lectures, M W, 12. Caldwell Hall 100. Professor CROSS.

Designed for students of home economics and others interested in elementary food chemistry.

93. **Household Chemistry, Laboratory Course.** Second term, credit two hours. Prerequisite Chemistry 6 and course 83. Hours to be arranged by the Department of Home Economics. Caldwell Hall 250. Assistant Professor RICE and ———.

This course is designed to accompany course 92.

## 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.** First or second term, credit two hours. Lecture, F, 9. Animal Husbandry Building A. One practice period, T, W, Th, or F, 2-4.30, or S, 8-10.30, by appointment. Animal Husbandry Building. Professor SAVAGE and Mr. MADDY.

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. MEADE and ALLEN.

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

5. **The Horse.** Second term, credit three hours. Lectures, W F, 11. Animal Husbandry Building A. Practice, T, 2-5. Judging Pavilion. Professor HARPER, and Messrs. MEADE and HAINES.

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

6. **Horse Training, Practical Course.** First term, credit two hours. Prerequisite course 5; registration limited, admission by permission only. Lecture, F, 11. Animal Husbandry Building. Practice, in sections by appointment. Animal Husbandry Building and barns. Professor HARPER and Mr. HAINES.

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

7. **Mechanics of the Horse.** First term, credit three hours. Will not be given unless elected by at least five students. Prerequisite course 5. Lectures and recitations, M W, 11. Practice, Th, 3.30-5. Animal Husbandry Building. Professor HARPER.

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



**10. Dairy Cattle.** First term, credit four hours. Lectures, M W, 9. Practice, W or Th, 2-3.30, by appointment; also, daily attendance at the barns for practice in feeding and stable management for three weeks, in groups as assigned. Animal Husbandry Building A, Judging Pavilion, barns, and stables. Professor WING, and Messrs. MEADE and ALLEN.

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, and feeding.

**11. Beef Cattle, Sheep, and Swine.** First term, credit three hours. Lectures, T Th, 11. Practice, T, 2-3.30, or S, 10.30-12. Animal Husbandry Building A. Assistant Professor SEULKE and assistants.

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

**12. Meat and Meat Products.** First or second term, credit three hours. Registration by appointment and limited to forty. Lecture, M, 8. Practice in two sections, M Th, 2-4.30, W F, 2-4.30, or T, 2-4.30, and S, 8-10.30. Animal Husbandry Building B, and Meat Laboratory. Assistant Professor SEULKE.

One required inspection trip to Buffalo and vicinity.

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

**13. Beef Cattle, Sheep, and Swine, Advanced Course.** Second term, credit two hours. Prerequisite course 11. Lecture, T Th, 11. Animal Husbandry Building B. Assistant Professor SEULKE and assistants.

This course is planned for advanced and graduate students who are specializing in meat-producing animals. It will consist of lectures, recitations, discussions, reports, and field trips that will give the student a more thorough knowledge of the management, production, and marketing of meat animals, both grade and purebred.

**14. The Microscopic Study of Feeds for Animals.** Second term, credit two hours. Practice, T Th, 2-4.30. Registration by appointment only, for those who have had a good preliminary training in the use of the microscope. Animal Husbandry Building 21. Assistant Professor LAKE.

This course is planned for advanced and graduate students, that they may become familiar with those manufacturing processes that yield by-products suitable for feeding animals, the by-products themselves, and materials that may be used as adulterants in feeds for animals, with methods for detecting them.

**15. Principles of Feeding, Advanced Course.** Second term, credit two hours. Prerequisite course 1 and Veterinary Physiology 12. For advanced and graduate students. Lectures, M W, 9. Animal Husbandry Building. Professor SAVAGE.

**16. Principles of Animal Genetics, Advanced Course.** Second term, credit two hours. Lectures, W F, 10. Animal Husbandry Building. Mr. MEADE.

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 Stock Judging.** First and second terms, credit one hour a term. First term: daily first three weeks in October. Second term: Saturdays after Easter recess. Hours by appointment. Professors WING, HARPER, SAVAGE, HOPPER, and assistants.

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

**18. Seminar.** 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. Monday afternoon. Departmental staff.

20. **General Elementary Course in Animal Husbandry.** For students in the New York State Veterinary College only. Throughout the year, credit three hours each term. Lectures, M W, 10. Practice, W, 11-1. Animal Husbandry Building. Professors WING, HARPER, and SAVAGE.

The general principles of breeding and feeding domestic animals, with practice in the formulation of rations and the judging and scoring of animals.

30. **Health and Disease of Animals.** First term, credit three hours. Lectures, M W F, 11. Veterinary College. Professors MOORE and WILLIAMS.

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 the first aid in emergencies.

31. **Horseshoeing.** Second term, credit one hour. Limited to thirty seniors. Th, 10-12. Farriery, Veterinary College. Professor ASMUS.

## BOTANY

1. **General Botany.** First and second terms, credit three hours a term. Lectures, M, 9 or 11. Dairy Building 222. Laboratory, two periods of two and one-half hours each. Agronomy Building. Laboratory sections are limited to twenty students each. All students other than freshmen must consult the Department in regard to laboratory and lecture appointments before registering for the course. Professor SCHRAMM, Misses HANCY, DOUGLAS, SEAMAN, and RANE, Mr. CLARK, and others.

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. Laboratory fee, \$2.50 a term; deposit, \$2, for first term only.

2. **Forest Botany.** First term, credit three hours. Prerequisite course 1 or its equivalent. Lecture, T, 8. Agronomy Building 192. Laboratory or field work, T Th, 2-4.30. Agronomy Building, Botanical Laboratory. Mr. BECHTEL.

A course dealing with the identification of trees and shrubs, both in summer and in winter condition. The laboratories covering the identification work will consist almost entirely of trips in the field. The work of the latter part of the term will be a study of the microscopic structure of wood from the standpoint of taxonomy. Adapted to the needs of all students wishing a technical knowledge of trees and shrubs. Laboratory fee, \$3; deposit, \$2.

4. **Microscopic Wood Technology.** First term, credit two hours. Prerequisite courses 1 and 2 or an equivalent. Two laboratory periods of two and one-half hours each with a few lectures during the periods. Laboratory, T Th, 8-10.30. Agronomy Building, Botanical Laboratory. Assistant Professor EAMES.

This course is planned for students specializing in wood technology. The microscopic anatomy of wood will be studied from the following standpoints: the relation of structure to important properties and uses; the identification of many commercial timbers; the problems of wood preservation and of fireproofing by impregnation with chemicals; the determination of the source and nature of wood pulp, including tests of various papers. Considerable attention will be given to the types of commercial fibers, their identification and their uses. Laboratory fee, \$4.

5. **Grasses.** Second term, credit two hours. Prerequisite course 1 or its equivalent. Lecture, by appointment. Laboratory, W, 10-1. Agronomy Building, Botanical Laboratory. Professor WIEGAND and Mr. ———.

A course designed especially to furnish instruction in the morphology, classification, and identification of wild and cultivated grasses, to students in farm



crops and general agriculture. Open also to other students interested in grasses. Laboratory fee, \$2.

6. **Taxonomy of the Higher Plants.** Second or third term, credit four hours. Prerequisite course 1 or its equivalent. Lecture, by appointment. Laboratory, T Th, 2-5. The remaining work by appointment. Agronomy Building, Botanical Laboratory. Professor WIEGAND and Messrs. BECHTEL and ———.

A study of the kinds of seed plants and ferns, their classification into genera, families, and orders, and field work on the local flora about Ithaca. 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, \$2.

6a. **Advanced Field Course in Taxonomy.** Third term, credit four hours. Prerequisite course 6 or its equivalent. Laboratory and field work, W, 8-1, 2-5. Remainder of work at times optional with the student. Professor WIEGAND and Mr. BECHTEL.

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, \$2.

7. **Weeds and Weed Seeds.** Third term, credit two hours. Prerequisite course 1 or its equivalent. Lecture and laboratory, by appointment. Agronomy Building, Botanical Laboratory. Professor WIEGAND and Mr. BECHTEL.

This course is designed to meet the needs of students of agriculture who wish to obtain a working knowledge of weeds and weed seeds. It will also aid persons intending to teach nature study and agriculture in the schools. Laboratory fee, \$2.

9. **Histology.** First or third term, credit four hours. Prerequisite course 1 or its equivalent. Lecture, F, 8. Agronomy Building 203. Laboratory: first term, M, 10-12.30, W, 8-10.30, F, 9-11.30; third term, T Th, 8-10.30, F, 9-11.30. Agronomy Building, Botanical Laboratory. Assistant Professor EAMES and ———.

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. Lectures, M W, 9. Laboratory, M W, 10.30-1. Agronomy Building, Botanical Laboratory. Assistant Professor SHARP and ———.

This course is planned to give instruction in the morphology and physiology of the cell, and in the cytological aspects of reproduction and inheritance. In the laboratory a study is made of material illustrating the subjects dealt with in the lectures. Laboratory fee, \$4.

11. **Methods in Histology and Cytology.** First term, credit three hours. Prerequisite course 1 or its equivalent. Laboratory, M W F, 2-4.30. Occasional lectures are given during the laboratory periods. Agronomy Building, Botanical Laboratory. Assistant Professors EAMES and SHARP, and Mr. WANN.

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 Algæ.** Second term, credit four hours. Prerequisite course 1 or its equivalent. Lectures, T Th, 8. Agronomy Building. Laboratory, T Th, 10-1. Agronomy Building, Botanical Laboratory. Professor SCHRAMM.

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

Courses 12, 13, 14, and 15, one term each, are designed to cover the field of comparative morphology. Although credit is given for each course separately, courses 13 and 14 should be taken in the order stated, and as far as possible course 12 should precede them.

**13. Comparative Morphology of Bryophytes and Pteridophytes.** First term, credit four hours. Prerequisite course 1 or its equivalent. Lectures, T Th, 9. Agronomy Building 192. Laboratory, T Th, 10.30-1. Agronomy Building, Botanical Laboratory. Assistant Professor SHARP and ———.

An advanced course embracing comparative and developmental studies of bryophytes and pteridophytes. Emphasis is placed on evolutionary and reproductive features. Laboratory fee, \$5. See statement under course 12.

**14. Comparative Morphology of Spermatophytes.** Second term, credit four hours. Prerequisite course 1 or its equivalent, and course 13. Lectures, T Th, 9. Agronomy Building 192. Laboratory, T Th, 10.30-1. Agronomy Building, Botanical Laboratory. Assistant Professor SHARP and ———.

An advanced course designed to follow course 13, and dealing in a similar way with the structure and development of gymnosperms and angiosperms. Laboratory fee, \$5. See statement under course 12.

**15. Comparative Morphology of Fungi.** First term, credit two hours. Prerequisite course 1 or its equivalent. Lecture, T, 8. Agronomy Building. Laboratory, T, 10-1. Agronomy Building, Botanical Laboratory. Professor SCHRAMM.

An advanced course dealing with the morphology and relationships of selected types of fungi. Laboratory fee, \$2.50.

**20. Plant Physiology.** First or second term, credit four hours. Prerequisite all freshman work or its equivalent, and course 1. This course may be taken to satisfy the requirement in physiology. Students must consult the Department with respect to laboratory assignments before registering for the course. First term: Lecture, T, 10, Dairy Building 222. Recitations, 4 sections, Th, 10, Agronomy Building 192, Dairy Building 222, Forestry Building 126, Caldwell Hall 282. Laboratory, 4 sections. Agronomy Building 21. Second term: Lecture, T, 10. Recitations, 3 sections, Th, 10, Caldwell Hall 143, Dairy Building 222, Agronomy Building 192; Laboratory, 4 sections. Professor KNUDSON, Assistant Professor CURTIS, and Messrs. BRANNON, BENSON, NANZ, and others.

The topics include absorption, nutrition, relations to environment, growth, reproduction, and propagative processes. Laboratory fee, \$4; breakage fee, \$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. Agronomy Building 192. Professor KNUDSON and Assistant Professor CURTIS.

**21a. Plant Physiology, Advanced Lecture Course.** Third term, credit four hours. Prerequisite as in course 21. Lectures, M T Th F, 7 a. m. Agronomy Building 192. Professor KNUDSON or Assistant Professor CURTIS.

**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. Agronomy Building 21. Professor KNUDSON, Assistant Professor CURTIS, and Mr. BRANNON.

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

**22a. Plant Physiology, Advanced Laboratory Course.** Third term, credit six hours. Requirements as in course 22. Laboratory, M T Th F, 10-1. Professor KNUDSON or Assistant Professor CURTIS.



Courses 21 and 22 or 21a and 22a are comprehensive courses and are recommended for those students specializing in plant study, including the applied subjects. Laboratory fee, \$10; breakage deposit, \$5.

[26. **Physiology of Fermentation.** First term, credit three hours. Prerequisite required work through the sophomore year, bacteriology, and course 20 or 21. Lecture, T, 12. Agronomy Building 192. Laboratory by appointment. Agronomy Building 21.] Not given in 1918-19.

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

### Courses intended primarily for graduates

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

A course designed for graduates and advanced students. Original investigations by students who are adequately prepared. The laboratory fee depends on 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. Assistant Professors SHARP and EAMES, 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.

30. **Special Chapters in Metabolism.** Third term, credit one hour or more. Lectures and laboratory. Professor KNUDSON.

A study of some of the more important temporary and storage products of plant metabolism. Open only to graduates, or to undergraduates who have had course 21 and organic chemistry.

31. **Seminary in Plant Physiology.** Throughout the year, credit one hour a term. Limited to graduates taking work in the Department. Conference, F, 11. Agronomy Building 152. Professor KNUDSON and Assistant Professor 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. Agronomy Building 192. Professor KNUDSON and Assistant Professor 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 laboratory fee is governed by the nature of the work.

### DAIRY INDUSTRY

1. **Milk Composition and Tests.** First or second term, credit three hours. For regular students only. Students must consult the Department in regard to laboratory assignments before registering for the course. First term: lectures, T S, 11, Dairy Building 222; practice, M or T, 2-4.30, or S, 8-10.30. Dairy Building 232. Second term: lectures, T 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. ——— and ———.

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

2. **Butter.** First or second term, credit three hours. Must be preceded or accompanied by courses 1 and 6; for regular students only. Lecture, F, 10. Dairy Building 222. Practice, M, W, or Th, by appointment. Dairy Building. Professor GUTHRIE and Mr. 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, 11. Dairy Building 222. Practice, M, W, or Th, 12-6. Cheese Laboratory. Assistant Professor FISK and Mr. ———.

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. Students must consult the Department in regard to laboratory assignments before registering for the course. Lecture, M, 8. 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, 10-1, W F, 8-11.) Dairy Building 122. Professor STOCKING, and Messrs. SUPPLEE and WHITING.

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 the study of morphology, cultural characteristics, chemical changes, and isolation and identification of species. Laboratory deposit, \$4, part returnable.

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. Students must consult the Department before registering for the course. Lectures, W F, 12. Dairy Building 222. Practice, T, 2-4.30, and S, 8-10.30, or Th, 2-4.30, and S, 10.30-1. (If registration exceeds the capacity of the laboratory another set of sections will be arranged.) Dairy Building. Professor ROSS and Mr. BREMER.

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-days 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; should be preceded by Chemistry 6; not open to first- and second-year students except by special permission. Laboratory will not accommodate more than fifteen students. Students must consult the Department in regard to laboratory assignments before registering for the course. T Th, 2-5. Dairy Building 202. Professor TROY, Assistant Professor MCINERNEY, and Messrs. ——— and ———.

This course includes work in such subjects as the determination of moisture and dry matter in dairy products; commercial tests for casein; various tests for butterfat; commercial tests for butter, oleomargarine, and condensed, milk; preservatives and adulterations; milk modification. Laboratory deposit, \$5, part returnable.

8. **Dairy Bacteriology.** Second term, credit four hours. Must be preceded or accompanied by course 1, and preceded by course 4 or its equivalent; open to regular students only. Students must consult the Department in regard to laboratory assignments before registering for the course. Lecture, Th, 11.



Dairy Building 222. Practice, M W F, 2-5, M, 9-12, and W F, 8-11. Dairy Building 122. Professor STOCKING, and Messrs. SUPPLEE and WHITING.

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 two hours. Must be preceded by a good record in course 2. Lecture, Th, 12. Dairy Building 222. Practice, one long period each week by appointment, with occasional lectures during the laboratory period. The periods will begin at the opening of the creamery in the morning and will close at one o'clock. Dairy Building. Professor GUTHRIE and Mr. 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. Assistant Professor FISK and Mr. COWAN.

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

11. **Ice Cream.** Second term, credit two hours. Prerequisite courses 1 and 14 or their equivalent. 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 per section. Students must consult the Department before registering. Dairy Building E 122. Assistant Professor FISK and Mr. COWAN.

