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 Daniel Altman Roberts, Ph.D., Associate Professor of Plant Pathology.
 Verne Norton Rockcastle, Ph.D., Associate Professor of Rural Education.
 Richard Leander Sawyer, Ph.D., Associate Professor of Vegetable Crops.
 Raymond Sheldrake, Jr., Ph.D., Associate Professor of Vegetable Crops.
 Arden Frederick Sherf, Ph.D., Associate Professor of Plant Pathology.
 William Frank Shipe, Jr., Ph.D., Associate Professor of Dairy Industry.
 Charles Gald Sibley, Ph.D., Associate Professor of Ornithology.⁸

Samuel Thomas Slack, Ph.D., Associate Professor of Animal Husbandry.
 Robert Wilber Spalding, M.A., Associate Professor of Animal Husbandry.
 James Wendell Spencer, M.C.E., Associate Professor of Agricultural Engineering.
 Bernard Freeland Stanton, Ph.D., Associate Professor of Farm Management.
 Robert George Douglas Steel, Ph.D., Associate Professor of Biological Statistics.
 Earl Lewis Stone, Jr., Ph.D., Charles Lathrop Pack Associate Professor of Forest Soils.¹
 Robert Prindle Story, Ph.D., Associate Professor of Marketing.
 Philip Taietz, Ph.D., Associate Professor of Rural Sociology.
 Edward J. Thacker, Ph.D., Associate Professor of Animal Nutrition.
 John Fanning Thompson, Ph.D., Associate Professor of Botany.
 Charles Harrison Uhl, Ph.D., Associate Professor of Botany.
 Paul John VanDemark, Ph.D., Associate Professor of Bacteriology.
 Bruce Wallace, Ph.D., Associate Professor of Genetics.
 Helen Lucille Wardeberg, Ph.D., Associate Professor of Elementary Education.
 Richard Griswold Warner, Ph.D., Associate Professor of Animal Husbandry.
 Robert Elzworth Wilkinson, Ph.D., Associate Professor of Plant Pathology.
 Charles Edward Williamson, Ph.D., Associate Professor of Plant Pathology.
 Hugh Monroe Wilson, Associate Professor of Soil Conservation.
 Carlton Eugene Wright, Ph.D., Associate Professor of Food Information.
 Paul Joseph Zwerman, Ph.D., Associate Professor of Soil Conservation.

ASSISTANT PROFESSORS

Martin Alexander, Ph.D., Assistant Professor of Soil Science.
 Ronald Eugene Anderson, Ph.D., Assistant Professor of Plant Breeding.
 Joe Paul Bail, M.S., Assistant Professor of Rural Education.
 John Peleg Barlow, Ph.D., Assistant Professor of Oceanography.
 Henry Joe Bearden, Ph.D., Assistant Professor of Animal Husbandry.
 David W. Bierhorst, Ph.D., Assistant Professor of Botany.
 James William Boodley, Ph.D., Assistant Professor of Floriculture.
 Warren Forrest Brannon, Ph.D., Assistant Professor of Animal Husbandry.
 Gordon Rowe Cunningham, M.S., Assistant Professor of Forestry.
 Olin Kenneth Dart, Jr., M.S., Assistant Professor of Agricultural Engineering.
 Hollis Rexford Davis, M.S., Assistant Professor of Agricultural Engineering.
 Bernard Emile Dethier, Ph.D., Assistant Professor of Agricultural Climatology.
 William C. Dilger, Ph.D., Assistant Professor of Ornithology.
 Edward Oscar Eaton, Ph.D., Assistant Professor of Agricultural Engineering.
 Thomas Eisner, Ph.D., Assistant Professor of Biology.
 Bertram Leighton Ellenbogen, M.A., Assistant Professor of Rural Sociology.
 Margaret Helen Emmerling, Ph.D., Assistant Professor of Genetics.
 Robert Hugh Ennis, Ph.D., Assistant Professor of Secondary Education.
 John Morris Fenley, Ph.D., Assistant Professor of Extension Education.
 Richard Norbert Fenzl, M.S., Assistant Professor of Agricultural Engineering.
 Raymond Thomas Fox, Ph.D., Assistant Professor of Floriculture.
 Ronald Bay Furry, M.S., Assistant Professor of Agricultural Engineering.
 Bruce Arthur Gaylord, M.Ed., Assistant Professor of Rural Education.
 Harrison Adam Geiselmann, Ph.D., Assistant Professor in Personnel Administration.
 Dana Clement Goodrich, Jr., Ph.D., Assistant Professor of Marketing.
 Richard William Guest, M.S., Assistant Professor of Agricultural Engineering.
 Martin Bernard Harrison, Ph.D., Assistant Professor of Plant Pathology.
 Dennis A. Hartman, B.S., Assistant Professor of Animal Husbandry.
 George Paul Hess, Ph.D., Assistant Professor of Biochemistry.
 Douglas E. Hogue, Ph.D., Assistant Professor of Animal Husbandry.
 John William Ingram, Jr., Ph.D., Assistant Professor of Botany.
 Arthur David Jeffrey, Ph.D., Assistant Professor of Marketing.

- Orvis Franklin Johndrew, Jr., M.S., Assistant Professor of Poultry Husbandry.
 Edward David Jones, Ph.D., Assistant Professor of Plant Pathology.
 Robert Carroll Jones, M.S., Assistant Professor of Rural Education.
 William Tinsley Keeton, Ph.D., Assistant Professor of Entomology.
 Edward John Kinbacher, Ph.D., Assistant Professor of Plant Breeding and Agronomy.
 John Merriam Kingsbury, Ph.D., Assistant Professor of Botany.
 Lafayette Whitmore Knapp, Jr., M.S., Assistant Professor of Agricultural Engineering.
 Robert John Lambert, M.S., Assistant Professor of Freehand Drawing.
 Robert Wing Langhans, Ph.D., Assistant Professor of Floriculture.
 James Edward Lawrence, B.S., Assistant Professor of Extension Teaching and Information.
 John William Layer, M.S., Assistant Professor of Agricultural Engineering.
 Fred George Lechner, M.Ed., Assistant Professor of Agricultural Engineering.
 Arthur Stuart Lieberman, M.S., Assistant Professor of Floriculture.
 Donald James Lisk, Ph.D., Assistant Professor of Pesticidal Chemistry.
 James William Longest, Ph.D., Assistant Professor in Extension Service.
 Russell Earl MacDonald, Ph.D., Assistant Professor of Bacteriology.
 Howard W. Matott, M.S., Assistant Professor in Extension Service and Assistant State Leader of County Agricultural Agents.
 Vincent Joseph McAuliffe, B.S., Assistant Professor in Extension Service and Assistant State 4-H Club Leader.
 Joseph Frank Metz, Jr., Ph.D., Assistant Professor of Marketing.
 Robert Adams Monroe, Ph.D., Assistant Professor of Avian Physiology.
 Roger A. Morse, Ph.D., Assistant Professor of Apiculture.
 Arthur Allen Muka, Ph.D., Assistant Professor of Entomology.
 Paul Edward Nelson, Ph.D., Assistant Professor of Plant Pathology.
 Malden Charles Nesheim, M.S., Assistant Professor of Animal Nutrition and Poultry Husbandry.
 Thomas Rud Nielson, Ph.D., Assistant Professor of Soil Science.
 Charles Evans Ostrander, B.S., Assistant Professor of Poultry Husbandry.
 Edwin Burnell Oyer, Ph.D., Assistant Professor of Vegetable Crops.
 Ellis Andine Pierce, Ph.D., Assistant Professor of Animal Husbandry.
 David Pimentel, Ph.D., Assistant Professor of Insect Ecology.
 Wilson Gideon Pond, M.S., Assistant Professor of Animal Husbandry.
 Gerald Edwin Rehkugler, M.S., Assistant Professor of Agricultural Engineering.
 Douglas Sherman Robson, Ph.D., Assistant Professor of Biological Statistics.
 William Frantz Rochow, Ph.D., Assistant Professor of Plant Pathology.
 Roger France Sandsted, Ph.D., Assistant Professor of Vegetable Crops.
 Robert J. Scannell, M.L.A., Assistant Professor of Ornamental Horticulture.
 Edward Arthur Schano, M.S., Assistant Professor of Poultry Husbandry.
 Ernest Frederick Schaufler, M.S.A., Assistant Professor of Ornamental Horticulture.
 Glen Henry Schmidt, Ph.D., Assistant Professor of Animal Husbandry.
 Marvin Mendel Schreiber, Ph.D., Assistant Professor of Agronomy.
 Bernice Margaret Scott, B.S.M., Assistant Professor of Rural Sociology.
 Robert Ramsey Seaney, Ph.D., Assistant Professor of Plant Breeding and Agronomy.
 Maurie Semel, Ph.D., Assistant Professor of Entomology.
 Emmit Frederick Sharp, M.S., Assistant Professor of Rural Sociology.
 John A. Sims, M.S., Assistant Professor of Animal Husbandry.
 James Ray Stouffer, Ph.D., Assistant Professor of Animal Husbandry.
 Phyllis Eloise Stout, B.S., Assistant Professor in Extension Service and Assistant State 4-H Club Leader.
 John C. Swan, B.S., Assistant Professor in Extension Service and Assistant State Leader of County Agricultural Agents.
 Harold Barber Sweet, B.S., Assistant Professor in Extension Service and Assistant State 4-H Club Leader.

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Glen Hanna Thacker, M.S., Assistant Professor of Poultry Husbandry.
Frederick Kwai Tuck Tom, Ph.D., Assistant Professor of Rural Education.
Ari van Tienhoven, Ph.D., Assistant Professor of Avian Physiology.
Donald Howard Wallace, Ph.D., Assistant Professor of Vegetable Crops and Plant Breeding.
Wallace E. Washbon, M.S., Assistant Professor in Extension Service and Assistant State Leader of County Agricultural Agents.
Mathias H. J. Weiden, Ph.D., Assistant Professor of Insecticidal Chemistry.
Carl Seymour Winkelblech, B.S., Assistant Professor of Agricultural Engineering.
Paul H. Wooley, Ph.D., Assistant Professor of Entomology and Plant Pathology.
Conrad S. Yocum, Ph.D., Assistant Professor of Botany.
Roger Grierson Young, Ph.D., Assistant Professor of Insect Biochemistry.

INSTRUCTORS

John Wesley Allen, M.S., Instructor in Agricultural Economics.
Charles Olen Crawford, M.S., Instructor in Rural Sociology.
James Stafford Dolliver, B.S., Instructor in Botany.
Elmer Ellis Ewing, M.S., Instructor in Vegetable Crops.
Robert J. Gallinger, B.A.E., Instructor in Agricultural Engineering.
E. Hale Jones, B.S., Instructor in Extension Teaching and Information.
John Stanley Mackiewicz, M.S., Instructor in Medical Entomology and Parasitology.
Walter Thomas McDonough, Ph.D., Instructor in Botany.
Gordon C. Perry, B.S., Instructor in Agricultural Engineering.
Barbara T. Phillips, B.A., Instructor in Extension Teaching and Information.
Irving Rollins Starbird, M.S., Instructor in Agricultural Economics.

STAFF OF THE EXPERIMENT STATION AT GENEVA PROFESSORS

Alvin Joseph Braun, Ph.D., Professor of Plant Pathology.
John Carlton Cain, Ph.D., Professor of Pomology.
Paul Jones Chapman, Ph.D., Professor of Entomology and Head of the Department.
Benjamin Edward Clark, Ph.D., Professor of Seed Investigations and Head of the Department.
Ralph Willard Dean, Ph.D., Professor of Entomology.
John Einset, Ph.D., Professor of Pomology and Associate Head of the Department.
Foster Lee Gambrell, Ph.D., Professor of Entomology.
Edward Hadley Glass, Ph.D., Professor of Entomology.
James Morton Hamilton, Ph.D., Professor of Plant Pathology and Head of the Department.
David Birney Hand, Ph.D., Professor of Biochemistry and Head of the Department of Food Science and Technology.
George Edward Romaine Hervey, Ph.D., Professor of Entomology.
George James Hucker, Ph.D., Professor of Bacteriology.
Zoltan Imre Kertesz, Ph.D., Professor of Chemistry.
James Douglass Luckett, M.S., Professor and Editor.
James Charles Moyer, Ph.D., Professor of Chemistry.
DeForest Harold Palmiter, Ph.D., Professor of Plant Pathology.
Carl Severin Pederson, Ph.D., Professor of Bacteriology.
Willard Bancroft Robinson, Ph.D., Professor of Chemistry.
Charles Bovett Sayre, M.S., Professor of Vegetable Crops and Head of the Department.
Wilbur Theodore Schroeder, Ph.D., Professor of Plant Pathology.

Nelson Jacob Shaulis, Ph.D., Professor of Pomology.
 George Lewis Slate, M.S., Professor of Pomology.
 Edward Holman Smith, Ph.D., Professor of Entomology.
 William Thorpe Tapley, M.S., Professor of Vegetable Crops.

ASSOCIATE PROFESSORS

James Alfred Adams, Ph.D., Associate Professor of Entomology.
 John Dwain Atkin, Ph.D., Associate Professor of Vegetable Crops.
 Alfred Williams Avens, Ph.D., Associate Professor of Chemistry.
 Donald Wilber Barton, Ph.D., Associate Professor of Vegetable Crops.¹
 Karl Dietrich Brase, M.S., Associate Professor of Pomology.
 Willard Francis Crosier, Ph.D., Associate Professor of Seed Investigations.¹
 Otis Freeman Curtis, Jr., Ph.D., Associate Professor of Pomology.
 Alexander Cochran Davis, Ph.D., Associate Professor of Entomology.
 Desmond Daniel Dolan, Ph.D., Associate Professor of Seed Investigations.
 Chester Gene Forshey, Ph.D., Associate Professor of Pomology.
 Robert McCullough Gilmer, Ph.D., Associate Professor of Plant Pathology.
 Alvin William Hofer, Ph.D., Associate Professor of Bacteriology.
 Robert Consay Lamb, Ph.D., Associate Professor of Pomology.
 Frank Andrew Lee, Ph.D., Associate Professor of Chemistry.
 Siegfried Eric Lienk, Ph.D., Associate Professor of Entomology.
 Guilford Leroy Mack, Ph.D., Associate Professor of Chemistry.
 Freeman Lester McEwen, Ph.D., Associate Professor of Entomology.
 John Jacob Natti, Ph.D., Associate Professor of Plant Pathology.
 LeRoy Walter Nittler, Ph.D., Associate Professor of Seed Investigations.
 Keith Hartley Steinkraus, Ph.D., Associate Professor of Bacteriology.
 Michael Szkolnik, Ph.D., Associate Professor of Plant Pathology.
 Emil Frederick Taschenberg, Ph.D., Associate Professor of Entomology.
 Haruo Tashiro, Ph.D., Associate Professor of Entomology.
 John Preston Tomkins, Ph.D., Associate Professor of Pomology.
 Morrell Thayer Vittum, Ph.D., Associate Professor of Vegetable Crops.
 Austin Clayton Wagenknecht, Ph.D., Associate Professor of Biochemistry.

ASSISTANT PROFESSORS

Kenneth Warren Hanson, Ph.D., Assistant Professor of Pomology.
 Robert Lawrence LaBelle, B.Chem.E., Assistant Professor of Chemistry.
 Louis Melville Massey, Jr., Ph.D., Assistant Professor of Biochemistry.
 Leonard Robert Mattick, Ph.D., Assistant Professor of Food Science.
 Loyd Earl Powell, Ph.D., Assistant Professor of Pomology.
 George Albert Schaefer, Ph.D., Assistant Professor of Entomology.
 Pasquale Richard Sfera, Ph.D., Assistant Professor of Entomology.
 Robert Sands Shallenberger, Ph.D., Assistant Professor of Biochemistry.
 Edgar Roy Skinner, Ph.D., Assistant Professor of Chemistry.
 Don Frederick Splittstoesser, Ph.D., Assistant Professor of Bacteriology.
 Jerome Paul VanBuren, Ph.D., Assistant Professor of Biochemistry.
 Roger Darlington Way, Ph.D., Assistant Professor of Pomology.
 Donald Ellsworth Wilson, Ph.D., Assistant Professor of Food Science.

THE NEW YORK STATE COLLEGE OF AGRICULTURE

CORNELL UNIVERSITY, the Land-Grant institution for New York State, was chartered by the Legislature in 1865. By the terms of the Land-Grant Act of 1862, teaching in agriculture has been, from the beginning, a regular part of the university program. In 1904 the Legislature of the State of New York established the College of Agriculture as a state institution under the title "The New York State College of Agriculture at Cornell University," and made an appropriation for the erection of buildings for the College. In 1906 an Administration Act was passed by the Legislature defining the purpose and activities of the College of Agriculture thus: "The object of 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, publication of bulletins and reports, and in such other ways as may be deemed advisable in the furtherance of the aforesaid objects; to make researches in the physical, chemical, biological and other problems of agriculture, the application of such investigations to the agriculture of New York, and the publication of the results thereof."