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. For advanced students; required of graduate students taking work in the Department. T, 4.30-5.30. Dairy Building. Professors STOCKING, ROSS, TROY, and GUTHRIE, and Assistant Professors FISK and MCINERNEY.

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, and GUTHRIE, and Assistant Professors FISK and MCINERNEY.

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. Students must consult the Department in regard to laboratory assignments before registering for the course. Lecture, W, 10. 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, 8-11.) Dairy Building 122. Professor STOCKING, and Messrs. SUPPLEE and WHITING.

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, silage. Laboratory deposit, \$4, part returnable.

**15. Bacteriology for the Home.** Second term, credit three hours. Students must consult the Department in regard to laboratory assignments before registering for the course. Lecture, S, 12. Home Economics Building 245. Practice, T Th, 2-5. (If registration exceeds the capacity of the laboratory, a second set of sections will be arranged, T Th, 8-11.) Dairy Building 122. Messrs. SUPPLEE and WHITING.

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; molds and yeasts in their relation to household 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. Assistant 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.

## DRAWING

**1. Mechanical Drawing.** First or second term, credit three hours. Students must register for not less than three hours. Lectures during practice. Practice, M W, 2-4.30, or T Th, 2-4.30. The two remaining two-hour practice periods by appointment. Dairy Building 341. Assistant Professor REYNA.

The drafting room will accommodate but thirty students in each section. Those registering in the course will be assigned to desks in the order of registration in the Department. Therefore, in order to obtain a place it will be necessary to report promptly to the Department. A small amount of outside reading will be required.

Work will begin with the first afternoon period. Students must consult the Department before that period as to materials required.

**2. Free-hand Drawing.** First and second terms, credit two or more hours a term. Students may not enter the second term unless they have taken the course in the first term, or its equivalent. Students must register for not less than two hours in either term. Lectures during practice. Practice by appointment. First term, daily except S, 8-1 and 2-4.30, S, 8-1. Professor BAKER and Miss GARRETT. Second term, daily, 8-1. Miss GARRETT. Dairy Building 371.

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 also to develop the student's appreciation of pictures. As this course is laid out for two terms, students are advised against planning to take only the work of the first term.

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. Students must report promptly to the Department for list of materials, so as to begin work with the first period scheduled.

**2a. Free-hand Drawing and Outdoor Sketching.** Third term, credit from two to five hours. Prerequisite course 2 or its equivalent. Students must register for not less than two hours. Lectures during practice. Practice by appointment, T W Th F, 8-1, T W Th, 2-5. Dairy Building 371. Professor BAKER.

While this course is intended primarily for students in landscape art—being out-of-door study, in pencil, pen and ink, and water color, of foliage, tree growth, and architecture—provision is also made for the general student and for teachers of drawing in the secondary schools.

**3. Free-hand Drawing, Advanced Course.** First or second term, credit two or more hours. Prerequisite course 2 or its equivalent. Students must



register for not less than two hours. Lectures during practice. Practice by appointment. First term, daily except S, 8-1 and 2-4.30, S, 8-1. Professor BAKER and Miss GARRETT. Second term, daily, 8-1. Miss GARRETT. Dairy Building 371.

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

4. **Perspective.** Second term, credit two hours. Prerequisite course 2 or its equivalent, and descriptive geometry. For students in landscape art. Lecture, W, 9. Drafting period, S, 8-1. Dairy Building 341. Assistant Professor REYNA.

A course in appearance representation from plan and elevation.

5. **Pictures and Their Making.** First term, without credit. Open to all who are interested. Lecture, T, 12. Landscape Art Building lecture room. Professor BAKER.

A weekly talk on the graphic arts, book illustration, methods of reproducing drawings, pictorial photography, and some of the elements of art.

## ENTOMOLOGY, LIMNOLOGY, AND ORNITHOLOGY

### Biology

1. **General Biology.** Second term, credit three hours. Lectures, T Th, 9 or 11. Roberts Hall 131. Botany I and Zoology I or the equivalent must precede or accompany this course. Practice, W F S, 8-10.30 or 10.30-1, or daily except S, 2-4.30. Roberts Hall 302. Professor NEEDHAM, Mr. CLAASSEN, and assistants.

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

1a. **General Biology.** First or second term, credit three hours. Lectures, T Th, 9, first term, Roberts Hall 131, second term, Roberts Hall 392. Practice, W or S, 8-10.30, or T, W, or F, 2-4.30. Roberts Hall 302.

This course is primarily for students from other colleges of the university. It may be offered as a prerequisite for course 1. Laboratory fee, \$2.50.

### Introductory Entomology

1. See Biology, course 1.

2. **The Ecology of Insects.** Third term, credit three hours. Lecture, W, 8. Roberts Hall 392. Practical exercises, largely field work, W, 10-12.30, and another by appointment. Professor NEEDHAM and Mr. ———.

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.

3. **General Entomology.** First, second, and third terms, credit three hours a term. Work of the first term repeated in the third term. Prerequisite course 1 or Zoology 1. First and second terms: 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, and Messrs. WELLHOUSE and DETWEILER. Third term: Lectures, M W, 9. Roberts Hall 392. Assistant Professor MATHESON. Practical exercise, W or Th, 2-4.30. Assistant Professor MATHESON and Mr. ———.

First term, lectures on the characteristics of orders, suborders, and the more important families, and on the habits of representative species. The practical exercises include a study of the structure of insects and practice in their classifi-

cation. The lectures only (credit two hours) are taken by those who have had courses 4 and 5. The work of the first term may be taken without registration for the second term. It is repeated in the third term. Laboratory fee, \$3.

Second term, lectures on the habits and life histories of injurious insects with a discussion of the present-day methods of controlling their ravages. The practical exercises include a study of the more common pests of orchard, field, and garden, together with a limited number of field observation trips. Prerequisite, first term. Laboratory fee \$3.

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

An introductory laboratory course. 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. Assistant Professor BRADLEY, and Messrs. YOUNG and ———.

Courses 4 and 5 are introductory laboratory courses 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.

### Apiculture

[9. **General Beekeeping.** Second or third term, credit three hours. Prerequisite first term of course 3. Lecture, W, 10. Roberts Hall 392. Practical exercises, T Th, 2-4.30. A second laboratory section will be arranged for M W, 2-4.30, provided fifteen or more students register in the T Th section. In case a second section is formed, the first section will be limited to fifteen persons. Assistant Professor KING.] Not given in 1918-19.

The course is intended to afford a general and thorough knowledge of the fundamentals of beekeeping. The larger problems which confront the beekeeper can be taken up only in a limited way. Conditions in the apiary will be made to approximate as nearly as possible those with which the modern apiarist has to deal. In so far as possible, each student will be required to put into practice the principles discussed in class and to learn by actual practice the things that are necessary for the proper management of an apiary. It will be the aim to acquaint the student with the various phases of bee culture, such as life history, instincts, and general behavior of bees, their products, the sources of honey, the rôle of bees in cross-pollination, the equipment of the apiary, wintering problems, the diseases of bees, and the rearing of queens. Laboratory fee, \$2.

### Systematic Entomology

10. **Entomotaxy.** Third term, credit two or three hours. Laboratory and field work, W F, 2-5, and for three-hour students, Th or F, 10-1. Roberts Hall 301. Assistant Professor BRADLEY and Mr. ———.

Methods of collecting insects and of 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 during W Th F afternoons, or S morning. Roberts Hall 301. Assistant Professor BRADLEY and Mr. ———.

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.

12. **Taxonomy of Insects.** Throughout the year, credit four hours a term. Prerequisite courses 3, 4, 5, 11, 14, and 20, and preferably 10. Lecture, F, 8. Roberts Hall 392. Laboratory, F, 10-1, and two other periods of three hours each



to be arranged. Professors NEEDHAM and JOHANNSEN, Assistant Professors BRADLEY and MATHESON, and cooperating specialists.

This course will continue throughout a number of terms, but the work of each term may be elected independently. The course is intended primarily for graduate students who desire a systematic survey of one or more of the orders of insects.

D. Lepidoptera. First term, 1918-19. Dr. FORBES.

E. Diptera. Second term, 1918-19. Professor JOHANNSEN.

F. Neuropteroids. Third term, 1919. Professor NEEDHAM.

[G. Hymenoptera. First term, 1919-20. Assistant Professor BRADLEY.]

[H. Orthoptera. Second term, 1919-20.]

13. **Classification of the Coccidæ.** First term, credit two hours. Prerequisite courses 4, 5, and 11. Laboratory work by appointment. Roberts Hall 301. Assistant Professor BRADLEY.

The scale insects are selected as the subject of this course because of their economic importance, but the work of the course is a survey of the whole group without undue emphasis on the economic forms. Practice is given in the preparation of specimens for study. Laboratory fee, \$3.

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. Assistant Professor BRADLEY.

A study of general entomological literature. Practice in the use of generic and specific indices, and bibliographies, and in the preparation of the latter; the 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 intend to specialize in entomology or systematic zoology in their contact with literature.

19. **Research in Systematic Entomology.** Throughout the year, credit three or more hours a term. Prerequisite courses 3, 10, 11, 14, 20, and one term of course 12. Laboratory hours by arrangement. Roberts Hall 301. Assistant Professor BRADLEY, and Professors NEEDHAM and JOHANNSEN.

Laboratory fee, 50 cents a credit hour.

### Insect Morphology

20. **Morphology and Development of Insects.** First and second terms, credit two hours a term. Prerequisite courses 3 (first term), 4, and 5. Lectures, 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 or second term, credit three or more hours. Prerequisite courses 3 (first term), 4, 5, and 20. Laboratory open daily except S, 8-5. Roberts Hall 392. Professor JOHANNSEN.

A laboratory course to accompany or follow the first term of course 20. Laboratory fee, \$1.50 a credit hour.

29. **Research in Morphology of Insects.** Throughout the year, credit three or more hours a term. Prerequisite courses 3, 4, and 5. Laboratory open daily except S, 8-5, S, 8-1. Roberts Hall 391. Professors JOHANNSEN and NEEDHAM.

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

### Economic Entomology

30. **Parasites and Parasitism.** First term, credit two hours. Prerequisite course 3. Lecture, T, 8. Roberts Hall 392. Practical exercise: section 1, M, 2-4.30; section 2, T, 2-4.30. Assistant Professor MATHESON and Mr. MUESEBECK.

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

**31. Relations of Insects to Disease.** Second term, credit two hours. Prerequisite first term of course 3 or 30. Lecture, T, 8. Roberts Hall 392. Practical exercise: section 1, M, 2-4.30; section 2, T, 2-4.30. Professor JOHANNSEN. Causation and transmission of disease by insects and other arthropods. Laboratory fee, \$2.

**40. Advanced Economic Entomology and Insectary Methods.** Third term, three hours. Open only to graduates. 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, T Th, 11. Roberts Hall 392. Professor HERRICK.

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

**49. Research in Economic Entomology.** Throughout the year, credit three or more hours a term. Prerequisite courses 3, 4, and 5. Laboratory and field work by appointment. Insectary. Professor HERRICK, Assistant Professor MATHESON, and Mr. MUESEBECK.

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

### 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 NEEDHAM and Mr. LLOYD.

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

**51. Aquiculture.** Second term, credit two hours. Lectures, M W, 12. Roberts Hall 392. Assistant 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 five dollars.

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

A laboratory and field course designed to give practice in the methods of fish culture. May be taken either one or two terms. Laboratory fee, \$1.50 a credit hour.

**53. Plankton.** Second and third terms, credit one hour a term. Prerequisite permission to register. Laboratory, F, 2-4.30. Roberts Hall 492. Professor JOHANNSEN and Mr. LLOYD.

A laboratory and field course designed to give acquaintance with the genera of microscopic organisms of the region. Laboratory fee, \$1.50.

**58. Research in Aquiculture.** Throughout the year, credit three or more hours a term. Prerequisite courses 50, 51, and 52. Laboratory and field work by appointment. Assistant Professor EMBODY.

**59. Research in Limnology.** Throughout the year, credit three or more hours a term. Prerequisite course 50 or its equivalent. Laboratory and field work by appointment. Roberts Hall 492 and Biological Field Station. Professor NEEDHAM and Assistant Professor EMBODY.



## Seminaries

**Seminary.** Throughout the year. M, 4.30-5.30. Roberts Hall 392.

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

## 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. ———.

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 held 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.] Not given in 1918-19.

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 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. ———.

This course is designed to assist those planning professional work with birds or mammals. The lectures will take up the various phases of bird and mammal life 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.

## EXTENSION TEACHING

1. **Extension Work.** First term, credit two hours. Open to juniors and seniors, and to others by arrangement. Public Speaking 1 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, Agronomy Building 192; M F, 11, W F, 10, or T Th, 10, Roberts Hall 131; T Th, 11, Roberts Hall 131. Criticism by appointment, daily, 8-1. Professors EVERETT and WHEELER, Assistant Professor GILKEY, and Messrs. ———, ———, and ———.

Lectures and discussions on problems of university extension in agriculture. Practice in oral and written presentation of topics in agriculture, with criticism and individual appointments on the technique of public speech. Designed to acquaint students with parliamentary practice, to encourage interest in public affairs, and, 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 Prize for Public Speaking. (See page 22.)

2. **Extension Work.** Second term, credit two hours. Prerequisite course 1, of which course 2 is a continuation. Lectures and practice, W F, 10, M F, 11, or T Th, 10, Roberts Hall 131, or T Th, 11, Caldwell Hall 282. Criticism by appointment, daily, 8-1. Professors EVERETT and WHEELER, Assistant Professor GILKEY, and Messrs. ———, ———, and ———.

3. **Extension Work, Advanced Course.** First term, credit one hour. Prerequisite courses 1 and 2, or the equivalent. F, 9. Agronomy Building 192. Professors WHEELER and CROSBY.

The course will take up advanced study of subject matter and administrative problems in extension. Students will be given opportunity to gain experience in addressing meetings whenever it can be arranged. The number of students will be limited.

4. **Seminar.** Second term, without credit. Open to graduate students and others by special permission. Hours to be arranged. Professors CROSBY and WHEELER, and Assistant Professor ROBINSON.

Discussions, readings, and reports on assigned problems in agricultural extension.

### THE NATURAL HISTORY OF THE FARM

1. **The Natural History of the Farm.** First or second term, credit one hour. One field trip a week. Sections by assignment. Professor NEEDHAM, Assistant Professor EMBODY, Mr. ALEXANDER, and assistants.

This is a course in the study of agricultural environment. The university farm is visited. Its topography, its population, and its chief crops, wild and cultivated, are studied. Its fields, hills, woods, and streams are explored, and records are made of the things observed.

The course deals with the sources of agriculture. It considers crops from the naturalist's viewpoint—Nature's cereals and fruits and roots and fowls that were all present before agriculture developed. These things are viewed collectively, as conditioning the human affairs of the country community. They are considered as elements that may be contributory to the beauty, the healthfulness, and the intellectual interest and enjoyment of the farm home. Fee, \$2.

### FARM CROPS

1. **Cereals, Forage Crops, and Miscellaneous Crops.** First or second term, credit four hours. To be preceded or accompanied by Soils 1 or 2 and Botany 1. Lectures, M W F, 10. Poultry Building 375. Laboratory, M, T, or W, 2-4.30. Students must consult the Department regarding laboratory appointments. Poultry Building 350. Mr. DYNES.

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

2. **Farm Crops, Advanced Course.** First or third term, credit three hours. Prerequisite course 1. Lectures, M W F, 11. Poultry Building 175. Professor MONTGOMERY.

The object of this course is to study the more important principles of crop production, based on experimental evidence. Both cereal and forage crops are studied. An effort is made to acquaint the student with the best sources of literature, especially the work of experiment stations. About six hours per week reference reading is required.

4. **Special Cash Crops.** First or second term, credit three hours. To be preceded or accompanied by course 1 and Botany 1. Lectures, T Th, 11. Poultry Building 175. Laboratory: first term, Th, 2-4.30; second term, Th or F, 2-4.30. Poultry Building 175. Mr. HARDENBURG.

This course is designed to make a special study of those crops that are grown in New York State largely as cash crops for the wholesale market, such as potatoes, field beans, and cabbage. Lectures and laboratories consider history, economic importance, classification, all cultural phases, marketing, and uses of the crops under discussion. Laboratory fee, \$2.

5. **Seminary.** First term, without credit. Required of graduate students. M, 4.45. Poultry Building 175. Professor MONTGOMERY.

6. **Research.** Throughout the year. Two or more hours a term. Prerequisite permission to register. The student will usually be required to remain during one third term in order to work out experimental problems. Limited to graduate students. Professor MONTGOMERY.



### Division of Vegetable Gardening

NOTE: As much of the subject matter in course 11 is repeated in course 13 the Department cannot allow a student university credit for both courses.