With the creation of the State University of New York in 1948, the College of Agriculture, as one of the four state-supported units at Cornell University, became an integral part of this new State University. "Created to provide a comprehensive and adequate program of higher education" the State University now includes more than thirty educational institutions. The College of Agriculture, functioning in this broad context, offers teaching and research facilities to serve the agricultural needs of the State.

THE COURSES AVAILABLE

The resident instruction in the College of Agriculture is planned for those who desire an education in agriculture and in the sciences most closely related to agriculture. It is organized, for the most part, in a course of four years, or eight terms, leading to the degree of Bachelor of Science. Those who want instruction in a special field may register for one or more terms as special students, provided they are qualified by education and experience to pursue the courses they want to take (see page 26).

For those who cannot plan to take four years of college work, special curricula are organized, running through two years, to give specific training for definite vocational objectives. Transfer from the two-year to the four-year course is possible under certain conditions which are described in the Announcement of the two-year course.

Graduate work in the various fields of agriculture is under the jurisdiction of the Graduate School of Cornell University to which questions about admission should be addressed.

Aside from the above, there is regularly a six-week summer school designed especially for teachers, school principals, and superintendents.

There are also one-week and two-week courses with specific purposes. Correspondence courses, without credit toward a degree, are available.

The information contained in this Announcement applies specifically to the four-year course. Circulars describing the other courses referred to may be obtained on application to the Secretary of the College.

THE FOUR-YEAR COURSE

The four-year course provides an education in science with emphasis upon applications in agriculture. Graduates of the College are found in such a wide variety of occupations and situations that only a broad and basic education can give many of them the foundation needed in adjusting to the changes and responsibilities that will come their way. While it is literally correct to think of "agriculture" as applying to crop and livestock production on farms, the four-year course is organized and functions in a much broader educational context than that.

The requirements for a degree, as outlined on page 26, are extremely flexible, with only a few specific courses demanded of all students. The major part of the program for any individual student is chosen from three large groups of courses. This opportunity for election may result in a broad, general program or one in which basic sciences or, to the other extreme, the more applied subjects, are emphasized almost exclusively.

Programs, arranged with the help of a faculty adviser, are available in the following fields:

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Agricultural Business	Genetics
Agricultural Credit	Greenhouse Crop Production
Agricultural Engineering	Landscape Service
Applied—4 year	Livestock Production
Professional—5 year	(Sheep, Swine, and Beef Cattle)
Agricultural Journalism	Meat and Meat Products
Agricultural Marketing	Nursery Crop Production
Agricultural Missionary	Plant Breeding
Agronomy	Plant Pathology
Bacteriology	Pomology
Biochemistry	Poultry Husbandry
Biological Science	Poultry Science
Botany	Preprofessional Programs
Combination Programs	Preveterinary (2 years)
Business and Public Administration	Preprofessional Social Work (4 years)
Nutritional and Food Science	Rural Sociology
Professional Agricultural Engineering	Seed Technology
Conservation Education	Soil Conservation
Dairy Husbandry	Soil Science
Dairy Industry	Statistics
Dairy Science	Teaching Science in High School
Entomology	Teaching Vocational Agriculture in
Extension Service	High School
Farm Management	Turf Management
Food Distribution	Vegetable Crop Production
Floriculture	Vertebrate Zoology (including ornithol-
Food Technology	ogy, mammalogy and ichthyology)
Foreign Agricultural Service	Wildlife Conservation (including fishery
Fruit Production	biology, wildlife management and ma-
General Agriculture	rine biology)

EMPLOYMENT OPPORTUNITIES

The employment opportunities described in the paragraphs which follow are in fields of work in which graduates of the College currently are engaged. It would be possible to compile a long list of specific jobs held by graduates; instead, it has seemed more desirable to name only a few broad fields which include these specific jobs. Experience shows that students should not train too narrowly, because unforeseen circumstances may have an important bearing on the specific jobs which they accept initially. Training appropriate for a broad vocational field will qualify graduates for more than one job opening within that field or even for openings in more than the one field.

FARMING. . . . A first responsibility of the College is to the young men who plan to enter farming. A good living at satisfying work and an opportunity to contribute to community life await the graduates with the necessary farm experience and enough capital to operate a desirable farm. These young men take a general course in agriculture, with emphasis on the type of farming they plan to follow. A general course likewise fills the needs of others who may enter related fields until they

have enough capital to buy or rent a farm. The important types of farming in New York State are dairy, livestock, poultry, fruit, vegetable, and general, with a small number of farms concentrating on other products because of special interests or special markets.

BUSINESS AND INDUSTRY... Leaders in business and industry, particularly in those businesses or industries that market farm products or serve the production needs of farmers, are continually seeking competent young persons with agricultural college training.

The food industry is concerned with the movement of agricultural products, such as eggs, milk, meat, fruits, and vegetables, through processing plants and distribution channels to the consumer. To perform these varied services requires men and women with diverse kinds of training and personal characteristics. For instance, the milk industry provides opportunities in plant and laboratory work for graduates with training in the handling and processing of milk and milk products; in sales, business management, and regulatory jobs for graduates whose training has emphasized marketing and related courses in agricultural economics. College professors and administrators are continually seeking the advice of leaders in the dairy industry regarding the courses of study which they regard as most important for future leaders in the industry.

In the fruit and vegetable processing and marketing fields, there are jobs for fieldmen, buyers, raw-products inspectors, laboratory quality control workers, plant managers, wholesale distributors, and retail store managers. Most of these positions are with food processing companies and with retail food chains.

The business of supplying feed for New York dairy cattle and poultry is of major importance. It requires men who know New York agriculture and, more particularly, who know feeds and the feed requirements of the various types of livestock. The production and the delivery of the right fertilizers, machinery, insecticides, and fungicides, and all other supplies used on our farms, require the services of qualified men. They may need to be well-trained scientists, technicians, salesmen, promotional specialists, or plant operators, or to serve eventually as managers or in other administrative capacities.

All of these businesses and many others in agriculture require a knowledge of financing, advertising, insurance, and other specialized services. Credit organizations, both private and governmental, advertising concerns, and insurance companies have employed graduates of the College. Farm-loan representatives have been employed by local banks, insurance companies, and the various branches of the Farm Credit Administration. Farm experience and the ability to work with people are valuable assets as qualifications for employment, along with a general training in agriculture, including agricultural economics.

The production and sale of flowers and ornamental shrubs in New York is an important and large business. Many students who specialize in floriculture and ornamental horticulture are sons and daughters of persons in the greenhouse or nursery business. Others who do not have that background but combine practical experience with their training find satisfactory opportunities upon graduation.

The College does not have a school of journalism, but it offers several courses in agricultural journalism, visual aids, and television and radio writing and broadcasting. Job opportunities include editorial and staff positions on newspapers, farm papers, and farm magazines. In radio, agricultural college graduates occupy positions as farm program directors and farm news writers for radio and television services in the state colleges throughout the Nation.

HIGH SCHOOL TEACHING . . . Two kinds of secondary school teachers are trained at the College—teachers of vocational agriculture and teachers of science. The former includes only men, the latter both men and women.

More than 300 secondary schools in New York State have departments of vocational agriculture, each of which requires the services of one or more teachers. Newly trained teachers continually are needed to serve departments organized in additional schools and to replace teachers who retire or change to other occupations. Young men who have an extensive background of practical farm experience, a vital interest in boys who would like to become farmers, and a real love for farming as a way of life and of making a living will find the teaching of vocational agriculture a challenging and rewarding field of service. Moreover, the experience gained as a teacher provides excellent background for related positions in school administration, in businesses related to farming, and in farming itself.

The high birth rate of the early 1940's and the increasing number of boys and girls who complete high school have created a strong demand with improved salaries for high school teachers in all fields. Because of the need for scientists in industry as well as in education, the demand for science teachers is particularly acute. This demand is certain to become even greater as boys and girls in the lower grades move on into high school. The young man or young woman who has both an interest in and aptitude for science courses and mathematics, as well as a sincere interest in the welfare of young people, will find rewarding experiences in preparing for and later in serving as a teacher of high school science.

AGRICULTURAL RESEARCH AND COLLEGE TEACHING . . . Agricultural research is concerned with adding to the fund of knowledge bearing on the production, processing, or distribution of farm products. It may be of an economic, social, physical, biological, or

chemical nature, depending on the particular kind of problem being studied. The majority of those responsible for research have had advanced, specialized study in a graduate school. Graduates of the four-year course in the College who have superior records and a sound background in basic subject matter have the opportunity to pursue graduate study, often with the help of a graduate assistantship to defray part of the costs. In recent years, about a third of the graduates of the four-year course have continued with graduate or professional study.

College teaching involves preparation of the same kind as is needed for agricultural research. Whether one engages in research or in teaching depends on personal interests and abilities as well as on opportunities available at the time graduate study is completed. In many cases, graduates hold positions which combine teaching and research.

AGRICULTURAL EXTENSION SERVICE...The term "agricultural extension" refers to the teaching of agricultural subjects at places other than on a college campus and usually on an informal, non-credit basis. The four-year graduate may serve as a county agricultural agent, a 4-H Club agent, or an agricultural missionary. Extension Specialists, located at colleges of agriculture, conduct educational programs and meetings throughout their states. Graduate study, the same as for other college positions, is usually required.

WILDLIFE CONSERVATION...Opportunities in the conservation and management of fish and wildlife are found principally in public employment, with either the state or federal government. Occasionally, there are openings with museums and private foundations. The training in college emphasizes the biological sciences. The work is likely to consist chiefly of survey and research, but in recent years many management and administrative positions have been established. As such, the work is exacting but of great interest to those scientists with a desire to develop and conserve our wildlife resources and to help the people to understand them. The Department of Conservation at the College has printed material on training and employment opportunities in this field.

SOCIAL SERVICE...Another appeal for graduates of the College who have specialized in rural sociology is in the field of social service. The Department of Rural Sociology cooperates with the State Department of Social Welfare as well as with other governmental agencies. The College does not prepare students for positions in social service which require professional or graduate training, but it does provide preprofessional instruction. Qualified graduates have received through the State Department of Social Welfare fellowships for training in rural child welfare.

FOREIGN SERVICE... During the past few decades, the international aspect of American agricultural activities, interests, and problems has become increasingly important. The Foreign Agricultural Service, which is the international arm of the United States Department of Agriculture, is seeking well-qualified, recent graduates in limited numbers to enter its Junior Professional Development Program. These young men emphasize agricultural economics and related courses in their college training. Upon appointment, they serve initially in the United States and subsequently must be willing to accept rotating overseas and domestic assignments in accordance with the needs of the Service.

Graduates with several years of subsequent experience in agricultural work in this country may qualify for foreign assignments with agencies such as the International Cooperation Administration, the Food and Agriculture Organization of the United Nations, or one of the Foundations. Occasionally, they are employed by the government of a foreign country.

STATE AND FEDERAL CIVIL SERVICE... Several agricultural agencies, both state and federal, employ their personnel from registers established by the New York State Department of Civil Service or the United States Civil Service Commission. Positions with these organizations may be of a research, extension, regulatory, or administrative nature. To gain a place on Civil Service registers, seniors or graduates take the appropriate examinations which are announced from time to time.

DIRECTIONS REGARDING CORRESPONDENCE

For admission to the freshman class, to the two-year courses, or to advanced standing from other colleges and universities, all communications should be addressed to the Director of Admissions of Cornell University, Edmund Ezra Day Hall.

For enrollment in correspondence courses, communications may be addressed to the Supervisor of Study Courses in the College of Agriculture, Roberts Hall.

For admission to graduate work in agriculture and candidacy for advanced degrees, communications should be addressed to the Dean of the Graduate School, Edmund Ezra Day Hall.

The *General Information Announcement*, giving details concerning admission, expenses, scholarships, and related subjects, may be obtained by writing to Cornell University Announcements, Edmund Ezra Day Hall. Announcements of the other colleges, schools, and departments of the University may also be obtained by writing that office.

THE APPLICATION FOR ADMISSION

Admission to the College is not simply a matter of presenting certain specified entrance units. For both the applicant and the College it is of the utmost concern that a proper choice of college work be made, and the College, therefore, in making its choice of students to be admitted, considers not only the school record submitted but also any other available indications of probable success in the course the student proposes to take. For this reason the applicant should give, in addition to his formal school credentials, the fullest information regarding his background and experience, the quality of his work, his resources for carrying on and his own purposes in seeking a college education, so that the College may have a better basis for consultation and decision. Correspondence regarding these matters is solicited, and, if it is at all possible, applicants should come to the College for an interview.

Prospective students who have neither lived on farms nor had considerable practical experience in agriculture are urged to spend at least one summer on a well-managed farm to familiarize themselves with common farm affairs and operation before entering College. This experience will count toward the requirement in practice which is described on pages 27-29.

Candidates for admission to the four-year course must be at least sixteen years of age. Students from other colleges or universities are required to furnish certificates of honorable dismissal from those institutions. The academic requirements may be satisfied by the presentation of New York State Regents credentials, or acceptable school certificates, or satisfactory ratings in the tests of the College Entrance Examination Board. Candidates who have prepared for college in New York State should offer a report of State Regents Examinations in subjects which are offered for entrance credit and in which Regents Examinations are scheduled at their schools.

Admission to the four-year course is possible only in the fall term, except for students who enter with advanced standing. Applications should be filed during the fall term of the senior year in high school, at the office of the Director of Admissions, Edmund Ezra Day Hall. Those received after April 1 will probably be at a disadvantage.

ENTRANCE REQUIREMENTS FOR THE FOUR-YEAR COURSE

The subjects that may be offered for admission to the College of Agriculture are named in the following list; the figures following each subject indicate the value in entrance units and show the maximum and the minimum amount of credit allowed in the subject. A unit represents five recitations a week for one year in a subject. In Drawing

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and Industrial Arts, 240 hours are required to earn one unit and 120 hours to earn one-half unit.

ENGLISH, 4 YEARS (required of all entering students)..... 4

FOREIGN LANGUAGES (modern and ancient)

French, first to fourth year 1, 2, 3, 4
German, first to fourth year 1, 2, 3, 4
Hebrew 1, 2, 3
Italian, first to third year 1, 2, 3

Spanish, first to fourth year 1, 2, 3, 4
Greek, first to third year 1, 2, 3
Latin, first to fourth year 1, 2, 3, 4

(If a foreign language is offered for entrance, it is desirable to present at least two years, although credit will be granted for a single year of study in not more than two languages.)

MATHEMATICS

Elementary Algebra 1
Intermediate Algebra 1
Advanced Algebra 1/2

Plane Geometry 1
Solid Geometry 1/2
Plane Trigonometry 1/2

SCIENCES

Biology 1
Botany 1/2-1
Chemistry 1
General Science 1

Physical Geography 1/2-1
Physics 1
Zoology 1/2-1

(If a unit in Biology is offered, a half-unit in Botany and a half-unit in Zoology may not also be counted.)

SOCIAL STUDIES, including History (each course)..... 1/2-1

VOCATIONAL SUBJECTS

Agriculture 1/2-7
Bookkeeping 1/2-1
Drawing 1/2-1

Home Economics 1/2-6
Industrial Arts 1/2-1

ELECTIVES—any high school subject or subjects not already used and acceptable to the University..... 1/2-2

For admission to the New York State College of Agriculture, an applicant must have completed a secondary-school course and must offer either A or B, plus C, as follows:

A. Sixteen units which must include English (4 units) and mathematics (2 units). Remaining units must be selected from above list.

B. The New York State Vocational Diploma in Agriculture, with the proviso that two units in mathematics are included.

C. All applicants must have taken the Scholastic Aptitude Test of the College Entrance Examination Board.

A committee on admissions in the College of Agriculture reviews the credentials of each applicant. In making its decision the committee considers, not only the nature of the subjects offered for admission and the quality of the work done in those subjects, and all available indications of ability for and interest in the work of the course to be under-

taken in the College, but also the background, experience, character, and personality of the applicant.

Students who wish to major in one of the sciences or to become research workers should offer adequate training in foreign languages.

HEALTH REQUIREMENTS ON ENTRANCE

Each entering student, graduate or undergraduate, is expected to assume personal responsibility for the health requirements adopted by the Board of Trustees of Cornell University. Prospective students should consult the *Announcement of General Information* or that of the Graduate School for complete details of the health requirements. Permission to register for a new semester will not be granted unless all health requirements pertaining to the previous semester have been fulfilled.