**11. Commercial Vegetable Gardening.** First or second term, credit four hours. Prerequisite Botany 1. Must be preceded or accompanied by Soils 1. Lectures, M W F, 11. Poultry Building 325. Practice, T, 2-4.30. Poultry Building, vegetable greenhouses, and East Ithaca gardens. Assistant Professor KIRKPATRICK.

A general study of the principles of commercial vegetable gardening. Laboratory work consists of exercises in growing plants under glass and in the planting and care of late or early outdoor vegetable crops. A one-day trip to visit a vegetable-growing center is required during the term. Cost about \$7.50. Laboratory fee, \$2.

**12. Commercial Vegetable Gardening.** Second term, credit three hours. Prerequisite course 11. Lectures, T Th, 11. Poultry Building 350. Laboratory, Th, 2-4.30. Poultry Building, vegetable greenhouses, and East Ithaca gardens. Assistant Professor KIRKPATRICK.

Lectures on the principles of market garden, truck farm, muck land farm, and cannery crop production, based partially on experimental evidence available. Laboratory work includes exercises in the harvesting, care, and marketing of produce, study of important market garden, truck, and muck farm centers, and principles of farm management as applied to the commercial production of vegetable crops. Special problems of professional market gardeners, truckers, muck farmers, and growers of canning crops will be considered. Short trips to neighboring market gardens and a two-days trip to one or more of the important muck farming or trucking sections may be required. Exact dates to be arranged. Cost, \$12 to \$15. Laboratory fee, \$2.

**13. Home Vegetable Gardening.** Second term, credit three hours. Lectures, T Th, 9. Poultry Building 325. Practice, F, 2-4.30. Poultry Building 350, vegetable greenhouses, and gardens. (If necessary, an additional section will be arranged, S, 10.30-1.) Assistant Professor SCHNECK.

Students will not be given credit for both course 11 and course 13. This course is planned primarily to meet the requirements of those interested in school gardening and home garden leadership work.

Production of vegetables for home use; the planning and management of the garden, growing early plants, special requirements of crops, control of pests. The laboratory work consists chiefly of actual practice in the greenhouse, frame yard, and garden. Each student assumes full charge of his own plantings and cares for them to the end of the term. Laboratory fee, \$2.

**14. Vegetable Forcing.** Second term, credit three hours. Must be preceded or accompanied by course 11 and Floriculture 2. 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.

Vegetable growing 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. Each student will be assigned a plot in the greenhouse on which he will grow vegetables to maturity, assuming full charge except as to heating and ventilation. The class will participate in a required one-day excursion to Rochester in April to visit greenhouses; cost, about \$6. Laboratory fee, \$2.

**15. Preservation of Perishable Crops.** First term, credit two hours. Must be preceded or accompanied by course 11 and Dairy Industry 4. Registration limited to 20 students. Lecture, T, 11. Combined lecture and practice, Th, 2-5. Poultry Building 350, vegetable greenhouses, and East Ithaca gardens. Assistant Professor KIRKPATRICK.

Course deals with the principles and methods of preserving surplus perishable crops. The theory and practice of drying, canning, pickling, preserving, and kraut making are considered from the community and the commercial standpoint. Laboratory deposit, \$5.

### FARM MANAGEMENT

1. **Farm Cost Accounting.** First term, credit three hours. Open to juniors and seniors who have passed the farm practice examination. Should precede course 2. Lectures, T Th, 10. Caldwell Hall 100. One laboratory period per week; students must report to the Department for assignment to laboratory sections. Professor WARREN and Assistant Professor MISNER.

Farm inventories, single-enterprise accounts, complete farm accounts, and other farm records. Special emphasis is given to the interpretation of results and their application in the organization and management of the farm. Two one-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 examination. 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. Roberts Hall 292. One laboratory period per week. Students must report to the Department for assignment to laboratory sections before the course begins. On days when farms are visited, laboratory work may last longer than two and one-half hours. Second term, Professor LIVERMORE and Mr. NOBLE.

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 farming; 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.

### Advanced and Graduate Courses

3. **Farm Organization.** First term, credit three hours. Prerequisite permission to register, and courses 1 and 2. No undergraduate will be admitted to this course who has not made an unusually good record in courses 1 and 2. Application for admission to the course should be made several days before registration. F, 2-5, and a two-hour period to be arranged. Farm Management Building 101. On days when field trips are taken, the class will in some cases leave on a noon train and return on an evening train. Professor LIVERMORE and Mr. NOBLE.

Field trips for studying farms and regions. Discussions of organization and management of farms visited. Some time will be devoted to other problems in farm management. There will be two one-day field trips or one two-day field trip in October or November. Expenses for trips are estimated to be about \$15.

4. **Types of Farming in the United States.** Second term, credit two hours. Prerequisite course 2. Laboratory, Th, 2-4.30. Farm Management Building 101. Professor WARREN and Mr. ———.

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 these types best.

5. **Seminar.** Second term, credit one hour. Open only to graduate students. T, 4.45-6. Farm Management Building 101. Professors WARREN and LIVERMORE, and Assistant Professors SCOVILLE and ———.

Problems, reading, and discussions, on subjects relating to farm management.



6. **Agricultural Statistics.** First term, credit two hours. Prerequisite permission to register. T, 2-4.30. Farm Management Building 102. Professor WARREN.

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 in farm management or in other agricultural statistics.

7. **Food Problems.** Second term, credit two hours. Prerequisite permission to register. W, 2-4.30. Farm Management Building 101. Professor WARREN and Mr. ———.

A study of problems of food supply, land development, and land ownership.

8. **Teachers' Course.** Third term, credit four to six hours.

This course will include the work given in courses 1, 2, and 3. It is designed for persons who have studied more or less farm management in other institutions, but who wish to specialize in farm management work. Whether or not the course will be given will depend on the number of applications received by April 1, 1919.

9. **Research.** Throughout the year, credit one or more hours a term. Prerequisite permission to register. Only those students who can present an acceptable plan for an investigation will be admitted. Hours by appointment. First and second terms, Professors WARREN and LIVERMORE; third term, Assistant Professor MISNER.

Special investigations of problems in farm management.

## FARM PRACTICE

1. **Farm Practice.** First and second terms, without credit toward graduation, but gives 2 to 5 points toward the farm practice requirement, depending on the quality of the work done. Hour and place by appointment. Mr. ——— 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.

The farm practice requirement is forty points, twenty of which must be obtained by actual farm work. (See page 25.)

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 Department 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 Department in regard to work on farms.

The Department 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

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 for 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 3 and 4 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.

1. **Principles and Methods of Greenhouse Practice.** First term, credit three hours. Prerequisite Botany 1. Lectures, T Th, 10. Floriculture Building. Practice, W, 2-4.30. Greenhouses. Professor WHITE and Miss MINNS.

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

2. **Greenhouse Construction.** Second term, credit three hours. Lecture, M, 11. Floriculture Building. Practice, W Th, 2-4.30. Forestry Building 8. Assistant Professor LUMSDEN.

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 blue prints 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.

3. **Commercial Floriculture.** First term, credit four hours. Prerequisite courses 1 and 2, Botany 1 and 20, and Soils 1. Lectures and recitations, M W F, 10. Floriculture Building. Practice, F, 2-4.30. Greenhouses. Professor WHITE and Mr. THAYER.

Studies in the propagation and culture of commercial florists' crops. Methods of packing, shipping, and marketing will be considered. The class will participate in a required excursion to Rochester on November 1 and 2. Laboratory fee, \$2.

4. **Commercial Floriculture.** Second or third term, credit four hours. Prerequisite course 3. Lectures and recitations, M W F, 10. Floriculture Building. Practice, F, 2-4.30. Greenhouses. Professor WHITE and Assistant Professor LUMSDEN.

A continuation of course 3, with methods of propagation and culture of those 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 during one semester and vacations on commercial ranges. Laboratory fee, \$2.

6. **Floral Arrangement.** Second term, credit one hour. Registration is limited to fifteen students. Lecture, demonstration, and practice, S, 10.30-1. Greenhouses. Professor WHITE and Miss MINNS.

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, \$3.50.

7. **Conservatory Plants.** Second and third terms, credit two hours. Prerequisite course 1. Lectures and demonstrations, T Th, 11. Floriculture Building. Assistant Professor LUMSDEN.

Designed for students interested in work on private estates or in parks. This course should be preceded or accompanied by courses 2 and 3. A study of such tropical and subtropical foliage and flowering plants as are used for the ornamentation of glasshouses of decorative type. Fee, \$1.

8. **Garden Flowers.** Second or third term, credit three hours. Prerequisite Botany 1; Botany 8 recommended. Lectures, T Th, 9. Floriculture Building. Practice, T or Th, 2-4.30. Greenhouses and gardens. Assistant Professor LUMSDEN, Miss MINNS, and Mr. THAYER.

A study of the identification, propagation, 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 an excursion to the Thompson estate at Canandaigua on May 31 and August 16. Laboratory fee, \$2.



**8a. Grouping and Arrangement of Annuals and Herbaceous Perennials.** Second or third term, credit two hours. Prerequisite course 8. Lecture, S, 9. Practice, S, 10-12.30. Forestry Building 8. Assistant Professor LUMSDEN.

A study of the principles and methods of arrangement of garden flowers in the border and 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.

**9. Amateur Floriculture.** First, second, or third term, credit three hours. Lectures, W F, 11. Floriculture Building. Practice, M, 2-4.30. Greenhouses. Miss MINNS and Mr. THAYER.

The propagation and 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 who are interested especially in home economics, but is open to any one desiring information regarding simple methods of plant culture. Laboratory fee, \$2.

**11. The History and Literature of Floriculture.** Second term, credit two hours. Lectures, M W, 9. Floriculture Building. Designed primarily for seniors and graduate students. Professor BEAL.

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

**12. Investigation in Floriculture.** Throughout the year, credit, one, two, or three hours a term. Prerequisite courses 1, 3, and 4, and permission to register. Designed primarily for upperclassmen and graduate students. Consultation by appointment. Professors WHITE and BEAL, and Assistant Professor LUMSDEN.

The investigation of problems in growing flowers for cutting, exotics, garden flowers, and the like.

**13. Seminary.** Throughout the year. One hour a term. Required of advanced students who elect course 12, and of all graduate students. F, 9. Floriculture Building. Professor WHITE and members of the staff.

## FORESTRY

The Department of Forestry has three principal aims: to give instruction at the University; to conduct research; and to be of direct help to 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, and other lines in which specialists will be useful.

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. The entrance requirements are the same as for general agriculture.

Part of the work, both in the senior and in the graduate year, is given in the third (summer) term. A portion of the third term is spent in camp in the Adirondacks, or in some other large forest in New York State.

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 three months experience in forestry work or in a logging camp, in lieu of the farm practice requirement. On this and 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. Freshmen who are planning to take the professional forestry course are urged to consult the Department of Forestry at the beginning of the college year.

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 logging camp, proof of which is to be a signed statement or by an examination in woodmanship, 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 third (summer) term. Otherwise it will be difficult to arrange his work satisfactorily. 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 this and 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. Professional students must register with the Department in order that their standing as such may be recognized.

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

The subjects in black-faced type are required of all students in the College of Agriculture. The schedule below will be followed by all students entering the College in and after September, 1917. Seniors and juniors will continue, with some slight changes, under the schedules announced for 1916-17. Subjects not in black-faced type should be taken by professional forestry students in the terms indicated; the failure of a student to do this will complicate the remainder of his course.



The emergencies created by war conditions may make minor changes in the courses unavoidable.

Freshman year			
	Hours 1st term		Hours 2d term
English 1 .....	3	English 1 .....	3
Chemistry 1 .....	6	Biology 1 .....	3
Zoology 1 .....	3	Zoology 1 .....	3
Botany 1 .....	3	Botany 1 .....	3
The Natural History of the Farm 1	1	Mathematics 3*	3

Sophomore year			
	Hours 1st term		Hours 2d term
Geology 1 .....	3	Physics 2 .....	5
Geology 11† .....	3	Botany 20 (Plant Physiology) .....	4
Civil Engineering 10 (Elementary Surveying)† .....	3	Civil Engineering 11a (Advanced Surveying)† .....	2
Botany 2 .....	3	Forestry 6 .....	2
Entomology 3 .....	3	Entomology 41 .....	2
Electives .....	3	Drawing 1 .....	3

#### Summer following sophomore year

Summer camp for six weeks, beginning in May. Civil Engineering 13 (Surveying), seven hours credit.

Junior year			
	Hours 1st term		Hours 2d term
Political Science 51 .....	3	Political Science 51 .....	3
Forestry 8 .....	3	Forestry 13 .....	3
Plant Pathology 1 .....	4	Plant Pathology 2 .....	2
Soil Technology 1 .....	3	Plant Pathology 9 .....	1
Electives .....	5	Civil Engineering 14a (Survey Computations and Mapping)† .....	2
		Sibley S4 (Forge Work)† .....	1
		Electives .....	6
		Forestry 9 .....	4
		Forestry 11 .....	5
		Forestry 14 .....	3
		Forestry 15 .....	3

NOTE: Expenses for the six-weeks trip, taken in the latter part of the third term, should not exceed \$75, including travel and subsistence.

Senior year		
	1st term	Hours 2d term
Three months practical work in the forest		Forestry 10 .....
		Forestry 16 .....
		Forestry 18 .....
		Forestry 19 .....
		Geology 15† .....
		Electives .....

Graduate year	
Third, or summer, term	First, or autumn, term
Forestry 20 (Forest Management: a. Forest Organization)	Forestry 20 (Forest Management: b. Forest Finance)
Forestry 22 (Seminary)	Forestry 21 (Forest Administration)
Forestry 23 (Advanced Work)	Forestry 22 (Seminary)
Forestry 24 (Research)	Forestry 23 (Advanced Work)
	Forestry 24 (Research)

\*If Mathematics 3 (plane trigonometry) has been offered for entrance, Drawing 1 should be taken in the freshman year, second term.

†Courses so indicated are given in other colleges than Agriculture and are charged against the allowed twenty hours of non-agricultural subjects (page 26).

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

**1. The Farm Woodlot.** First or second term, credit two hours. Lecture, M, 9. Forestry Building 122. Practice, M or T, 2-4.30. Forestry Building 126. Assistant Professor COLLINGWOOD.

The management of the farm woodlot, and the starting of new woodlots by planting or sowing. A course dealing with the woodlot as deserving and repaying proper care, such as is given other crops on the farm. 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 or W, 2-4.30. Forestry Building 118. Professors BENTLEY and RECKNAGEL.

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, volume, and value; 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 HOSMER.

An elementary course including the life history of the forest; the influence of soil and climate on forests; the influence of forests on stream flow, climate, and soil; forest planting, sowing, and nursery work; reproducing the forest without planting or sowing; care of the crop during its growth, including 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 timberland management than is given in course 1, but do not wish the professional courses.

**4. Elements of Forestry: Forest Utilization.** First term, credit two hours. Lectures, M W, 10. Forestry Building 122. Professor RECKNAGEL.

The principal industrial uses of timber; logging methods and equipment; logging in representative regions; manufacture of lumber; determination of stumpage values; minor industries; utilization of forest products other than wood, as grazing range, fish and game, and the like.

**5. Conservation of Natural Resources.** First term, credit two hours. 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.

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

**6. The Field of Forestry.** Second term, credit two hours. Lectures, M W, 10. Forestry Building 122. Professor SPRING.

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

**8. Wood Technology.** First term, credit three hours. Lectures, W F, 11. Forestry Building 122. Practice: professional forestry students, F, 2-4.30; other students, Th, 2-4.30. Forestry Building 118. Professor RECKNAGEL.

Structure of wood; physical, chemical, and mechanical properties of wood; technical uses of wood (paper pulp, destructive distillates, and the like); wood



conditioning (drying and seasoning); wood preservation; identification, qualities, and uses of the wood of important trees. Laboratory fee, \$1.

NOTE: The first ten weeks of the course cover everything up to wood preservation, which occupies the remaining five weeks. Those students who desire to omit wood preservation should register for two hours; those who desire only wood preservation should register for one hour and enter the course for the last five weeks. Professional forestry students are required to take the complete course.

### 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.

**9. Forest Utilization.** Third term, credit four hours. First ten weeks in Ithaca; remainder of term on a forest tract. Lectures, M W F, 11. Forestry Building 126. Practice in logging camps and in mills the latter part of the term. Professor BENTLEY.

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.

**10. Forest Engineering.** Second term, credit two hours. Prerequisite plane trigonometry and one course in surveying. Lectures, T Th, 11. Forestry Building 126. Professors BENTLEY and RECKNAGEL.