IMMUNIZATION. A satisfactory certificate of immunization against smallpox, on the form supplied by the University, must be submitted before registration. It will be accepted as satisfactory only if it certifies that within the last three years a successful vaccination has been performed. If this requirement cannot be fulfilled by the student's home physician, opportunity for immunization will be offered by the Cornell medical staff during the student's first semester, with the cost to be borne by the student. If a student has been absent from the University for more than three years, immunity will be considered to have lapsed.

ADMISSION WITH ADVANCED STANDING

A student admitted to the College of Agriculture from another college in Cornell University, or from any other institution of collegiate rank, is regarded as having completed the number of terms and hours to which his records entitle him and receives all the privileges of students who have completed the same number of terms and hours by residence in the College. No more than fifteen semester hours of credit are allowed for one semester of work at another institution. To obtain the degree of Bachelor of Science, however, a student 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 past 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. Because advanced-standing credit may reduce the number of summers available for farm or other work after admission, these applicants are ordinarily held to satisfy a part or all of the practice requirement at entrance, depending upon the number of terms of residence for which they are held.

Credit toward a degree for preparatory school work, beyond that used in satisfying entrance requirements, may be obtained only through a satisfactory grade received in an Advanced Placement Test of the College Entrance Examination Board, in each subject.

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 is surplus entrance credit based on extra work done in preparatory school accepted as the equivalent of more than one term.

REQUIREMENTS FOR ADMISSION OF SPECIAL STUDENTS

Opportunity is provided for the admission of students whose needs may not be well met by the organized curricula of the College. Applicants for admission to such special standing must present entrance credentials as other students do, and in addition they must present a detailed statement of the program they desire to follow. They must show that they have had recent farm experience or other experience qualifying them for the special work they plan to do, and, unless they meet the regular entrance requirements they must be twenty-one years of age.

Students having a first degree and desiring further undergraduate work may be admitted as special students. The work of such students is ordinarily limited to courses in the College of Agriculture; for work taken outside, tuition is charged at the rate prevailing in the college where the work is done.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

The requirements for the degree of Bachelor of Science are residence for eight terms, except for those who make an average of 75 or above, and, in addition to the prescribed work in Military Training and in Physical Education (outlined on page 106 and completely described in the *Announcement of the Independent Divisions and Departments*), the completion of 120 hours of required and elective work, as outlined on pages 29 and 30.

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

THE PRACTICE REQUIREMENT

All men students must satisfy a practice requirement. The purpose is to make certain that they shall have learned some of the skills of the occupations for which they are preparing and shall have gained some understanding from experience, of the economic and social conditions related thereto, particularly with respect to farming. Credit toward meeting the requirement is measured in points which must be obtained according to the following schedule:

A minimum of thirteen points required for registration in the sophomore year, all of which shall be earned from experience on a farm.

A minimum of twenty-seven points from farm work or from work in an approved field of specialization required for registration in the junior year.

A minimum of forty points from farm work or from work in an approved field of specialization required for registration in the senior year.

Credit is given for work done prior to college entrance and during vacations after matriculation. Many students satisfy the full requirement at entrance because of having lived and worked on a farm and others because of a combination of farm and other work experience that is acceptable in their specialization.

Prospective students who have not had considerable practical experience in farming or in their intended field of specialization are urged to take advantage of every opportunity to gain such experience before entrance to college. The experience furnishes a background for much of the college instruction. Practice credit after entrance may normally be expected at the rate of about one point a week for satisfactory work. The amount of credit is based on the nature and variety of work done and what was learned from the experience.

Since regular NROTC students are required to spend from six to eight weeks each summer on cruises or in aviation training, it is necessary for those who register in the College of Agriculture to satisfy a major part of the practice requirement at the time of admission. This should ordinarily amount to not less than 25 of the required 40 points of practice credit. Contract students should have no difficulty in finding time to satisfy the practice requirement and also take the required cruise. (See the *Announcement of the Independent Divisions and Departments* for information about NROTC.)

Credit toward the practice requirement is given for work on a farm. In addition, students specializing in bacteriology, biochemistry, botany, dairy industry, entomology, floriculture and ornamental horticulture, food industry, nutrition, rural sociology, wildlife conservation, or zoology may be given credit for work in these fields, as follows:

Students desiring to special in bacteriology, biochemistry, botany, dairy industry, food industry, nutrition, wildlife conservation, and zoology shall obtain a minimum of thirteen points, and those specializing in rural sociology, a minimum of twenty-seven points, of their practice credit from farm work. Upon their acceptance as specializing students and with the approval of the designated adviser for the specialization and of the Student Practice Office, they may then complete the practice requirement by approved work in their field of specialization.

Selected students specializing in Agronomy may be permitted by the Department to substitute approved work in Agronomy after earning at least 13 points of practice credit from farm work. This is done only on the recommendation of the adviser in Agronomy and with the approval of the administrator of the practice requirement. Also, selected students specializing in agricultural economics, agricultural engineering, agricultural journalism, animal husbandry, plant breeding, plant pathology, poultry husbandry, and science education may petition to substitute appropriate work experience in their respective fields after earning at least 27 points of practice credit from farm work, and upon the recommendation of their faculty adviser and the administrator of the practice requirement.

The practice requirement for students specializing in floriculture and ornamental horticulture applies to both men and women. For these students, production work in greenhouses and nurseries may count toward satisfaction of the thirteen points of credit required from farm work. The Department requires at least sixteen points of credit from work in floriculture or ornamental horticulture.

Students specializing in entomology must obtain the thirteen points of credit from farm work required of all students for admission to the sophomore year. A minimum of sixteen points of their credit must come from entomological practice.

All students who are specializing in one of the fields listed and who expect to use work in their specialization to satisfy a part of the practice requirement must consult the adviser concerned with regard to course and other requirements for acceptance as specializing students. Students are held for farm work to meet the practice requirement until the adviser for the specialized program officially notifies the Student Practice Office and the Office of Resident Instruction of their acceptance as specializing students. After matriculation any additional farm experience that is required must precede the specialized experience.

The practice requirement applies to male alien students just as it does to citizens of the United States.

Prospective students and students who desire information about any aspect of the practice requirement or want assistance in finding employ-

ment on a farm should write or consult Professor S. R. Shapley, Student Practice Office, Roberts Hall, Ithaca, New York. The Department concerned assists in finding employment for the specialized practice.

THE COURSES LEADING TO THE DEGREE OF BACHELOR OF SCIENCE

(Required courses given in other colleges than Agriculture are described in the *Announcement of the College of Arts and Sciences*.)

Freshman Orientation Course	1
English, Introductory Course	6
Botany, Biology, or Zoology	6
Chemistry or Physics	6
Geology 115 (the requirement may be waived for students presenting geology or earth science for entrance; in such a case 3 hours are added to the minimum agricultural electives)	3
Basic sciences and social studies	24

(Not less than 9 hours and not less than 2 subjects under A and not less than 9 hours and 2 of the 5 subjects under B)

- A. Biology, botany, zoology, entomology, bacteriology, physiology, genetics, psychology, chemistry, physics, geology, mathematics, meteorology, and biochemistry.
- B. (1) Economics, (2) government, (3) history, (4) rural sociology, sociology and anthropology, and (5) American studies, except that courses under these headings in accounting and statistics may not be used.

Elective in the College of Agriculture (including any courses listed in this <i>Announcement</i> on pages 41 to 106 with exceptions specifically noted)	54
Elective (either in Agriculture or in any other college in the University)	20
Total	120

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

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

As a land-grant institution chartered under the Morrill Act of 1862, Cornell offers courses in military science which include all branches of the service (Army, Air Force, Navy, and Marines), the successful completion of which, and receipt of a baccalaureate degree, qualify a male student for a commission in the Regular or Reserve component of the appropriate service.

Participation in military training during the first four terms is mandatory for all undergraduate men who are citizens of the United States and are physically qualified. Satisfactory completion of the basic course in Military Science and Tactics, Air Science, or Naval Science fulfills this requirement. The number of terms of military training required of students entering with advanced standing is to be reduced by the number of terms which the student has satisfactorily completed (not necessarily including military science) in a college of recognized standing. Service in the armed forces may under certain conditions also satisfy the military training requirement.

Entering students who have had previous ROTC training in secondary or military schools, are requested to obtain DA Form 131 (Student's Record—ROTC) from the institution previously attended. This record should then be presented to the appropriate military department during registration. (See also the *Announcement of the Independent Divisions and Departments*.)

Credit either in the Basic Course in Military or Air Science (four terms), or in the first four terms of Naval Science, does not count toward the 120 hours required for graduation in the College of Agriculture.

All undergraduates must pursue four terms of work, three hours a week, in Physical Education. Ordinarily, this requirement must be completed in the first two years of residence; postponement is to be allowed only by consent of the University Faculty Committee on Requirements for Graduation. Exemption from this requirement may be made by the Committee when it is recommended by the medical office, by the Department of Physical Education, or because of unusual conditions of age, residence, or outside responsibilities. An exemption recommended by the Department of Physical Education shall be given only to students who meet standards of physical condition established by the Department of Physical Education and approved by the Committee on Requirements for Graduation. Students who have been discharged from the armed services may be exempted.

For students entering with advanced standing, the number of terms of Physical Education required is to be reduced by the number of terms which the student has satisfactorily completed (whether or not Physical Education was included in his program) in a college of recognized standing (see the *Announcement of the Independent Divisions and Departments*.)

BACHELOR OF SCIENCE WITH DISTINCTION

The degree of Bachelor of Science with distinction will be conferred upon those students who, in addition to having completed all of the requirements for the Bachelor of Science degree, shall have done all of their undergraduate work at Cornell University and have cumulative

scholastic averages of 85 or above; and upon those transfer students who have been in residence for at least two years and have cumulative averages of 88 or above.

REGISTRATION FOR COURSES

The standard schedule for the freshman year must include the following courses:

Freshman Orientation Course	1
Military Training	0
Physical Education	0
English, Introductory Course	6
Botany 1-2, Biology 1-2, or Zoology 103 and 104	6
Chemistry or Physics	6
Elective courses in the College of Agriculture	6
Elective courses in the basic sciences, in social studies, or in courses in the College of Agriculture	3-6

In making his program, the student has the assistance of a faculty adviser, preferably from the field in which he expects to specialize. The adviser is ordinarily assigned to the new student for the first term, but following that he is chosen by the student. Other counselors to assist students on personal matters, vocational guidance, and placement are available in the Office of Resident Instruction, Roberts 192.

A student must register for at least twelve hours each term, and no new student may register for more than eighteen hours in addition to the regular work in Physical Education and Military Training.

Failures in courses, either required or elective, taken outside the College of Agriculture are counted against the allotment of the twenty free hours that may be taken in any college.

If senior students who have met all requirements desire to take courses outside the College of Agriculture in addition to those required or allowed free, they may do so upon paying for the additional hours at the rate of tuition prevailing in the colleges where the courses are taken. Those with exceptional scholastic records and with the recommendation of the department in which their major work is done may be permitted to elect, without additional payment, up to ten hours in basic science outside the College of Agriculture beyond the twenty hours normally allowed for election in any college.

Courses in Advanced ROTC may be taken, in addition to the twenty hours of free electives outside the College, without payment for those excess hours.

To be eligible for the degree, the student must maintain an average grade of at least 70 for the entire course.

COURSES IN AGRICULTURE OPEN TO FRESHMEN

Agricultural Economics 50	Drawing (mechanical) 1
Agricultural Engineering 1, 21, 31, 40, 42	(freehand) 10, 11
Agronomy 2	Entomology 10
Animal Husbandry 1, 10, 50, 60, 70	Floriculture and Ornamental Horticulture 1, 2
Biology 1-2	Food Science and Technology 1
Botany 1-2	Meteorology 1
Conservation 1, 2, 3, 9	Orientation 1, 5
	Pomology 1, 2
	Poultry Husbandry 1, 50
	Vegetable Crops 3, 10, 22

COMBINED COURSES

PROFESSIONAL AGRICULTURAL ENGINEERING

A JOINT program between the Colleges of Agriculture and Engineering at Cornell University leads to the degree of Bachelor of Agricultural Engineering at the end of five years. Students in this program register in the College of Agriculture during the first four years but take courses in the Colleges of Engineering, Arts and Sciences, and Agriculture. In the fifth year the registration is in the College of Engineering which recommends the candidates to the Trustees of the University for the degree.

Applicants for admission must meet the academic entrance requirements of the College of Engineering. These include English (4 units) elementary and intermediate algebra (2 units), plane geometry (1 unit), and trigonometry ($\frac{1}{2}$ unit). A foreign language (2 units) or history (2 units); advanced algebra ($\frac{1}{2}$ unit) or solid geometry ($\frac{1}{2}$ unit); and chemistry (1 unit) or physics (1 unit) must also be offered. It is strongly recommended that at least 3 of the elective units to make up the balance of 16 be in language or history. Applicants are also advised to offer advanced algebra rather than solid geometry, when a choice is possible.

Each candidate for admission is required to take the Scholastic Aptitude Test of the College Entrance Examination Board and to request the Board to report the results to the Director of Admissions, Cornell University. Candidates are urged to take the tests in January of their senior year.

Since it is the purpose of this curriculum to train engineers for agriculture in its many relationships of building, soil and water management, machinery, manufacturing and processing of agricultural products and supplies, drainage, irrigation, and so on, evidence of interest in and background for engineering work in agriculture is a qualification for admission that is given careful consideration. Only a limited number of students are admitted to the program, and agricultural experience and the quality of the academic preparation are important criteria in the selection of applicants.

The curriculum includes basic work in biology, mathematics, physics, and chemistry; a well-rounded selection of courses in engineering science and technology, including agricultural engineering; courses in soils, crops, farm management, and other subjects in agriculture; and general studies to provide a broad and useful training.

Charges for tuition and fees, during the first four years in the curriculum, are the same as outlined on page 36, except that students in this combined course are required to take more courses outside the College of Agriculture than are permitted to other students and for which they must pay, on a credit-hour basis, as soon as the regular allowance has been used up. The amount of the charge depends upon the specific courses that are taken but is approximately a total of \$1400 for residents of the State who are eligible for free tuition. The additional charge for the excess out-of-college instruction in the case of non-residents, who pay the regular tuition of \$200 a term, is approximately \$825. Payment for the excess hours begins in the fourth term, but the major part is paid in the third and fourth years. In the fifth year these students are subject to the tuition and fees charged in the College of Engineering, which at present are \$512.50 for tuition and \$112.50 for fees each term.

A six-week summer session, between the fourth and fifth years, is spent in field study. Regular summer session tuition is charged.

Students in the agricultural engineering curriculum must satisfy the practice requirement of the College of Agriculture by work on farms, as described on pages 27 and 28 of this *Announcement*.

In applying for admission the applicant should indicate in the application, which should be sent to the Director of Admissions, that he wants to enter the College of Agriculture for the joint program, with the College of Engineering, in agricultural engineering.

WITH BUSINESS AND PUBLIC ADMINISTRATION

Properly qualified undergraduate students in the College of Agriculture may enroll in their fourth year, in a joint program with the Graduate School of Business and Public Administration, leading to the regular Bachelor of Science degree from the College of Agriculture, at the end of that year, and to the Master of Business Administration or the Master of Public Administration, from the Graduate School of Business and Public Administration, at the end of the fifth year. A careful selection of courses is necessary if the two degrees are to be earned in five years, so a student who is interested should plan his program with the help of the designated faculty adviser, beginning with the sophomore year. If the decision to enroll is not made until later, consultation with the adviser is necessary to determine whether the requirements for the two degrees can be met in five years or if a longer time is needed.

The opportunity to receive these two degrees in five years, when the normal time is six years, is made possible by the inclusion in the fourth-year schedule of certain courses from the Department of Agricultural

Economics that may be acceptable in lieu of certain first-year requirements by the Graduate School of Business and Public Administration. Similarly, the Faculty of Agriculture accepts up to nine hours of courses in Business and Public Administration in the fourth year toward the satisfaction of the requirement in the social studies. These substitutions are allowed only to those who have been accepted for admission by the Graduate School of Business and Public Administration and who have their schedules approved by the College of Agriculture faculty adviser for this program.

In the fifth year the student registers only in the Graduate School of Business and Public Administration. The program of that year consists of certain core subjects that are taken by all students in Business or Public Administration and of concentrated study in a sector of the field of agricultural management. The specific courses to be taken depend upon the special interest of the student and the particular option that he chooses. Options that have been listed include:

- Management of farm cooperatives
- Agricultural credit administration
- Agricultural industries
- Agricultural marketing
- Public policy and the administration of government agricultural programs
- Management of natural resources

During the first four years these students are subject to the tuition requirements of the College of Agriculture and in the fifth year to those of the Graduate School of Business and Public Administration.

For further details about this joint program reference should be made to the *Announcement of the Graduate School of Business and Public Administration*.