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

**11. Forest Mensuration.** Third term, credit five hours. First ten weeks in Ithaca; remainder of the term in special field work. Lectures, M T W, 8. Forestry Building 126. Practice, M, 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.

**13. Timber Trees and Forest Regions.** Second term, credit three hours. Lectures, M W, 12. Forestry Building 122. Practice, F, 2-4.30. Forestry Building 118. Professors BENTLEY and RECKNAGEL.

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.

**14. Silviculture: Forest Ecology.** First six weeks of third term, credit three hours. Open only to professional forestry students. Prerequisite course 13 and Botany 2 or their equivalents. Lectures, M T W Th F, 10. Forestry Building 122. Practice, W, 2-4.30, S, 8-1. Forestry Building 118. Professor SPRING.

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

**15. Silviculture: Natural Reproduction and Care of the Forest.** Beginning the seventh week of the third term, credit three hours. Prerequisite courses 13 and 14. Lectures and practice to be arranged. Professor SPRING.

A technical discussion of the silvicultural methods of producing 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.

**16. Silviculture: Forest Planting and the Forest Nursery.** Second term, credit three hours. Lecture, W, 9. Forest Building 122. Practice, S, 8-1. Forestry Building 118. Professor SPRING and Mr. ———.

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 two hours. Open only to professional forestry students. Lectures, M F, 9. Forestry Building 126. Professor HOSMER.

Protection of forests from fire and other enemies. (Protection from injury by insects and fungi is given in Entomology 41 and Plant Pathology 1, 2, 9, respectively.)

**19. Forest Policy, Forest Law, and History of Forestry.** Second term, credit three hours. Lectures, M W F, 11. Forestry Building 122. Professor HOSMER.

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

Course 19 should not be elected by others than professional forestry students, unless they have had courses 2 and 3, or course 6.

**20. Forest Management: a. Forest Organization.** Third term, credit three hours. Open only to graduate students. First ten weeks in Ithaca; remainder of the term on a forest tract. Lectures, M W F, 9. Forestry Building 126. In camp: lectures, T, 10, S, 8 and 10. Practice all day M F. Professor SPRING.

The organizing of a forest property for management. An important part of this course is a critical study of a working plan on a large forest tract in New York State; the course includes practice in forest engineering under direction of Professor BENTLEY, and field studies in forest administration.

**b. Forest Finance.** First term, credit two hours. Lectures, T W, 9. Forestry Building 126. Professor RECKNAGEL.

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

**21. Forest Administration.** First term, credit two hours. Prerequisite course 20. Lectures, M Th, 9. Forestry Building 126. Practice, S, 9-11.30. Forestry Building 126. Professor RECKNAGEL.

The administrative organization and business practice in federal, state, and private forestry. Field work in forest administration is given in camp on a forest tract in the third term, in connection with course 20.

**22. Seminary.** First and third terms. Two hours a term. Open only to graduate students. Hours to be arranged. Forestry Building 126. Professors HOSMER, SPRING, RECKNAGEL, and BENTLEY, and Assistant Professors CHANDLER and COLLINGWOOD.

Field and classroom conferences on important phases of forestry.

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

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, and BENTLEY, and Assistant Professors CHANDLER and COLLINGWOOD.



## HOME ECONOMICS

A four-year course in home economics has been organized for students who desire to specialize in this work. All students who expect to specialize in home economics must report to the Department before completing registration for the first term of the freshman year.

1. **Foods and Nutrition, Survey Course.** First term, credit three or five hours. May be taken in any year. Only twenty students may be admitted to the laboratory of this course. Lectures and recitations, M W F, 9. Home Economics Building 100. Practice, T Th, 2-5. Professor ROSE and Miss KELLEY.

A course intended for students registered in any department of the University who desire a general knowledge of foods and nutrition. The lectures will deal with the various phases of human nutrition. Laboratory fee, \$10.

2. **Supervised Study.** First term, credit one hour. Open only to freshmen in home economics and required of them. Lecture, W, 10. Laboratory, W, 2-4, or S, 9-11, in alternate weeks. Home Economics Building 245. Assistant Professor HAZARD.

2a. **Elementary Sewing and Handicraft; Elementary Cookery.** Second term, credit in sewing one hour, credit in cookery one hour. This course or its equivalent is required of all home economics students. Sewing practice, T or Th, 10-1, or S, 9-12. Home Economics Building 300 and 415. Cookery practice, M, 2-5, one section, or S, 9-12, two sections. Registration limited to twenty in each section. Assistant Professors WARNER and HENRY, Misses GLEASON and KELLEY, and Mrs. BOYS.

The course in sewing and handicraft includes problems in design and color applied to accessories of the dress and the house. These problems will be worked out through sewing, embroidery, and other handicraft. The work consists of demonstrations, discussions, and practice. Students provide all materials subject to the approval of the instructor. Estimated expense, \$5; laboratory fee, \$2.

The course in cookery includes the theory and practice of the fundamental principles and methods of cookery and the selection and care of kitchen utensils. The work of this course is preparatory to course 3. Laboratory fee, \$2.

3. **An Introductory Course in Foods.** First and second terms; credit, first term, five hours, second term, four hours. Prerequisite Biology 1 and Chemistry 1. Chemistry 83, 92, and 93 must precede or accompany this course, which should be taken in the sophomore year. First term: Lectures, M W, 11. Home Economics Building 245. Practice, M W F, 2-5, two sections, or T Th S, 10-1, one section. Second term: Lecture, F, 11. Home Economics Building 245. Practice, M W F, 2-5, two sections, or T Th S, 10-1, one section. First term, Assistant Professor HENRY, Mrs. BRADFORD, and Mrs. BOYS; second term, Mrs. BOYS, Mrs. BRADFORD, and Miss SMITH.

A course for establishing a fundamental knowledge of foods. The lectures will include a discussion of the composition and characteristics of foodstuffs; sources and methods of manufacture of foods; principles of selection and methods of preparation of foods; preservation of foods; conservation of foods; comparative nutritive and economic values of various foods. Laboratory practice in applying scientific principles to food preparation will be given. Laboratory fee, \$15 each term, part returnable.

4. **Household Sanitation.** First term, credit one hour. Should be preceded or accompanied by Dairy Industry 15 and Physics 1, and must be taken with Physical Education 11. Lecture, S, 12. Required of seniors in home economics. Home Economics Building 245. Miss KELLEY.

The lectures and practice in this course deal with the sanitary conditions of the house and site; heating, lighting, ventilation of the house, and the disposal of refuse; the relation of bacteriology to the household in cleaning, in the preservation of foods, in diseases, and in disinfection; emergencies and home nursing.

5. **Institution Management: Equipment and Organization.** Second term, credit three hours. Open only to those students who give evidence of ability in this direction. Prerequisite courses 3, 5b, 5c, and 6, or the equivalent. Should

be taken in the senior year. Lecture, M, 9. Home Economics Building 100. Practice, hours by arrangement. Miss ———.

5a. **Institution Management: Survey Course.** Second term, credit two hours. Lecture, F, 9. Home Economics Building 100. Practice, T, 2-5. Miss ———.

A general course in lunch-room management for seniors who wish a knowledge of the problem of feeding large numbers, and who are not specializing in institution management. Laboratory fee, \$2.

5b. **Institution Management: Large Quantity Cooking.** First term, credit two hours. Practice, hours by arrangement. Home Economics Cafeteria. Miss ———.

A course in large quantity cooking intended for seniors who are specializing in institution management. Laboratory fee, \$1.

5c. **Institution Management: Institution Buying.** Second term, credit two hours. Lecture, W, 8. Home Economics Building 245. Practice, F, 2-5. Miss ———.

A course in institution buying intended for juniors who are specializing in institution management. Laboratory fee, \$2.

6. **Dietetics.** Second term, credit five hours. Prerequisite course 3, Chemistry 83, and Biochemistry 14; should be taken in the junior year. Lectures and recitations, T Th, 9, S, 8-10. Home Economics Building 100. Practice, T Th, 10-1, two sections, or T Th, 2-5, one section. Professor ROSE, Assistant Professor HENRY, and Miss SMITH.

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 and for institutions; consideration of special problems of nutrition, as in the feeding of infants and feeding in cases of abnormal metabolism. Laboratory work will include practice in estimating, planning, and preparing dietaries. Laboratory fee, \$10, part returnable.

7. **Foods and Nutrition, Survey Course.** First term, credit three or four hours. Lectures and recitations, M W F, 9. Home Economics Building 100. Practice, S, 8-11. Professor ROSE and Miss KELLEY.

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

8. **Design.** First and second terms, credit three hours a term. To be taken in the junior year. First term: Lecture, T, 10. Home Economics Building 245. Practice, T Th, 2-5, or W, 8-11, and F, 9-12. Home Economics Building 415. Second term: Lecture, M, 10. Home Economics Building 245. Practice, M W, 2-5, or W F, 10-1. Home Economics Building 415. Assistant Professor WARNER.

A course dealing with the principles of art expression and their application to the problems of everyday life. In the first term the theory of color and design will be considered, and special application will be made to wearing apparel. The object of the work is to give to students a working knowledge of color and to help them to express themselves appropriately in their clothing. In the second term interior decoration and home furnishing will be considered, and the principles of color and design will be applied to home surroundings. The object of the work is to develop in the students good judgment and taste in the selection and arrangement of home furnishings, to the end that they may express themselves in their environment. Laboratory fee, \$4 a term.

9. **Design, Advanced Course.** Second term, credit two hours. Prerequisite course 8. Practice, hours by arrangement. Home Economics Building 415. Assistant Professor WARNER.



This course is open to students who have 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.

10. **The House.** First and second terms, credit two hours a term. Should be accompanied by course 8. First term: Lecture, Th, 10. Home Economics Building 245. Practice, M, 2-5, W, 2-5, or S, 8-11. Home Economics Building 415. Second term: Lecture, M, 11. Home Economics Building 245. Practice, T, 2-5, Th, 2-5, or F, 2-5. Home Economics Building 415. Assistant Professor YOUNG.

A course dealing with the house structure, considered from the standpoint of economics and of architecture, accompanied by the analysis of forceful types of plans and exteriors. The object of the course is to develop in the student rational standards of judgment on housing problems by a discussion of the relation of the house plan to home making, to the individual family, and to the individual site. Special attention will be given to the planning of kitchen and pantry. Laboratory fee, \$1 a term.

12. **Woman and the Family.** Second term, credit three hours. Lectures, T Th S, 12. Home Economics Building 100. Professor VAN RENSSELAER and Assistant Professor HAZARD.

The 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. Opening of occupations and professions to women; law governing the family; the family a basis of civilization; a study of modern problems of women and the home, suffrage, education, economic function of woman and the family.

13. **Women in Industry.** First term, credit three hours. Lectures, T Th, 9. Home Economics Building 100. Laboratory, M, 2-5. Assistant Professor HAZARD.

A study of woman's gainful occupations, conditions, and problems in town or country from the fifteenth to the twentieth century. The course includes a study of (a) new problems for women in industries presented by war conditions in Europe and the United States; (b) the reaction of the new war work upon the labor market, wages, and trade union demands; (c) modern factory life with its problems for women and children; (d) the history of women as wage earners before the twentieth century. The laboratory periods will be spent in visiting factories, department stores, and women doing farm work in the country.

13a. **Welfare Supervision of Women in Industry.** Second term, credit three hours. Prerequisite course 13. Lectures, T Th, 10. Laboratory, M, 2-5. Home Economics Building 100. Assistant Professor HAZARD.

Intended for institutional management students who intend to be welfare supervisors or factory inspectors. This course includes an intensive study of conditions and problems with proposed remedies in industries where women and children are concerned. The methods of welfare supervision attempted in other countries as well as in this State and the constructive aid possible from factory inspection will be studied and criticized. This course attempts to correlate the student's previous courses in sanitation, physics, physiology, chemistry, dietetics and nutrition, household and institutional management, with the new problems and facts presented by the vocation of welfare supervision. Actual practice as assistant to a welfare supervisor in some city in this State during a summer month is expected to accompany this course.

14. **Household Management.** First term, credit three hours. Prerequisite Political Science 51. Required of seniors in home economics. Lectures, T Th S, 11. Home Economics Building 100. Professor VAN RENSSELAER and Miss KELLEY.

This course includes a study of the family income, cost of living, household accounts, problems of domestic service, methods of housekeeping, cost of food, shelter, and clothing.

Each student is required to spend one week in one of the practice houses to make a preliminary household study of the division of the food budget and of the problems of administering a small household. Laboratory fee, \$5.

**14a. Household Management: Apartment Problem.** Second term, credit one hour. Prerequisite courses 3, 6, and 14. Required of seniors in home economics. Professor VAN RENSSELAER and Miss KELLEY.

During the term each senior student will be required to live for two weeks in one of the practice houses. The purpose of this course is to apply the results gained in the preliminary work done in course 14. Laboratory fee, \$10.

**15. Introductory Course in Clothing and Textiles.** First or second term, credit three hours. Required of all home economics students. First term: Practice, T Th S, 10-1, two sections, or M W F, 2-5, one section. Second term: Practice, T Th, 2-5, and S, 10-1, one section. Home Economics Building 300 and 400. Registration limited to fourteen students in each section. Misses GLEASON and HILLHOUSE.

This course includes hand and machine sewing, drafting and designing of patterns, household mending, and simple embroidery. A cooking apron, a combination suit, a lingerie blouse, a silk or cotton petticoat, a sport skirt, and a summer dress are made. The work consists of demonstrations, discussions, and practice. Students provide all materials subject to the approval of the instructor. Estimated expense, approximately \$12 to \$15. Laboratory fee, \$3.

**15a. Garment Construction.** Second term, credit three hours. Prerequisite course 15. Lecture, T, 8. Practice, T Th, 10-1, or M W, 2-5. Home Economics Building 300. Registration limited to fourteen students in each section. Assistant Professor BLACKMORE and Miss GLEASON.

This course includes intensive work in the development of hand and machine sewing, drafting and adapting of patterns, knitting and crocheting. A set of undergarments and a middy blouse are made. The presentation of subject matter for elementary and secondary schools is emphasized. Students provide all materials subject to the approval of the instructor. Estimated expense, \$5 to \$10. Laboratory fee, \$3.

**16. Draping, Drafting, Designing, and Dressmaking.** First term, credit three hours. Prerequisite courses 15 and 15a. Lecture, M, 10. Practice, W, 8-11, and F, 9-12, or T Th, 2-5. Home Economics Building 300. Registration limited to fourteen students in each section. Assistant Professor BLACKMORE and Miss HILLHOUSE.

This course includes drafting, designing, and modeling of patterns for various types of figures. Practice is given in the construction of waists and skirts. A tailored cotton waist, a semi-tailored silk waist, and a wool skirt are made. The work consists of lectures, demonstrations, discussions, and practice. Students provide all materials subject to the approval of the instructor. Estimated expense, \$8 to \$10. Laboratory fee, \$3.

**17. Selection, Design, and Technique of Clothing.** Second term, credit two hours. Prerequisite courses 8, 15, 15a, and 16. The second term of course 8, costume design, should be taken parallel to course 17. Practice, W F, 10-1, or M W, 2-5. Home Economics Building 300. Registration limited to fourteen students in each section. Assistant Professor BLACKMORE and Miss GLEASON.

This course includes the cutting and making of a child's dress; the designing and modeling in practice material, and the making in silk or wool, of an afternoon or business dress; the designing and making of one other garment, depending upon the ability and need of the student. The work consists of demonstrations, discussions, and practice. The economical purchase of a wardrobe will be considered, also a comparison of commercial products with those made by hand. Students provide all material subject to the approval of the instructor. Estimated expense, from \$15 to \$20. Laboratory fee, \$2.

**18. Millinery.** First or second term; first term, credit two hours, second term, credit one or two hours. Prerequisite course 15. Required of all students specializing in clothing and textiles. First term: Practice, two-hour section,



W, 8-11, and F, 9-12. Second term: Practice, two-hour section, M W, 10-1; one-hour section, F, 10-1. Home Economics Building 310. Registration limited to twenty students in each section. Miss HILLHOUSE.

The course considers the methods of manipulation in the construction of hat frames out of wire, buckram, willow, and crinoline; the use and renovating of old materials, practice in making winter and spring hats from velvet, satin, straw, and other 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 materials; estimated expense, from \$6 to \$10. Laboratory fee, \$2 for one hour credit, \$3 for two hours credit.

**19. Textiles.** First term, credit two hours. Required of students specializing in textiles and clothing and of students working for certificates for teaching general home economics. Prerequisite Chemistry 83. Lecture, Th, 9. Practice, T or Th, 2-5. Home Economics Building 300. Registration limited to twenty students in each section. Assistant Professor BLACKMORE.