The College of Agriculture and the Graduate School of Business and Public Administration also cooperate in a special program in food distribution. This joint effort carries the sponsorship of the National Association of Food Chains. The majority of the students have been employed in the food distribution industry but the program also attracts others.

Qualified degree holders may enroll in the Graduate School as candidates for the Master of Science or Doctor of Philosophy degree, or in the Graduate School of Business and Public Administration as candidates for the Master of Business Administration degree which requires two years of residence. Undergraduates register in the College of Agriculture as candidates for the Bachelor of Science degree. Others who are not interested in a degree enroll as special students in the College of Agriculture and are granted a certificate at the successful completion of one year of work.

WITH THE SCHOOL OF NUTRITION

A plan between the College of Agriculture and the Graduate School of Nutrition permits students of Agriculture, who qualify, to follow a curriculum that leads to the regular degree of the College of Agriculture, at the end of the fourth year, and the degree of Master of Nutritional Science or Master of Food Science, at the end of the fifth year. To meet the requirements for the two degrees in five years, instead of the normal time of six years, the student in Agriculture should start planning his program with the adviser for students of nutrition not later than the end of the freshman year. During the first four years of this program, students are subject to the tuition requirements of the College of Agriculture and in the fifth year to those of the School of Nutrition.

WITH THE VETERINARY COLLEGE

Students who do their pre-veterinary work in the College of Agriculture and are accepted by the Veterinary College at Cornell University sometimes qualify for degrees from both colleges. This takes about seven years and is ordinarily done by spending the first three years in Agriculture followed by four in the Veterinary College, including a combined registration in Agriculture during one or two years.

PAYMENTS TO THE UNIVERSITY

TUITION

TUITION is free to undergraduate students pursuing full or special courses in the New York State College of Agriculture, who at the time of their matriculation are, and for at least twelve months prior thereto have been, bona fide residents of the State of New York.

Since physical presence in the State, especially for persons under age, by no means constitutes legal residence, applicants who are at all doubtful of their own right to exemption should address inquiries in advance to the Director of Resident Instruction in the College of Agriculture.

No student is allowed to transfer from any free-tuition course to another course in Cornell University where tuition is charged without first paying the difference in tuition for the credit transferred.

Students in Agriculture who are not exempt under these provisions are required to pay tuition of \$200 a term. Tuition-paying students transferring from the College of Agriculture to other colleges in the

University must first make payment for the difference in tuition for the credit transferred.

Senior students desiring to take, while registered in the College of Agriculture, courses in other colleges in the University, beyond those specifically required and also beyond the twenty hours allowed free, may do so upon payment of tuition for the additional hours at the rate of tuition in the college in which the work is taken.

Tuition and other fees become due when the student registers. The University allows twenty days of grace after the registration day of each term of the regular session. The last day of grace is printed on the registration card which the student is required to present at the Treasurer's office.

Any student, graduate or undergraduate, who fails to pay his tuition fees and other indebtedness within the time prescribed by the University is thereby dropped from the University. When in his judgment the circumstances in a particular case so warrant it, the Treasurer may allow an extension of time to complete payments. For such extension, the student is assessed a fee of \$5. A reinstatement fee of \$10 is assessed in the case of any student who is permitted to continue or return to classes after being dropped from the University for default in payments. For reasons satisfactory to the Treasurer and the Registrar, which must be presented in writing, the above assessment may be waived in any individual case. If the student withdraws, University fees are charged on the basis of 10 per cent for each week or fraction thereof in attendance.

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

FEES AND INSTRUCTIONAL EXPENSES

A DEPOSIT OF \$45 must be paid after the applicant has received notice of provisional acceptance. At the time of the first registration in the University, the deposit is used to cover matriculation charges, provides for certain graduation expenses, and establishes a fund for undergraduate and alumni class activities. The deposit is not refundable.

A DEPOSIT OF \$30 is required for a uniform, payable at registration in the first term, in the Basic Course in Military Science. Most of this deposit is returned as earned uniform allowance upon completion of the Basic Course.

A UNIVERSITY AND COLLEGE COMPOSITE FEE of \$115 is required of every student at the beginning of each term. This fee covers the following services: (1) *Health services and medical care.* These services are centered in the University Clinic or out-patient

department and in the Cornell Infirmary or hospital. Students are entitled to unlimited visits at the Clinic; laboratory and X-ray examinations indicated for diagnosis and treatment; hospitalization in the Infirmary with medical care for a maximum of fourteen days each term and emergency surgical care. The cost for these services is included in the College and University general fee. For further details, including charges for special services, see the *General Information Announcement*. (2) *Willard Straight Hall membership*. Willard Straight Hall is the student union; each student shares in the common privileges afforded by the operation of Willard Straight Hall, subject to regulations approved by the Board of Managers of the Hall. (3) *Laboratory services* for courses taken in the State Colleges. (4) *University administration and endowed college laboratory services*. (5) *Physical recreation*. Each male student is entitled to the use of the gymnasium and the university playgrounds, and to the use of a locker, bathing facilities, and towels in Teagle Hall, Barton Hall, or the Schoellkopf Memorial Building; and each woman student to the use of the women's gymnasium, recreation rooms, and playgrounds, and to the use of a locker. (6) *Student activities*. The fee helps to provide funds for worthy student organizations as approved by the Board of Trustees on recommendation of the Student Council.

BOOKS, instruments, and instructional supplies may cost from \$25 to \$50 a term.

MISCELLANEOUS RULES AND ASSESSMENTS

Every student is held personally responsible for any injury done by him to any of the University's property.

Assessments, charged to the student's account and payable at the Treasurer's office, are levied upon the student in certain circumstances, under the following rules of the University: (1) A matriculated student desiring to register after the close of registration day must first pay a fee of \$5. (2) A student desiring to take an examination or other test for the completion of a course in which the grade "absent" or "incomplete" was reported must first pay a fee of \$2 for each examination or other test. (3) A student desiring to make an appointment for the required medical examination or conference after twenty days from the last registration day of the term must pay a fee of \$2.

For reasons satisfactory to the proper authority, any of the above-mentioned assessments may be waived in any individual case if the student's failure to comply with the regulation was due to ill health or to any other reason beyond his control. Application for such a waiver should be made to the Secretary of the College, or, in the case of the medical examination, to the Director of the Student Health Service.

STUDENT HOUSING AND DINING ARRANGEMENTS

MEN STUDENTS

HOUSING for men is available in the Residential Halls of the University, in private homes, rooming houses, and fraternities (for members only). At present, university facilities house approximately 30 per cent of the men students.

Cornell University provides, on the campus, adequate dormitories for approximately 2100 men. These dormitories are a five-minute walk from the center of the campus. A snack bar is located in the dormitory area. Complete cafeteria service is provided in Willard Straight Hall, the student union building, which is situated between the dormitories and the academic buildings. In addition to two complete cafeterias, equipped for regular meal and snack service, there is a well-appointed dining room with table service. These dining facilities as well as the dormitories are under the supervision of the Department of Residential Halls. In addition, there is a cafeteria in Martha Van Rensselaer Hall, operated by the College of Home Economics, and there is also one in Stocking Hall, operated by the Department of Dairy Industry.

Application forms for University dormitories will be mailed automatically by the Office of Admissions to each male candidate for admission as a freshman or to a transfer student at the time of notification of provisional acceptance to the University. Housing in University dormitories can be guaranteed for undergraduate men who have been admitted to the University and have filed dormitory applications by June 1.

Graduate men should make application for University dormitory housing directly to the Department of Residential Halls as soon as possible after January 1 for fall matriculants; after November 1 for February matriculants.

WOMEN STUDENTS

The University provides comfortable, well-furnished dormitories and cottages for the housing of undergraduate and graduate women attending the University. Undergraduate women are required to live in University-operated dormitories or sororities (for members only) unless, because of exceptional circumstances, other arrangements are approved by the Office of the Dean of Women.

An application form for living accommodations for undergraduate women will be sent to each candidate by the Office of Admissions with the notice of provisional acceptance to the University.

Graduate women should make application for University dormitory housing directly to the Department of Residential Halls.

MARRIED STUDENTS

Facilities for married students include a new 96-unit housing development which was completed for occupancy in the fall of 1956. This area, known as the Pleasant Grove Apartments, offers 64 one-bedroom and 32 two-bedroom apartments for married graduate students. In addition, fifty houses were renovated during the spring and summer of 1957 to provide 34 duplex dwellings, each containing two two-room apartments, and 16 four-room cottages. In this area, known as Cornell Quarters, one-half of the units are allocated to married graduate students, with the other half being available to married undergraduates. All apartments and cottages are rented unfurnished and exclusive of utilities except water.