This course includes a history of the processes of manufacture, spinning, weaving, and finishing of cotton, wool, silk, and linen; an intensive study of fabrics with a view to their appropriateness in clothing, and an analysis of weaves and making of textile cards; microscopic identification and chemical testing of fabrics, and the composition and characteristics of adulterants; simple dyeing. Estimated expense, \$5. Fee, \$2.

**20. Special Problems.** First and second terms, credit and hours by arrangement. Prerequisite a fundamental knowledge of home economics. Open to seniors and graduate students in home economics, and to other qualified persons by special arrangement. No student may register in this course without the permission of the heads of the Department. Instruction by members of the departmental staff and others.

A course intended for the development of the individual student in particular lines of work. Special facilities in lectures and practice classes will be arranged for those intending to teach home economics. The course will include a consideration of the logical methods of organizing and developing courses of study. Problems of original investigation will be planned for graduate students, or for undergraduate students who have proved themselves capable of undertaking such work.

**21. Advanced Cookery.** First term, credit one hour. Prerequisite course 3. Practice, M or W, 2-5. Open to juniors. Mrs. BOYS.

This course is planned to give advanced work in the preparation of foods. Laboratory fee, \$5.

**21a. Experimental Cookery.** First and second terms, credit two hours a term. Prerequisite courses 3 and 21. Open only to seniors. First term, T Th, 2-5, or W, 8-11, and F, 9-12. Second term, T Th, 2-5. First term, Assistant Professor BREWER; second term, Mrs. BOYS.

Laboratory fee, \$10.

**22. Bibliography and Advanced Reading in Nutrition.** First term, credit one hour. Open only to seniors in home economics. Th, 8-11. Home Economics Building 415. Assistant Professor HENRY.

**23. Extension in Home Economics.** First and second terms, credit three hours a term. Open only to seniors who have given evidence of their ability to develop this work satisfactorily. First term: Lecture, M, 10. Home Economics Building 265. Practice, W F, 2-5. Home Economics Building 260. Second term: Lecture, W, 9. Home Economics Building 265. Practice, W F, 2-5. Home Economics Building 260. Professor VAN RENSSELAER, Assistant Professor BREWER, and others.

Laboratory fee, \$5 a term.

**26. Accounting.** First and second terms, credit two hours a term. Open only to seniors in home economics. First term, M W, 8. Second term, M W, 12. Home Economics Building 100. Miss ———.

The first term will be devoted to the study of fundamental principles of book-keeping and accounting. In the second term special study will be given to cafeteria, tearoom, and institutional problems.

27. **Vocational Work in Clothing.** First and second terms, credit two hours or more. Prerequisite courses 15, 15a, 16, 17, and 19. Required of and open only to students who expect to teach in vocational high schools. Practice by arrangement. Home Economics Building Room 305. Miss INGERSOLL.

This course includes all phases of garment making and remodeling, such as are found in a regular dressmaking shop. Garments are made for outside custom. In this way an actual commercial situation is maintained which will enable the teachers to establish training trade courses in the vocational high schools. Laboratory fee, \$5 a term.

28. **Woman and the State.** Second term, credit three hours. Lecture, T Th S, 9. Home Economics Building 245. Assistant Professor HAZARD.

This course is designed to prepare students for their future interests and responsibilities as voting citizens by making them familiar now with social, industrial, and world conditions and problems. It is combined with a study of those political organizations and groups through which they will have to work in order to secure legislative and administrative action necessary to establish better living conditions for town, city, state, and nation.

## LANDSCAPE ART

Instruction in the Department of Landscape Art is planned to meet the requirements of several classes of students, as follows: (1) Students in general agriculture or others who desire a better understanding of the principles underlying landscape architecture. For such students the Department offers several courses designed to foster an appreciation of landscape in general, and an understanding of the basic principles governing both the arrangement and the beautification of land for various uses. (2) Students in technical courses in this or other colleges of the University whose work is allied to landscape art and who wish a better understanding of such principles of landscape design as relate to their particular field of work. (3) Professional students in landscape art.

The sequence of studies outlined below includes the required work of the College of Agriculture, technical work of the Department, and other corollary courses, constituting a four-year undergraduate course in landscape design, leading to the degree of bachelor of science. It is designed to train the student in the understanding and appreciation of the history and basic principles of landscape architecture; to teach general methods of design, and the application of principles to both design and planting; and to give a fundamental knowledge of plant materials, engineering, and architecture as applied to landscape work.

In the student's senior year he is required to major (register for eight credit hours) in design, planting, or construction, and also to register for three credit hours in each of the remaining subjects.

A fifth, or graduate, year leads to the special degree of master in landscape design. In this year the student's course is individually organized for specialization within a chosen branch of landscape work, and his general advance in the professional field is fostered.

It is important that on the completion of either the four- or the five-year course the student should continue his training by means of several years experience in the office of a reputable landscape architect, and if possible by domestic and foreign travel. As far as possible, the Department will aid its students in finding opportunity for office apprenticeship. See special lectures and excursions, page 64.

While lecture courses are open to election for all students who meet the general prerequisites, the Department reserves the right to restrict enrollment in design courses to those who intend to fit themselves for professional practice, who give evidence of ability, and who continue to maintain a satisfactory standard of proficiency in the work.



**Recommended sequence of studies for professional students in landscape art**

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

The following schedule is a carefully arranged sequence of courses which, if consistently adhered to, will enable the student to take all required work, and also, without conflict of hours, the electives most important to his needs. Failure to follow this sequence in the first two years of the course is likely to complicate later scheduling of work.

All students intending to follow the professional course in landscape art should report to this Department at the beginning of their freshman year.

Freshman year			
	Hours 1st term		Hours 2d term
<b>English 1</b> .....	3	<b>English 1</b> .....	3
<b>Chemistry 1</b> .....	6	<b>Biology 1</b> .....	3
<b>Zoology 1</b> .....	3	<b>Zoology 1</b> .....	3
<b>Botany 1</b> .....	3	<b>Botany 1</b> .....	3
<b>Drawing 2</b> .....	2	<b>The Natural History of the Farm</b> ..	1
		Mathematics 1 (Solid Geometry)	3
		or	
		<b>Drawing 2</b> .....	2

Sophomore year			
	Hours 1st term		Hours 2d term
<b>Geology 1</b> .....	3	<b>Physics 2</b> .....	5
<b>Physiology</b> (Botany 20) .....	4	Architecture 11 (Ele- ments of Architec- ture) .....	3
Architecture 9 (Descrip- tive Geometry) .....	3	Architecture 13 (Shades and Shadows) .....	2
Architecture 11 (Ele- ments of Architec- ture) .....	3	Mathematics 3 (Trig- onometry) .....	3
Landscape Art 3 .....	2	Drawing 4 (Perspec- tive) .....	2
Landscape Art 4 .....	2	Landscape Art 4b ....	2
Landscape Art 4a .....	1	Landscape Art 9 .....	2
		Floriculture 8 .....	3
		Floriculture 8a .....	2
		Drawing 2a .....	5
		Landscape Art 13 ..	6

Junior year			
	Hours 1st term		Hours 2d term
<b>Political Science 51</b> .....	3	<b>Political Science 51</b> .....	3
Architecture 50 .....	1	Architecture 50 .....	1
Civil Engineering 10 .....	3	*Civil Engineering 11a .....	2
Landscape Art 11 .....	4	Landscape Art 11 .....	4
Landscape Art 17 .....	3	Landscape Art 16 .....	3

Senior year		Hours 1st term
Architecture 50a (History of Architecture) .....		1
Landscape Art 15 .....		3 or 8
Landscape Art 16 .....		3 or 8
Landscape Art 18 .....		3 or 8
Landscape Art 25 .....		1

The above schedule provides for specialization in design, planting, or construction.

\*In addition to this course three weeks attendance is required immediately following the second-term examinations at the Summer Survey Camp of the College of Civil Engineering (see Announcement of the College of Civil Engineering), credit two hours.

Senior students who have not previously taken history of architecture should elect it.

Students who have not offered solid geometry for entrance should elect it in the freshman year.

Students who have not offered plane trigonometry for entrance should elect it before the junior year.

Students proposing to specialize in plant work should take plant physiology to satisfy the college requirement in physiology.

Suggested additional electives

	Hours 1st term		Hours 2d term		Hours 3d term
Soils 1.....	3	Soils 1.....	3	Plant Pathology 1...	3
Plant Pathology 1.....	3	Plant Pathology 1.....	3	Plant Pathology 2...	3
Entomology 3.....	3	Plant Pathology 2...	3	Entomology 3.....	3
Civil Engineering 65...	3	Entomology 3.....	3		
Greek Art and Antiqui- ties 1 (History of Greek Sculpture)....	3	Entomology 41.....	2		
Philosophy 4 (Fine Arts).....	3	Geology 30.....	3		
		Civil Engineering 65..	3		
		Architecture 40 (Mod- ern Architecture)..	2		
		Greek Art and Anti- quities 1 (History of Greek Sculpture)..	3		

Courses suggested for students not taking the professional course in landscape art

Courses 1, 2, 3, 6, and 20 are without prerequisites and may be taken in any order desired. Courses 4, 4a, 4b, 13, 13a, and 17a are open to any student who satisfies the prerequisites or the acceptable equivalent.

Description of Courses

Instruction is given in the Landscape Art Building.

[1. **Appreciation of Landscape.** First term, credit one hour. Lecture, T, 11. Professor DAVIS.] Not given in 1918-19.

A general course introductory to an appreciation of landscape, and explaining the relation of natural landscape to landscape design.

2. **A Brief Introduction to Landscape Design.** First and second terms, credit two hours a term. Lecture, T, 10. Recitation, Th, 10. Professor DAVIS and Assistant Professor MONTILLON.

A discussion of the first principles involved in landscape development, with especial application to farmsteads, cottage grounds, and smaller suburban properties. 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.

3. **History of Landscape Design.** First term, credit two hours. Lectures, M W, 10. Open to general election, and intended for sophomores in landscape art. Professor DAVIS.

A study of the literature and the development of landscape design, and of the influences that have affected it at different periods and in different countries. A comprehensive study of the history of landscape design in relation to the landscape work of the present day. Laboratory fee, \$1 to cover cost of blue-print illustrations distributed to the class.

4. **Theory and Aesthetics of Landscape Design.** First term, credit two hours. Prerequisite course 3. Lectures, M W, 12. While this course is primarily for students specializing in this Department and is intended to lead up



to the courses in design, it may be elected by others who satisfy the Department of their preparation and fitness to take the work with profit. Professor DAVIS.

Theories of composition applied to landscape design; factors influencing landscape composition.

**4a. Theory: Planning of Private Properties.** First term, credit one hour. Prerequisite course 3, and, for students specializing in landscape art, course 4. Lecture, W, 9. Professor DAVIS.

A study of the principles and ideals involved in the development of private properties or residences; a discussion of their application as exemplified in such specific problems as country estates, cottage homes, suburban and city residences. A technical discussion, intended for students specializing in landscape design and also for those who desire a more thorough understanding of the planning of private properties than may be obtained in course 2.

**4b. Theory: Planning of Public Properties.** Second term, credit two hours. Prerequisite for landscape students only, courses 3 and 4. Lectures, M W, 8. Professor DAVIS.

A study of the principles involved in the landscape development of public properties and their application; a discussion of city park systems, including large parks, parkways, squares, and playgrounds, and of country villages with regard to the treatment of streets and village green.

**6. Rural Improvement.** A course of six or more lectures beginning after the Christmas recess, without credit. These lectures are outlined primarily for winter-course students. Time to be announced. Professor CURTIS.

Brief outlines and discussions of the ways and means of bettering out-of-door conditions. The course deals with questions of rural improvement in such a manner as to enable the student from the farm or the village to appreciate his landscape problems and opportunities, and to gain a point of view in landscape methods. Specific suggestions are offered for the solution of some of the simpler home problems.

**9. Landscape Design, Elementary Course.** Second term, credit two hours. Prerequisite courses 3 and 4, Architecture 9, 11, and 13. Intended for sophomores in landscape art. Hours to be arranged. Assistant Professor MONTILLON and Mr. SCHUMM.

A series of problems explanatory of method in the designing of landscape properties and illustrative of the theory of design. The course is a study in graphic expression and particularly of methods of indication in landscape plans. Laboratory fee, \$1.

**11. Landscape Design, Intermediate Course.** First and second terms, credit four hours a term. Prerequisite courses 3, 4, 4a, 9, and 13, Architecture 9, 11, and 13, and Drawing 2, 3, and 4. Intended for juniors in landscape art. Hours to be arranged. Assistant Professor MONTILLON and Mr. SCHUMM, assisted in judgments by the departmental staff.

A series of problems, continuing the series of course 9, based upon topographical surveys and programs of requirements and furnishing a medium for the study of composition in landscape design—plans with interpretative sections and perspectives—presentation in different mediums. Laboratory fee, \$2 a term.

**13. Plant Materials.** Third term, credit six hours. Prerequisite Botany 1. Lectures, M W, 8. Laboratory and field trip, M F, 10-12.30, 2-4.30. Open to general election but intended for juniors in landscape art. Professor 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.

**13a. A Brief Introduction to Plant Materials.** First term, credit three hours. Lecture, M, 9. Laboratory and field trips, M F, 2-4.30. Professor CURTIS.

This course is an abridgment of course 13 and is intended for general election. Laboratory fee, \$1.50.

**\*15. Landscape Design, Advanced Course.** First and second terms, credit three or eight hours a term. Prerequisite course 11 and its prerequisites, and

courses 13 and 17. Intended for seniors in landscape art. Two criticism periods a week, to be arranged, and additional drafting hours. Assistant Professor MONTILLON, assisted by the departmental staff.

Course 15 continues the series of course 11 and includes problems on local land and some study of group plan. A series including short sketch problems as well as problems of several weeks duration. Laboratory fee, \$1 a term.

**\*16. Landscape Engineering and Details of Construction.** Second and first terms; credit, second term, three hours, first term, three or eight hours. Interrelated with course 15. Prerequisite Civil Engineering 10; must be accompanied by Civil Engineering 11a. Intended for seniors in landscape art. Lecture: second term, M, 12; first term, Th, 11. Practice, T Th, 2-5. Professor DAVIS and Mr. SCHUMM.

The engineering peculiar and necessary to landscape work; methods of survey; drainage methods; earthwork; types of road and walk construction; finished grade plans; together with mapping in plans, profiles, and sections, modeling, estimates of cost, and specifications.

**17. Planting Design, Elementary Course.** First term, credit three hours. Prerequisite course 13. Intended for juniors in landscape art. Lecture, F, 8. Drafting and outdoor practice, T Th, 2-4.30. Professor CURTIS.

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

**17a. A Brief Introduction to Planting Design.** First term, credit two hours. Prerequisite course 13a. Intended for general election. Lecture, W, 8. Practice, W, 2-4.30. Professor CURTIS.

A study of composition in trees, shrubs, and vines, including the designing of simple plant groups and small home grounds. Laboratory fee, \$1.50.

**\*18. Planting Design, Advanced Course.** First term, credit three or eight hours. Interrelated with course 15. Prerequisite course 17. Intended for seniors in landscape art. Drafting with criticism, hours to be arranged. Professor CURTIS.

A detailed study of the use, adaptation, arrangement, and æsthetic composition of plants with reference to problems of landscape design together with the preparation of nursery lists and estimates of costs.

**20. Propagation.** First and second terms, credit one hour a term. Laboratory, with occasional discussions, T or W, 2-4.30. Mr. HUNN.

A course in the propagation and growth of woody plants commonly used in landscape planting.

**25. Seminary.** First and second terms, credit one hour a term. Intended for seniors in landscape art. M, 4.30-6. Departmental staff.

Discussions of important questions relating to various phases of the landscape architect's work, reviews of literature, and reports on investigations.

**Special Lectures and Excursions.** Occasionally during the year, at times to be announced, special lectures on landscape subjects will be held under the auspices of the Department. Representative landscape architects, park superintendents, and gardeners will be speakers. While these lectures are open to the public, they are intended to augment departmental instruction and should be of special interest to the students in landscape art.

In the course of, or at the end of, each year, inspection trips will be taken for the purpose of studying, at first hand, important examples of good American landscape work.

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\*Students wishing to elect courses 15, 16, or 18, are required to register in all three, registering for eight hours in one, and for three hours in each of the other two.



### METEOROLOGY

1. **Meteorology and Climatology.** First or second term, credit three hours. Lectures, T Th, 10. Roberts Hall 292. One laboratory period per week. Forestry Building 8. Students must consult the Department in regard to laboratory assignments. Professor WILSON and Mr. 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 work consists of demonstrations, recitations, practice, and comparative studies of general and local weather and climate in relation to agriculture and other industries. Laboratory fee, \$2.

[2. **General Climatology.** Second term, credit three hours. Prerequisite course 1. Professor WILSON and Mr. MORDOFF.] Not given in 1918-19.

This course is designed to give a general knowledge of climatology in its broader and less technical aspects.

3. **Climatology of the United States.** First term, credit three hours. Prerequisite courses 1 and 2. Lectures, T Th, 8. One laboratory period per week. Forestry Building 8. Students must consult the Department in regard to laboratory assignments. Professor WILSON and Mr. MORDOFF.

This course presents a general view of the climates of the United States. It is especially adapted to meet the needs of students in agriculture. Laboratory fee, \$2.

10. **Research.** First and second terms, credit one or more hours a term. Prerequisite permission to register. Hours by appointment. Professor WILSON.

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

### PLANT BREEDING

1. **Genetics.** First or third term, credit four hours or, by special arrangement, three hours. Prerequisite Botany 1 and 20, or equivalents in zoology by permission. Lectures, T Th, 8. Forestry Building 210. One conference period to be arranged. Laboratory, T or Th, 2-4.30. Forestry Building 212. First term, Professor HUTCHISON, Assistant Professor BARKER, and Messrs. FRASER and EYSTER; third term, Assistant Professor BARKER and Mr. FRASER.

A general introductory course and survey of the field of genetics, designed to acquaint the student with the laws of variation and heredity, their application to the improvement of plants and animals, and their bearing upon eugenics. Laboratory studies in the collection and measurement of variations among certain species, in hybridization and selection, and in the laws of segregation and recombination. By special arrangement the course may be taken with three hours credit without the laboratory. Laboratory fee, \$3.

8. **Methods of Plant Breeding.** Second term, credit one hour. Prerequisite course 1. Lecture, S, 9. Forestry Building 210. Professor MYERS.

A study of the application of genetic principles to plant breeding. A consideration of methods, technique, and results, as exemplified by the work of the Department with specific crops.

### Advanced and Graduate Courses

11. **Biometry.** First term, credit two hours. For graduate students only. Lecture, M, 11. Forestry Building 210. Laboratory, W, 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 the like.

13. **Genetics, Advanced Course.** Second term, credit three hours. Primarily for graduate students. Seniors admitted by special arrangement only.

Prerequisite course 1 or its equivalent, and Botany 1, 10, and 20. Lectures, T Th, 9. Forestry Building 210. Laboratory, Th, 2-4.30. Forestry Building 212. Professor HUTCHISON and Mr. ANDERSON.

An advanced course dealing with special topics in genetics, such as the present status and the more important problems in mendelism, linkage, sex inheritance, the pure-line question, selection, and the mutation theory. Laboratory studies of mendelian ratios, linkage, sex inheritance, and the like. Laboratory fee, \$3.

14. **Organic Evolution.** First term, credit two hours. For seniors and graduate students. Prerequisite course 1. Lectures, M F, 9. Forestry Building 210. Assistant Professor BARKER.

A general survey of the development of the theory of evolution from its inception in early Greek times to the present, treated from the biological point of view.

16. **Research.** Throughout the year. For graduate students only. Hours by appointment. Forestry Building. Professors EMERSON, LOVE, MYERS, and HUTCHISON, and Assistant Professor BARKER.

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

17. **Seminary.** First and second terms. One hour a term. For graduate students only. S, 8. Forestry Building 212. Professors EMERSON, LOVE, MYERS, and HUTCHISON, and Assistant Professor BARKER.

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

## PLANT PATHOLOGY

1. **General Plant Pathology.** Credit one, three, or four hours. Prerequisite Botany 1, or equivalent botany of the same type. Lectures if taken must accompany or follow three credit hours of practice and recitation.

LECTURES: First, second, or third term, credit one hour. First term, M or Th, 10; second or third term, M, 10. Home Economics 100. Professor WHETZEL.

Recitations and practice periods in limited sections as follows:

### FIRST TERM

FARM CROPS SECTIONS. Credit three hours. Recitation, Th, 11, Home Economics Building 245, or F, 11, Roberts Hall 392. Practice, W F, 2-4.30, or M T, 2-4.30. Bailey Hall, West Basement. Assistant Professor GREGORY.

POMOLOGY SECTION. Credit three hours. Recitation, Th, 11, Roberts Hall 392, or F, 11, Home Economics Building 100. Practice, Th, 2-4.30, S, 10.30-1. Bailey Hall, West Basement. Assistant Professor HESLER.

FORESTRY SECTION. Credit three hours. Recitation, F, 12. Bailey Hall, West Basement. Practice, T Th, 10-12.30. Bailey Hall, West Basement. Assistant Professor RANKIN.

### SECOND OR THIRD TERM

GENERAL SECTION. Credit three hours. Recitation, F, 12. Practice, W F, 2-4.30. Bailey Hall, West Basement. Professor WHETZEL, Assistant Professors GREGORY, HESLER, and RANKIN, and Miss SMILEY.

A fundamental course treating of the nature, cause, and control of plant diseases, illustrated by studies of the commoner diseases of cultivated crops. Students specializing in those lines indicated by the names of the sections for the first term are advised to schedule their work accordingly. The practice work must be taken in the couplets announced above. Practice sections limited to twenty-four students each. Laboratory fee, \$4.50; breakage deposit, \$3.

2. **Principles of Plant Disease Control.** Prerequisite course 1.

GENERAL SECTIONS. Second term, credit three hours. Recitation, Th, 11. Caldwell Hall 100. Practice, Th, 2-4.30, S, 10.30-1. Bailey Hall, West Basement. Professor WHETZEL and Mr. TAPKE.



**FORESTRY SECTION.** Second term, credit two hours. Recitation, F, 11. Bailey Hall, West Basement. Practice, Th, 10-12.30. Bailey Hall, West Basement. Assistant Professor RANKIN.

A consideration of the principles and the methods of control of 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. The practice sections must be taken in the couplets announced and are limited to twenty-four students each. Laboratory fee, \$1.50 a credit hour; breakage deposit, \$3.

**6. Elementary Mycology.** First term, credit four hours. Prerequisite Botany 1 or its equivalent. Lecture, T, 11. Practice, M T W, 2-4.30. Bailey Hall, East Basement. Assistant Professor FITZPATRICK.

A general introductory course in mycology. Laboratory fee, \$6; breakage deposit, \$3.

**9. Timber Decay and Its Prevention.** Second term, credit one hour. Prerequisite course 1. Lecture, T, 10. Bailey Hall, West Basement. Assistant Professor RANKIN.

A course treating of the cause, nature, and relation to environment of the commoner decay processes of wood, and a consideration of the fundamental principles involved in the preservation of timber for commercial uses. Designed especially for students in forestry, but fundamental as well for general farm practice.

**11. Fungous Diseases of Plants.** First term, credit one hour. Prerequisite course 1 or 6. Lecture, W, 10. Home Economics Building 100. Assistant Professor HESLER.

A lecture course for advanced and graduate students, dealing with the nature of fungous diseases in plants.

**12. Mycology.** First and second terms, credit four hours a term. Prerequisite Botany 1 or its equivalent. Lecture, M, 11. Recitation, W, 11. Practice, M W, 2-4.30. Bailey Hall, East Basement. Assistant Professor FITZPATRICK.

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

**[14. Mycology.** First term, credit four hours. Prerequisite Botany 1 or its equivalent. Assistant Professor FITZPATRICK.] Not given in 1918-19.

An advanced course alternating with course 12, and dealing with the Basidiomycetes.

**15. Phytopathological Histology.** Second or third term, credit two hours. Prerequisite course 1, Botany 9, and permission to register. Lecture, T, 11. Bailey Hall, West Basement. Practice by arrangement. Bailey Hall, East Basement. Professor WHETZEL and Miss SMILEY.

This course is designed for advanced and graduate students. It deals with the histological modifications of plant tissues under traumatic and pathogenic conditions, and a review of the literature of the subject.

**16. Bacterial Diseases of Plants.** First term, credit one hour. Prerequisite course 1 and elementary bacteriology. Lecture, T, 11. Bailey Hall, East Basement. Professor WHETZEL.

An advanced lecture course designed for students who are specializing in plant pathology.

**17. History of Phytopathology.** Second or third term, credit one hour. Prerequisite course 1 and a reading knowledge of French and German. Lecture, W, 8. Home Economics Building 100. Professor WHETZEL.

Designed for graduate and advanced students. In addition to the lecture, individual library assignments will be made.

**19. German Phytopathological Reading.** First or second term, two one-hour periods a week. Without credit for undergraduate students. Hours by

arrangement. Open only to advanced or graduate students who have had elementary training in German. Home Economics Building 100. Professor WHETZEL.

20. **Research.** Throughout the year. Not less than three hours a term. Professors WHETZEL, REDDICK, and BARRUS, and Assistant Professors FITZPATRICK, GREGORY, HESLER, and RANKIN.

Original investigation of problems in plant pathology. Laboratory fee, \$1.50 a credit hour; breakage deposit, \$3.

25. **Seminary.** First and second terms. For graduate students in plant pathology. Hours by arrangement. Bailey Hall, West Basement. Members of departmental staff.

## POMOLOGY

1. **Pomology.** First or second term, credit three hours. Prerequisite for regular students Biology 1 and the farm practice requirements, or Botany 1 and 20. Course limited to one hundred and five students each term, and both regular and special students must obtain permission to register. Lectures, T Th, 11. Roberts Hall 292. Laboratory: First term, Th or F, 2-4.30, or S, 8-10.30. Roberts Hall 202. Second term, Th or F, 2-4.30, or S, 10.30-1. Roberts Hall 202. Assistant Professors HEINICKE and OVERHOLSER, and Messrs. ——— 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, \$3.50; deposit, \$1, to be refunded provided all tools lent to the student are returned in good condition.

8. **Fruit Varieties: Exhibits, Identification, Judging.** First term, credit one hour. Prerequisite course 1. Practice and laboratory, M, T, or W, 2-4.30. Roberts Hall 202. Assistant Professor OVERHOLSER.

This course consists in a study of varieties, both from the standpoint of the tree and the fruit, the preparation of exhibits, identification and description of varieties and species, and the judging of single plates and the largest and best collection of fruit. It includes a study of varieties of apples, pears, peaches, plums, grapes, and other fruits that may be available. Considerable practice is given in the judging and identification of fruit and in the study of the tree characters of some of the more important varieties and species. Students in this course may compete for judging teams to practice judging at the annual meetings of the State Horticultural Society at Rochester. Preparation of the fruit exhibit at the College is required of the students in the course. Laboratory fee, \$3.50.

9. **Packing Fruit for Market.** First term, credit two hours. Prerequisite courses 1 and 8, and permission to enter; must be preceded or accompanied by Entomology 3, Plant Pathology 1, and Soils 1. Practice, S, 8-1. Roberts Hall 202. Professor REES.

Particular emphasis is placed on packing apples in barrels, boxes, and other retail packages, but the work covers such fruits as peaches, pears, plums, and grapes in so far as they are available. The effect of grades and packages on distribution and marketing is fully discussed. The class may be required to spend one week in harvesting and packing fruit in a commercial orchard at Port Byron. Laboratory fee, \$3.50.

10. **Economic Fruits of the World.** Second or third term, credit two hours. Prerequisite courses 1 and 8, and Botany 1. Lectures or recitations: second term, W F, 8; third term, T Th, 8. Roberts Hall 292. After April 15 in the second term a laboratory period, to be arranged, is substituted for the Friday lecture. In the third term several laboratory periods, to be arranged, are substituted for a corresponding number of lectures. Assistant Professors OVERHOLSER and HEINICKE.

A study of the botanical, ecological, and physiological characters of all species of fruit-bearing plants of economic importance, such as the date, the banana, nut-bearing trees, citrus fruits, newly introduced fruits, and the like, with special refer-



ence to their cultural requirements in certain parts of the United States and the insular possessions. The characteristic cultural methods of each fruit not discussed in a previous course are considered. Laboratory fee, \$1.

**11. Orchard Field Trip.** Credit one hour. Prerequisite courses 1, 8, and 10, and permission to register. To be taken during the three weeks preceding the opening of the first term. Students who wish to take this trip must signify their intention by July 20 preceding. Expense of the trip must be met by the individual student. Assistant Professors HEINICKE and OVERHOLSER.

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

**12. Experimental Pomology.** Second term, credit two hours. Prerequisite courses 1, 8, and 10, and Botany 1, and permission to register; must be preceded or accompanied by Botany 20, Plant Pathology 1, Entomology 3, and Soils 1. Lectures, T Th, 8. Roberts Hall 292. Professor CHANDLER.

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.** Third term, credit one hour. Prerequisite courses 1, 8, 10, and 12, and permission to register. Hours to be arranged. Assistant Professor HEINICKE, and Messrs. ——— and ———.

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.

**19. Research.** Throughout the year, credit one hour a term. Prerequisite courses 10 and 12, Botany 1 and 20, Plant Pathology 1, Entomology 3, and Chemistry 1 and 32. Professors CHANDLER and REES, and Assistant Professors OVERHOLSER and HEINICKE.

Students who have not had the prerequisites but who wish to do reading in some special line, may have the assistance of members of the Department, but will not receive credit for the work.

**20. Seminary.** Once each month throughout the year. Required of graduate students in pomology. Roberts Hall 292. Members of the departmental staff.

Undergraduates who are interested will be welcome to attend without receiving credit toward graduation.

## POULTRY HUSBANDRY

**1. Poultry Husbandry.** Second or third term, credit three hours. Second term: Lectures, T Th, 11. Poultry Building 375. Practice, T W, 2-4.30. Poultry Building 300. (If registration requires it, another section will be given M, 2-4.30.) Third term: Lectures, T Th, 11. Poultry Building 375. Practice, Th, 2-4.30. Poultry Building 300. Professor RICE and ———.

An introductory and prerequisite course for students desiring to take specialized courses in poultry husbandry. Those desiring a general course should see courses 2a, 3, 3a, and 10. The course includes the anatomy and physiology of poultry; the study of the egg; embryology; nomenclature; bibliography; environmental conditions; the history and scope of poultry husbandry.

**1a. Poultry Husbandry.** First term, credit three hours. Prerequisite course 1. Lectures, T Th, 11. Poultry Building 375. Practice, T or W, 2-4.30. Poultry Husbandry 125. Professor RICE, Assistant Professor KENT, and Mr. BANNER.

Principles and practice of poultry breeding; incubation and brooding; diseases, parasites, and sanitation.

**2. Poultry Feeds and Feeding.** First term, credit two hours. Prerequisite course 1 and Animal Husbandry 1. Lecture or recitation, T, 10. Practice, W or Th, 2-4.30. Poultry Building 325. Messrs. HEUSER and ———.

The physiology of digestion; a study of feeds suitable for poultry; the principles of feeding for egg production, fattening, and rearing; the compounding of poultry rations.

**2a. Flock Management.** First, second, or third term, credit one hour. Must be preceded or accompanied by course 2 or by course 10, and preferably also by Animal Husbandry 1. Persons registering for this course for the first term may not register for course 3 or 3a. Practice periods and extra time arranged by appointment. Practice, reporting three times daily, including Sunday, for four weeks, 7.45-8.30, 12.45-1.15, 4.30-5, except during the first term, when the night period is 4.15-4.45. Poultry Building. Messrs. HEUSER and ANDREWS.

Practice in record keeping, and management of fowls for egg production and for fattening, including preparation for market. A series of observations and tests will be carried on by the class. Assigned reading and a written examination will be required.

**3. Incubator Practice.** First, second, or third term, credit one hour. Must be preceded or accompanied by course 1a or by course 10. Practice periods and extra time arranged by appointment. Practice, reporting three times daily, including Sunday, for four weeks, 7.45-8.30, 12.45-1.15, 4.30-5. Poultry Building 1. Messrs. BANNER and ———.

Practice in operating incubators, testing eggs, keeping records; comparison of results. A series of interesting tests will be carried on by the members of the class. Assigned reading and a written examination will be required.

**3a. Brooder Practice.** First, second, or third term, credit one hour. Must be preceded or accompanied by course 1a or by course 10. Practice periods and extra time arranged by appointment. Practice, reporting three times daily, including Sunday, for four weeks, 7.45-8.30, 12.45-1.15, 4.30-5. Poultry Building. Messrs. BANNER and ———.

Practice in the management of a brooder and a flock of chickens; the keeping of temperature, food, and growth records. Assigned reading and a written examination will be required.

**4. The Breeds of Poultry and Judging.** First term, credit two hours. Prerequisite course 1. Lecture or recitation, W, 10. Poultry Building 325. Practice, F, 2-4.30, or S, 8-10.30. Breed Observation House. Assistant Professor KENT and Mr. ———.

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.

**4a. Judging, Advanced Course.** First term, credit one hour. Prerequisite course 4 and permission to register. Practice, W, 2-4.30. Breed Observation House. Assistant Professor KENT.

This course is designed to give additional practice in judging and in preparation for exhibits. Special emphasis will be placed on selection for egg production. Several excursions to near-by farms will be made.

**5. Poultry-House Design and Construction.** First term, credit two hours. Prerequisite course 1 and permission to register. Lecture or recitation, M, 10. Poultry Building 325. Practice, M, 2-4.30. Poultry Building 300. Assistant Professor KENT, and Messrs. ——— and ———.

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. Market Products.** Second term, credit two hours. Prerequisite course 1. Lecture or recitation, M, 11. Poultry Building 375. Practice, M, T, or W, 2-4.30. Poultry Building 100. Assistant Professor BENJAMIN, and Messrs. MACOMBER and ———.

This course deals with the preparation of poultry and eggs for market, and with storage and preservation. It includes caponizing, killing, picking, drawing,



and packing poultry; testing, candling, grading, packing, and shipping eggs. Types of market packages will be studied. A class trip to New York for the three days immediately following the Easter vacation is required of all students. This trip gives the students an opportunity to become familiar with the live- and the dressed-poultry markets, exchanges, cold-storage plants, egg-breaking establishments, commission and wholesale dealers, city markets, hotel buyers, housewives' organizations, and leaders in market work. The total necessary expense is about \$20.

**7a. Marketing Practice.** First, second, or third term, credit one hour. Prerequisite course 7 and permission to register. Discussion hour, Th, 4.45-5.45. Practice period, three hours each week, to be arranged by appointment. Poultry Building 100. Assistant Professor BENJAMIN, and Messrs. MACOMBER and —.

This course is for those who desire additional instruction and practice in the handling of poultry products and refrigeration machinery, and in general sales-room work.

The work is so arranged that it is different in each of the three terms. Students may register for the course in any two of the three terms of work.

**8. Poultry Farm Management.** Second term, credit two hours. Prerequisite courses 1, 1a, 2, 4, 5, and Farm Management 1; must be preceded or accompanied by courses 2a, 3, 3a, 7, and Farm Management 2. Lecture or recitation, W, 11. Poultry Building 300. Practice, W, 2-4.30. Poultry Building 325. Professor RICE and Mr. BOTSFORD.

The principles of farm management as applied to the poultry farm; selection of the farm; use of poultry-farm score card; 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 to representative poultry plants in April and May, at an approximate cost of \$12.

**9. Commercial Marketing.** Second term, credit two hours. Prerequisite course 7. Lectures or recitations, T Th, 11. Poultry Building 325. Assistant Professor BENJAMIN and Mr. MACOMBER.

A course designed for students who wish to obtain further instruction relative to the selling of poultry products. The use of advertising will be considered, also methods and problems of food distribution, and general economic phases of the business. An extensive problem in market distribution of poultry products will be an important part of the work.

**10. Farm Poultry.** Second or third term, credit three hours. Second term: Lectures, T Th, 9. Poultry Building 375. Practice, Th or F, 2-4.30, or F or S, 8-10.30. Poultry Building 300. Third term: Lectures, M W, 11. Practice, T or W, 2-4.30. Professor RICE, Assistant Professors BENJAMIN and KENT, and Messrs. HEUSER and BANNER.

This course is for persons who are not specializing in poultry husbandry. It is not open, without special permission, to students who have had other courses in poultry husbandry.

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

**11. Undergraduate Conference.** First, second, or third term, or throughout the year, credit one hour a term. Prerequisite permission to register; must be preceded or accompanied by course 8. M, 8-10. Poultry Building 325. Members of the departmental staff.

Round-table discussion of poultry literature, and current problems of interest to the advanced student of poultry husbandry, including critical examinations of experiment station literature and research methods relating to poultry. Written reports will be required on many of the subjects discussed.

**11a. Seminary.** Throughout the year. For graduate students only; required of all graduate students in poultry husbandry. M, 8-10. Poultry Building 325. Members of the departmental staff.

An advanced discussion of work in poultry husbandry.

**12. 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 courses 8 and 11. 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.

### RURAL ECONOMY

**1. Agriculture.** First term, credit two hours. Open only to freshmen. Lectures, T Th, 10. Forestry Building 126. Professor LAUMAN.

A brief general survey of agriculture in its technical, economic, social, and historical aspects.

**4. Economic and Social Status of the Rural Community.** First term, credit three hours. Prerequisite Political Science 51. Lectures, M W F, 9. Goldwin Smith B. Professor LAUMAN, and Messrs. WRIGHT and ———.

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

**5. Marketing and Prices.** First term, credit three hours. Prerequisite Political Science 51. Lectures, M W F, 11. Caldwell Hall 100. Professor LAUMAN, and Messrs. WRIGHT and ———.

A study of the distribution of products, markets, the requirements of markets, methods of marketing, and the course of prices with special reference to agricultural products.

**6. History of Agriculture.** Second term, credit three hours. Open only to seniors. Lectures, M W F, 9. Home Economics Building 370. Professor LAUMAN.

The important phases of the development of agriculture are considered historically. Special stress will be laid on the rise of the agricultural classes and on agrarian problems, as well as on the beginnings of rational agriculture.

**7. Rural Economy.** Second term, credit three hours. Open only to selected seniors who have had course 4 and additional training in economics and history. Lectures, T Th, 11. Home Economics Building 370. Professor LAUMAN.

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

**8. Cooperation.** Second term, credit three hours. Prerequisite Political Science 51. Lectures, M W F, 11. Caldwell Hall 100. Professor LAUMAN, and Messrs. WRIGHT and ———.

A study of cooperation, primarily for economic ends, in its general principles, in its historical setting, and in its practice. Special reference will be made to agriculture and the conditions prevailing in the United States.

**12. Research in Rural Economy.** First and second terms, credit two or three hours a term. For seniors who have done superior work and for graduates. Home Economics Building 370. Professor LAUMAN.

**14. Seminary.** First and second terms. By special permission, for students who have had courses 4 and 5 or their equivalent. Tuesday afternoons. Home Economics Building 370. Professor LAUMAN.

In 1918-19 a study will be made of the commission and committee reports on markets and food supply.

**16. Rural Organization.** First term, credit two hours. Open only to seniors. Prerequisite Farm Management 2; must be preceded or accompanied by course 4 and Extension Teaching 1 and 2. Lectures, T Th, 8. Roberts Hall 292. Practice, T, 2-4.30. Professor BURRITT.

A study of rural community organization as exemplified in farm bureaus. Designed to familiarize students with this movement and to point out underlying principles in rural organization and leadership. County problems will be assigned.



## RURAL EDUCATION

Students in agriculture and home economics who desire to teach should so adjust their work that on the completion of their courses they will be entitled to recommendation for a certificate to teach these subjects. Not more than twenty-five students will be admitted to a course, so that students should arrange with the instructor before registering for work in the Department.

1. **Introduction to Education.** First or second term, credit four hours. Open to juniors and seniors. Lectures: first term, M T W Th, 11; second term, M T W Th, 10. Caldwell Hall 143. Professor KRUSE.

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

2. **Principles of Teaching.** First, second, or third term, credit four hours. Open to juniors and seniors who have completed course 1 or its equivalent. Lectures: first term, M T Th F, 11, Caldwell Hall 282; second term, M T Th F, 8, Caldwell Hall 143. Professor STEWART and Mr. ———.

The application of the principles of education to the problems of teaching and practice. Among the topics considered are: the task of the teacher and her relation to the child's development; the aims of high school instruction with special emphasis upon the vocational; the problem and problem-solving; the utilization and cultivation of interest; the selection and organization of subject matter; the use of first-hand experience; teaching methods; the recitation; assignment of lessons, questioning, practice; classroom management.

3. **Agriculture in the High School.** First, second, or third term, credit three hours. Open to juniors and seniors who have completed courses 1 and 2 and who have met the farm practice requirements. Lectures, M W, 8. Caldwell Hall 282. Laboratory, M, 2-4.30. Professor LUSK.

A study of the purposes of vocational agriculture, organization and presentation of subject matter, textbooks, and home project and extension activities of the high school. A one-day excursion is a part of the course. Laboratory fee, \$1.

4. **Home Economics in the High School.** First or second term, credit three hours. Open to juniors and seniors who have completed courses 1 and 2. Students must arrange for a practice period before registering for the course. Lectures, M W, 11. Home Economics Building 100. Professor WORKS and Miss BENNETT.

Selection, organization, and presentation of subject matter for home economics subjects in the high school. Equipment, references, and purposes of home making in the secondary school. A one-day excursion is a part of the course. Laboratory fee, \$1.

5. **Teaching.** First or second term, credit, not to exceed five hours, to be determined by work done. Open to a limited number of seniors in agriculture and home economics. Students planning to take this course should arrange with the Department during the junior year. Professors WORKS and LUSK, and Miss BENNETT.

This course is designed to give students an opportunity to teach under the guidance of the Department.

10. **Educational Measurement.** First term, credit two hours. Open to graduate students only. T, 4-6. Caldwell Hall 282. Professor KRUSE.

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. Rural school survey work conducted by the Department will furnish the specific problems and materials of the course.

12. **Principles of Method.** Second term, credit three or four hours. Open to graduate students only. Recitations and discussions, M W F, 2. Caldwell Hall 143. Professor STEWART.

A detailed study of the principles underlying method, particularly from the standpoint of vocational agriculture and home economics. Topics considered: education as essentially a dynamic process, illustrated in growth changes, hereditary expressions, formation of habits, play and manual activities; economy in the expenditure of energy; the laws of learning and the organization of knowledge; the function and structure of subject matter; the principles underlying typical modern school practices; the tests of teaching; the technique of problem solving.

**14. Organization of College Departments of Agricultural Education.** First term, credit two hours. Open to graduate students who have completed course 3. Those who have not had course 3 will be required to take the lectures of that course. T, 2-4. Caldwell Hall 143. Professor LUSK.

This course is designed for those preparing for teacher training work in college departments of agricultural education. It deals with the study of agricultural college and high school curricula in agriculture with respect to the technical preparation of teachers of secondary agriculture, the professional needs of the high school teacher of agriculture, practice teaching, graduate needs to be met by such departments, and the content of special methods course in agricultural education.

**[16. Rural Secondary Education.** First and second terms, credit two or three hours a term. Designed primarily for graduate students. Lectures, T Th, 9. Caldwell Hall 282.] Not given in 1918-19.

The general purpose is to consider the supervisory and instructional problems of secondary schools adapted to rural conditions. Topics receiving special consideration are: curricula, courses of study; junior high schools; development of the free high school; comparative studies.

**18. Rural School Administration.** First and second terms, credit two or three hours a term. Open to graduate students only. Lectures, M W, 10. Caldwell Hall 282.

This course deals with the development of rural school organization; district, township, and county as administrative and supervisory units; rural school maintenance. The study of these topics will be preceded by a survey of state systems of school administration.

**20. Administration and Supervision of Vocational Agriculture.** Second term, credit two or three hours. Prerequisite first term of course 18 or the equivalent. Open to graduate students only. Lectures, T Th, 8. Caldwell Hall 282. Professor WORKS.

This course is especially designed for persons fitting themselves for state supervision of agricultural education. It treats: administration and supervision of agricultural education under the Smith-Hughes Act; state and federal acts relating to agricultural education; comparative study of types of schools. Visits to schools in New York and adjacent States are required as a part of the course.

**21. Rural School Surveys.** Credit according to work accomplished. Open to graduate students only. Hours to be arranged. Professors WORKS, LUSK, STEWART, and KRUSE.

Cooperative relationships with the State Department of Education and local school authorities give opportunity for field study of the administrative, supervisory, and instructional features of rural schools. The possibilities of vocational education under rural conditions receive primary consideration.

**25. Research in Rural Education.** Throughout the year. For graduate students only. Hours to be arranged. Professors WORKS, LUSK, STEWART, and KRUSE.

**26. Seminary.** First and second terms, without credit. Required of graduate students. Hour to be arranged. Caldwell Hall 282. Professors WORKS, GRIFFIN, LUSK, STEWART, and KRUSE, and Assistant Professor TUTTLE.

**60. Nature Study.** First term, credit three hours. Lecture, W, 12. Agronomy Building 192. Practical exercises, T Th, 11-1, or T Th, 2-4.30. Insectary. Assistant Professor COMSTOCK.



**61. Nature Study.** Third term, credit three hours. Lecture and field work to be arranged. Laboratory, W, 2.30-5. Insectary. Assistant Professor COMSTOCK.

Courses 60 and 61 are similar in scope and method but deal with quite different subject matter. They give 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 methods of study and manner of presentation, and also to the relation of the topics to agriculture. The work consists of conferences, field practice, and laboratory practice. The lectures discuss nature study as a part of elementary education, and methods of correlating nature study with other school work.

**62. Nature Study, Advanced Course.** First term, credit three hours. Prerequisite Biology 1 or course 61. Lectures, hours to be arranged. Laboratory, M, 2-4.30. Insectary. Assistant Professor COMSTOCK.

Field and laboratory work, and the study of nature literature.

**63. Nature Study.** First term, credit one or more hours. Lecture, M, 12. Insectary. Open only to teachers. Assistant Professor COMSTOCK.

A course dealing with those phases of nature study most helpful to teachers of high school biology.

**65. Conference on Nature Study.** First term, credit one hour. W, 11. Insectary. Open only to teachers or prospective teachers of nature study. Assistant Professor COMSTOCK.

Informal discussion of a graded course in nature study for public schools.

## RURAL ENGINEERING

For students in agriculture who are not specializing in rural education, courses in shop work are given in Sibley College of Mechanical Engineering. They are made up of exercises particularly adapted to the needs of students intending to return to the farm. In forge work, S4, one or more hours may be taken; while in woodworking, S7, the minimum registration is two hours, and more work may be taken if desired.

**1. Farm Field Machinery.** Second term, credit three hours. Prerequisite Drawing 1 or reasonable and approved proficiency in drawing. Lectures, M W, 11. Forestry Building 126. Practice, W or F, 2-5. Rural Engineering Building. Assistant Professor HAZEN, and Messrs. FAIRBANKS and ———.

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. Intended to be taken either before or after course 2. Not open to students who have had course 3. Laboratory fee, \$2.

**2. Farm Power Machinery.** First term, credit three hours. Prerequisite Drawing 1 or reasonable and approved proficiency in drawing. Lectures, W F, 8. Caldwell Hall 143. Practice, Th or F, 2-5. Rural Engineering Building. Assistant Professor HAZEN, and Messrs. FAIRBANKS and ———.] Not given in 1918-19.

A study of the sources and applications of mechanical power on the farm, with special reference to the internal combustion engine and its use in tractors, in automobiles, and for stationary power. This course will include a study of water-supply systems but will not include spray machinery. Intended as supplementary to course 1, but may be taken independently. Laboratory fee, \$2.

**3. Farm Mechanics.** First, second, or third term, credit three hours. First term: Lectures, T Th, 10. Forestry Building 210. Practice, T or W, 2-5. Rural Engineering Building. Second term: Lectures, T Th, 10. Forestry Building 210. Practice, M or T, 2-5. Rural Engineering Building. Third term: Lectures and practice, time and place to be announced. First and second terms, Assistant Professor HAZEN and Mr. ———; third term, Professor RILEY.

A brief course intended for the general student who does not wish to devote to the study of machinery as much time as is required for courses 1 and 2. The main purpose of the instruction is to develop ability to think and to reason in terms of mechanical devices, the machines used for this purpose being plows, mowers, binders, pumps, water-supply systems, spray machinery, and internal combustion engines. Laboratory fee, \$2.

4. **Steam.** Second term, credit one or three hours. For one hour credit: Lecture, T, 12. Caldwell Hall 143. For three hours credit: Lectures, T Th, 12. Caldwell Hall 143. Practice, Th, 2-5. Rural Engineering Building. Mr. FAIRBANKS.

A brief course covering (a) the properties of steam, the use of "steam tables," heating by steam and hot water, boilers, boiler compounds, piping, pumps, valves, and fittings; and (b) steam machinery including engines and pump heads, power transmission, dairy machinery including milk pumps and power separators, and practice in belt lacing, soldering, babbitting, pipe fitting, care and operation of boilers, engines, pumps, and separators. The one-hour course will cover only the topics included under *a*. Laboratory fee, for the three-hour course, \$2.

19. **Research in Farm Mechanics.** First, second, or third term, credit one or more hours. Prerequisite adequate ability and training for the work proposed, and permission to register. Professor RILEY and Assistant Professor HAZEN.

Special work in farm mechanics 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, second, or third term, credit three hours. Prerequisite plane geometry. Students are urged to take Drawing 1 in preparation for this course. Lectures: first or second term, M W, 9, Caldwell Hall 100; third term, T F, 10, Caldwell Hall 143. Practice: first or second term, M or T, 2-5; third term, W, 2-5, Caldwell Hall 400. First or second term, Assistant Professors ROBB and MCCURDY; third term, Mr. STRAHAN.

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 the data obtained in the field a contour map will be drawn of one of the fields near the College. Farm sanitation and sewage disposal. Attention is also given to concrete construction, the design of simple concrete structures and estimates of their cost. Laboratory fee, \$2.

21. **Drainage and Irrigation.** (Same as Soils 21.) Second term, credit three hours. Prerequisite courses 3 and 20 or the equivalent, Soils 1, and Drawing 1 or its equivalent. Lectures, M W, 11. Caldwell Hall 143. Practice, Th, 2-5. Caldwell Hall 143. Professor BUCKMAN, and Assistant Professors ROBB and MCCURDY.

A course given in cooperation with the Department of Soil Technology, covering the principles and practice of drainage and irrigation. Two one-day excursions to drainage or irrigation projects at some distance from Ithaca will be held sometime in May. Laboratory fee, \$2.

28. **Farm Engineering, Advanced Course.** First term, credit three hours. Prerequisite course 20 or its equivalent. Lecture, T, 8. Caldwell Hall 282. Field work, S, 8-1. Assistant Professors ROBB and 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 third term, credit two or four hours. Prerequisite Drawing 1 or its equivalent. Lectures, M W, 9. Caldwell Hall 143. For four hours credit, two drafting periods, by appointment. Caldwell Hall 400. Mr. STRAHAN.



A study of the principles of design, including lighting, ventilation, sanitation, equipment, floor spacing, and construction, for barns, stables, and other farm buildings, and their application in practice. Laboratory fee, \$1.

**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. Farm Shop. Mr. ———.

Practice in woodworking and in drawing as it applies to the shop problems. Exercises are selected for their teaching value and also for the practical utility of the finished article.

## SOIL TECHNOLOGY

**1. Principles of Soil Management.** First or second term, credit three hours. Prerequisite Chemistry 1 and Geology 1. Students must consult Professor BUCKMAN in regard to laboratory and recitation appointments before registering for the course. Lectures, T Th, 9. Caldwell Hall 100. One laboratory period. Caldwell Hall 49. One recitation. 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 relations. Laboratory deposit, \$3.

**5. Soil Surveying, and Mechanical Soil Analysis.** First term, credit three hours. Prerequisite course 1, Physical Geography 5, and Chemistry 6. One lecture and two laboratory periods by appointment. Caldwell Hall 49 and 201. Professors BUCKMAN and BIZZELL.

A course considering the practical as well as the technical and theoretical phases of soil survey. The preparation of base maps and reports will be a feature of the course. Detailed as well as extended soil mapping will be studied. A good field knowledge of glacial geology is necessary for this work. The second half of the term will be devoted to a study of the methods of mechanical soil analysis. Laboratory deposit, \$3.

**6. Soils, Advanced Course.** First term, credit two hours. Prerequisite course 1, and Chemistry 6. Students must consult Professor BIZZELL before electing this course. Lectures, T W Th, 8. Caldwell Hall 143. Professor BIZZELL.

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

**7. Soil Bacteriology.** Second term, credit two hours. Prerequisite course 1, Dairy Industry 4, and Chemistry 6. Two laboratory periods by appointment. One discussion period to be arranged. Caldwell Hall 201. Assistant Professor 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 deposit, \$5.

**11. Research.** Throughout the year. For graduate students only. Hours by appointment. Caldwell Hall 350. Professor BIZZELL and other members of the Department.

**14. Seminary.** First and second terms, without credit. Open to seniors who have taken course 6, and required of graduate students. S, 11-12 30. Caldwell Hall 143. Professors LYON, FIPPIN, BIZZELL, and BUCKMAN, and Assistant Professors WILSON and WARSAW.

**21. Drainage and Irrigation.** Second term, credit three hours. Prerequisite course 1, Rural Engineering 3 and 20 or the equivalent, and Drawing 1 or its equivalent. Lectures, M W, 11. Caldwell Hall 143. Practice, Th, 2-5. Caldwell Hall 143 and field. Professor BUCKMAN, and Assistant Professors ROBB and MCCURDY.

A course given in cooperation with the Department of Rural Engineering, covering the principles and practice of drainage and irrigation. Two one-day excursions to drainage or irrigation projects at some distance from Ithaca will be held sometime in May. Laboratory fee, \$2.

### **WILD LIFE CONSERVATION AND GAME BREEDING**

Instruction in wild life conservation and game breeding 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 of 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 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 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. 27), those specializing in wild life conservation and game breeding are expected to take the two 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 and Game Breeding.** Second term, credit two hours. Lectures, T W, 4.45. Roberts Hall 131. Professors RICE and NEEDHAM, Assistant Professors ALLEN and EMBODY, Mr. KRUM, and cooperating specialists.

This is an introductory lecture course that is given cooperatively by specialists within and without the college. It is intended to show the relations of the various conservation interests to each other, and to give the student who plans to fit himself for work in game breeding or other lines of conservation a general view of the field and a basis for the selection of subsequent elective courses.

2. **Practice in Wild Life Conservation and Game Breeding.**

Two summers, spent in the field in the furtherance of technical training along one or more of the lines covered by course 1. Those specializing in game breeding should spend one summer on the State Game Farm at Cornell University.

### **Special Public Lectures on Wild Life Conservation and Game Farming**

Due to the generosity of Frederic C. Walcott, of New York City, who has contributed the sum of \$500 to defray the expenses of the project, and to the hearty cooperative spirit shown by the lectures named below, the College was enabled during 1917-18 to offer the following public lectures on various problems related to wild life conservation:

Clinton G. Abbott. Still life photography of birds.

Ernest Harold Baynes. Lecturing on birds. Bird club organization.

John B. Burnham. Practical deer farming.

Warwick S. Carpenter. The organization of the forces of a State for wild life conservation.

Lee S. Crandall. The care and breeding of aviary birds, with special reference to pheasants and waterfowl.

Dr. A. K. Fisher. The raptorial birds.

Edward Howe Forbush. The economic value of birds.  
The rat and the cat problem.



- Louis Agassiz Fuertes. The painting of birds.  
 Herbert K. Job. Moving picture photography of wild life.  
                                     The breeding of the diving ducks.  
 Llewellyn Legge. The part played by the warden force in protecting and  
                                     increasing the wild life of a State.  
 Norman McClintock. The telephoto lens in moving picture photography.  
 W. L. McAtee. Plant life that is attractive to wild ducks.  
 Donald MacVicar. Ruffed grouse breeding.  
 T. Gilbert Pearson. The national movement for wild life conservation, with  
                                     special reference to sanctuary work and implanting a  
                                     knowledge of bird life in the juvenile mind.  
 Emmet Augustus Quarles. Wild life conservation and its relation to game  
                                     breeding.  
                                     The pheasants.  
                                     First steps in pheasant breeding.  
                                     Miscellaneous problems of pheasant breeding—vermin,  
                                     disease, and the like.  
                                     Establishing and holding pheasants on preserves.  
                                     State game farms, and pheasants in their relation to agri-  
                                     culture and the food supply.  
                                     Quail breeding.  
                                     Mallard duck breeding.  
                                     Wood duck breeding.  
 Harry T. Rogers. The preparation of pheasant rations and methods of  
                                     combating vermin.  
                                     The care and rationing of young pheasants.  
 Clyde B. Terrell. The sowing and planting of foods that attract wild ducks.  
 John W. Titcomb. Modern methods in stocking waters with food and game  
                                     fishes.

### CITIZENSHIP

A course in citizenship open to all students in the University is offered, under the direction of the Department of Political Science. Students in agriculture may elect this course in excess of the twenty hours of non-agricultural electives allowed during the four-year course.

57b. **Lectures on Citizenship.** Second term, credit two hours. M W, 12.  
 Goldwin Smith B.

A lecture each Monday by a nonresident lecturer and each Wednesday by a member of the Department. The course has been arranged by a committee of alumni who are actively engaged in civic and social work and who are cooperating in this way with the Department. It will follow the same general plan as last year, but the speakers and most of the subjects treated will be changed.

The course will be under the general charge of Professor WILLCOX. Readings, reports, and essays will be required.

### 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 of Agriculture. 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 States Relations Service in the United States Department of Agriculture, in the administration and super-

vision 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 with 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 forty farm bureaus in the State.

### WINTER COURSES

The Winter Courses now offered are eight in number, all opening on November 6, 1918, and closing on February 14, 1919. They are:

- |                      |                        |
|----------------------|------------------------|
| 1. Agriculture.      | 5. Home Economics      |
| 2. Dairy Industry    | 6. Flower Growing      |
| 3. Poultry Husbandry | 7. Vegetable Gardening |
| 4. Fruit Growing     | 8. Game Breeding       |

A special program describing these courses will be sent on application to Cornelius Betten, Secretary, New York State College of Agriculture, Ithaca, New York.

### SUMMER COURSES

The primary object of the Summer School in Agriculture is to further agricultural education by aiding those engaged in it. Admission is restricted to those who are professionally engaged in education or have had two years of college work. The courses are arranged to meet the needs of the following classes:

1. Persons who desire to teach agriculture, nature study, and home economics, or who desire to fit themselves for the supervision of such instruction.

2. Persons who desire to pursue investigations in agriculture. Some of the courses are advanced, and therefore suited for specialists who wish to follow their individual line of study.

College students desiring to use the summer for additional study are advised to enter either the general summer session in Cornell University or the third term in agriculture.

### COURSES IN OTHER COLLEGES REQUIRED OF REGULAR STUDENTS IN THE COLLEGE OF AGRICULTURE

1. **English, Introductory Course.** Throughout the year, credit three hours a term. Students who have not taken the course in the first term may enter in the second term. Open only to underclassmen who have satisfied the entrance requirements in English. Freshmen who are candidates for the degree of bachelor of arts will ordinarily take course 3, and may not enroll in course 1 except with the consent of the head of the Department. Assistant Professors ADAMS and BAILEY, Dr. GILBERT, Messrs. BUNDY and BRADLEY. Sections at the following hours: M W F, or T Th S, 8, 9, 10, 11, 12. Rooms to be announced.

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 Milton and Tennyson. Registration in the course is in charge of Assistant Professor BAILEY.

Students who elect English 1 must apply at Goldwin Smith A on Monday, Tuesday, or Wednesday of registration week for assignment to sections.

1. **Introductory Inorganic Chemistry.** First or second term, credit six hours. Lectures, recitations, and laboratory.

1a. Lectures, T Th S, 11, or T Th S, 12. Professor BROWNE and Mr. GRIFFIN.

1b. Recitations (one hour a week, to be arranged). Laboratory: First term, M F, 2-4.30; T Th, 2-4.30; W, 2-4.30, and S, 8-10.30. Second term, M F, 2-4.30; T Th, 2-4.30; W, 2-4.30, and S, 8-10.30; M W, 8-10.30. Messrs. FOGELSONG, POLLARD, HAYES, COLONY, LIPPINCOTT, SOHON, and RYNALSKI.



6. **Qualitative and Quantitative Analysis.** First or second term, credit five hours. Prerequisite course 1. Lectures, T Th, 12. Laboratory sections: M W F, 2-5; T Th S, 8-11; T Th S, 9-12. Messrs. RIDER, BABCOCK, BRANDES, CLARK, and SHERBURNE.

Qualitative work: the properties and reactions of the common elements and acids, and their detection in various liquids and solid mixtures.

Quantitative work: the preparation and use of volumetric solutions, and work in elementary gravimetric analysis.

1. **Elementary Geology.** First or second term, credit three hours. Lectures: first term, T Th, 11, Sibley Dome; second term, T Th, 9, Sibley Dome. Laboratory periods, M, T, W, Th, or F afternoon, or S morning. One all-day excursion required. Professor RIES, and Messrs. ELSTON and ———.

Planned to give beginners the fundamental principles of this branch of science, with special attention to dynamic and structural geology. Those desiring additional work in geology are advised to take one or more of the following courses: 2, 11, 21, 32.

2. **Introductory Experimental Physics.** First or second term, credit five hours. Three lectures and two classroom periods a week. Lectures, T Th S, 9, or M W F, 11. Rockefeller A. Professor NICHOLS and Assistant Professor GIBBS. Classroom work: Assistant Professor GIBBS, Messrs. FIELDS, HYATT, McBERTY, MALLORY, MERTZ, NORTHROP, PIERCE, SCHMIDT, and STANTON, and Miss ROTHWELL. Hours to be arranged. Required of candidates for B.Chem., C.E., B.S., and D.V.M.

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

1. **General Zoology.** Throughout the year, credit three hours a term. Lectures: section 1, M W, 9; section 2, M W, 11. Sibley Dome. Laboratory: section 1, M, 2-4.30; section 2, T, 2-4.30; section 3, W, 2-4.30; section 4, Th, 2-4.30; section 5, F, 8-10.30; section 6, F, 2-4.30; section 7, S, 8-10.30. McGraw Hall 21. Assistant Professor REED, Mr. SHADLE, and assistants.

A general survey of the animal phyla, the life processes, adaptations, reaction to environmental stimuli, the relationship of animals, and the principles of zoology. As far as possible each phase of the subject is illustrated with living material. Laboratory fee, \$3 a term.

10. **Veterinary Physiology.** First term, credit three hours. Lectures, M W F, 10. Veterinary College. Professor FISH.

The physiology of the nutrition and secretion of the domesticated animals.

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, Assistant Professor DRESBACH and assistants. In registering for this course in the second term students are required to specify the section they desire to attend.

An introductory course for students of the biological sciences; also for students who expect to teach physiology in the secondary schools. A general review of the functions of the systems and organs of the human body, with introductory remarks on structures. The lectures will be fully illustrated by experiments, lantern slides, and diagrams.

51. **Elementary Economics.** Throughout the year, credit three hours a term. One lecture and two recitations each week. Lectures, M, 9; repeated M, 11. Barnes Auditorium. Professor DAVENPORT. Recitations, T Th, 8, 9, 10, 11, 12; W F, 8, 9, 10, 11, 12. Assistant Professors USHER and REED, and Mr. FISHER. Section assignments made at the first lecture.

An introduction to economics including a survey of business organization and corporation finance; principles of value, money, banking, and prices; international trade; free trade and protection; 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.

Open to all students, but especially designed for those who have entered with the minor requirements in mathematics and are preparing: (a) to teach mathematics in the secondary schools; (b) to take up engineering work later in the course; (c) to specialize in chemistry, physics, or forestry.

3. **Plane Trigonometry.** First or second term, credit three hours. First term, M W F, 10; second term, T Th S, 10.

Open to all students, but designed especially for those mentioned under course 1.

1. **Practical and Theoretical Military Training.** Throughout the year. Two hours, one afternoon as assigned, and F, 4.45-5.45. Drill Hall. Every 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.

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 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, 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 infantry tactics.

4. **Physical Training for Women (Freshmen).** Throughout the year, three periods a week. Misses CANFIELD and FURCHGOTT.

5. **Physical Training for Women (Sophomores).** Throughout the year, three periods a week. Misses ATKINSON and FURCHGOTT.

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 æsthetic dancing, and indoor games, in all of which certain prescribed tests must be met at the end of each period.

At the beginning of the college year, six lectures on health and hygiene are given, attendance upon which is compulsory for all first-year students. For further information as to the required work in physical training, see the handbook issued by the Department.





Correspondence concerning the publication of Cornell University should be addressed to the Secretary of Cornell University, Ithaca, New York.

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The Annual Register (for the year 1917-1918, published January 1, 1918), price 50 cents.

Book of Views, price 25 cents.

Directory of Faculty and Students, Second Term, 1917-1918, price 10 cents, and the following informational publications, any one of which will be sent gratis and post-free on request. The date of the last edition of each is given after the title.

General Circular of Information for Prospective Students, December 15, 1917.

Announcement of the College of Arts and Sciences, April 15, 1918.

Announcement of Sibley College of Mechanical Engineering and the Mechanic Arts, February 1, 1918.

Announcement of the College of Civil Engineering, April, 1, 1918.

Announcement of the College of Law, May 1, 1918.

Announcement of the College of Architecture, July 1, 1917.

Announcement of the New York State College of Agriculture, June 1, 1918.

Announcement of the Winter Courses in the College of Agriculture, June 15, 1917.

Announcement of Instruction in Wild Life Conservation and Game Breeding, January 15, 1918.

Announcement of the Summer Term in Agriculture, March 15, 1918.

Announcement of the New York State Veterinary College, May 15, 1918.

Announcement of the Graduate School, February 15, 1917.

Announcement of the Summer Session, March 1, 1918.

Annual Report of the President, September 1, 1917.

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

Announcement of the Medical College may be procured by writing to the Cornell University Medical College, Ithaca, New York.