Detailed information on all types of housing, including off-campus housing for men and married students, may be obtained by writing the Department of Residential Halls, Edmund Ezra Day Hall.

DEPARTMENTS OF INSTRUCTION

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

Special notice. Unless otherwise noted, all courses are given in the buildings of the College of Agriculture. Courses enclosed in brackets will not be given in 1959-1960.

Courses numbered from 1 to 99 are open to undergraduates generally; courses numbered from 100 to 199 are intended primarily for upperclassmen and graduates; courses numbered from 200 up are intended primarily for graduates.

ORIENTATION

1. **ORIENTATION.** Fall term. Credit one hour. Required of all freshmen in Agriculture. One lecture-discussion period a week, M 10, 11; T 10; W 9; Th 10; F 9, 10, or 11. Warren 160 or 201. Professors HARDEN, HERTEL, and TYLER.

5. **ORIENTATION.** Fall or spring term. Credit three hours. The credit in this course is not counted toward the 120 hours required for the degree. Fall term: For entering students only. M W F or T Th S 9 or 10. Spring term: May be elected by first- or second-year students only. Sections for two-year students, M W F 9 or 11; for four-year students, M W F 12. Warren 37. Assistant Professor GEISELMANN.

The course emphasizes the analysis and reasoning involved in the solution of work problems which have been drawn mainly from College of Agriculture courses requiring the use of mathematics.

AGRICULTURAL ECONOMICS

Courses in this Department provide instruction in the fields of farm management, prices, business management, public administration and finance, marketing, land economics, food distribution, and agricultural policy.

FARM MANAGEMENT

102. **FARM MANAGEMENT.** Spring term. Credit five hours. Not open to freshmen. This course should be preceded by as many as possible of the courses dealing with the production of crops and animals. Lectures, M W F 10. Warren 45. Laboratory: for undergraduate students, T W Th or F 2-4; for graduate students, F 4-6. Warren 101. On days when farms are visited the laboratory period is from 2-6. Professor WARREN.

A study of the organization and operation of the farm from the point of view of efficiency and continuous profit; farm records, farm business analysis, factors affecting profits, size of business, choice of enterprises, partnership arrangements, getting started in farming, planning the organization and management of specific farms. One all-day trip and five half-day trips are taken to visit farms in near-by regions.

103. **FARM COST ACCOUNTING.** Fall term. Credit three hours. Prerequisite, course 102. Lectures, W F 8. Laboratory, W or F 2-4. Warren 101. Brief weekly conferences to be arranged. Associate Professor KEARL.

Cost-accounting methods and procedures as applied to farms. The course considers

the organization of accounts; methods of recording information; methods of depreciation determination; methods of cost allocation; summarization and analysis of accounts; making financial and operating statements; and studying farm businesses from the standpoint of management and research.

104. *ADVANCED FARM MANAGEMENT*. Spring term. Credit three hours. Prerequisite, course 102. F 2-4, S 8-10. Warren 160. Professor CUNNINGHAM.

Advanced study of the organization and operation of major types of farms in different regions of New York State, with particular reference to land, market, and other resources. Field trips are taken, either Friday afternoons or Saturdays. One overnight trip is taken.

105. *FARM FINANCE*. Spring term. Credit three hours. Prerequisite, Course 102. Lectures, T Th 10. Discussion, T 2-4. Warren 145. Professor HEDLUND.

A study of sound financial arrangements for farmers and the credit institutions which serve them.

106. *FARM APPRAISAL*. Fall term. Credit three hours. Prerequisite, Course 102. Lecture, T 10. Laboratory, T 1-5. Warren 101. Professor WARREN.

A study of factors governing the price of farms, methods of farm valuation, and practice in the appraisal of farms of various types.

207. *FARM MANAGEMENT RESEARCH METHODS*. Fall term. Credit two hours. Open only to graduate students. Th 4-6. Warren 160. Associate Professor STANTON.

A discussion of problems involved in doing farm management research. Emphasis is placed on the organization of research projects, sources and methods of obtaining data, sampling, and the different methods of analyzing data commonly used by research workers in this field.

208. *FARM RESOURCE ALLOCATION*. Fall term. Credit three hours. Open only to graduate students. Lectures, M W F 12. Warren 160. Professor ROBINSON.

A review of economic theory, statistical methods, and empirical studies applicable to resource allocation problems in agriculture. Topics discussed include production functions, substitution relationships, cost functions, supply and demand relationships, linear programming techniques, and inter-industry studies.

PRICES AND STATISTICS

Attention is directed to courses in mathematics and statistics in the Colleges of Arts and Sciences and Engineering and in the School of Industrial and Labor Relations.

111. *INTRODUCTORY STATISTICS*. Fall term. Credit three hours. Lectures, T Th 11. Warren 145. Laboratory, M T or F 2-4. Warren 60. Associate Professor STANTON.

An introduction to procedures and methods of analysis used in the study of agricultural and economic data. Methods of calculating and interpreting the meaning of frequency distributions, measures of central tendency and dispersion, index numbers, time series analysis, cross tabulation, charts and tables, simple regression and correlation will be discussed.

115. *PRICES*. Spring term. Credit three hours. Open to juniors, seniors, and graduate students. Lectures, M W F 8. Warren 145. Professor ROBINSON.

A study of the factors affecting the prices of farm products.

BUSINESS MANAGEMENT

Attention is directed to the courses in administrative engineering in the College of Engineering, in economics in the College of Arts and Sciences, and in adminis-

tration in the School of Hotel Administration and the Graduate School of Business and Public Administration.

121. *ACCOUNTING*. Fall term. Credit three hours. Lectures, M W 11. Warren 131. Laboratory, M 2-4, Warren 101, T 2-4 or 4-6, Warren 201. Associate Professor CARPENTER.

A comprehensive survey of basic accounting principles. Some analysis and interpretations of financial statements with special emphasis on agricultural businesses.

122. *ACCOUNTING*. Spring term. Credit three hours. Prerequisite, Course 121 or its equivalent. Lectures, T Th 11. Warren 245. Laboratory, T or W 2-4. Warren 260. Professor ———.

Consideration of corporation and partnership accounting, asset valuation, income determination, special problems, and interpretation and use of financial statements. Emphasis is placed on special problems of agricultural business.

125. *BUSINESS MANAGEMENT*. Fall term. Credit three hours. Prerequisite, courses 122 and 140. Lectures, T Th 8. Warren 245. Laboratory, T 2-4, Warren 160, or W 2-4, Warren 260. Professor ———.

An introductory course in principles of business management, with emphasis on organizing and financing an operation, administrative and fiscal management policies and practices, and changes in structural organization. Designed especially for students who are planning careers in agricultural business.

126. *FARMERS' COOPERATIVES*. Spring term. Credit three hours. Lectures, M W 9. Warren 45. Discussions, W or Th 2-4. Warren 145. Associate Professor CARPENTER.

What cooperatives are, what they have tried to do, and what they have done; their legal status and special problems of organization, finance, and control.

127. *BUSINESS LAW*. Fall term. Credit three hours. Lectures M W F 9. Warren 231. Limited to upperclassmen. Mr. TREMAN.

Consideration is given chiefly to legal problems of particular interest to persons who expect to engage in business, including contracts, liens, mortgages, and negotiable instruments, ownership and leasing of property; wills; estates; inheritance taxation; and other practical problems.

226. *SEMINAR IN AGRICULTURAL COOPERATION*. Spring term. Credit two hours. Open only to graduate students. T 4-6. Warren 204. Associate Professor CARPENTER.

A discussion of the economic theory concerning farmer cooperatives. Special attention is given to problems of financing, management, control, and membership relations peculiar to farmer cooperatives.

PUBLIC ADMINISTRATION AND FINANCE

Attention is directed to the courses in Government and to Economics 306 (Federal Public Finance) in the College of Arts and Sciences.

130. *RURAL GOVERNMENT*. Fall term. Credit three hours. T Th 9 and Th 2-4. Warren 260. Professor LUTZ.

Government in the United States with emphasis upon organization, administration, functions and finance of government in rural New York.

138. *TAXATION*. Fall term. Credit three hours. Open to juniors, seniors, and graduate students. Lectures, M W F 11. Warren 145. Professor KENDRICK.

A study of the principles and practices of public finance, with emphasis on taxation. Among the topics examined are the growth of public expenditures and its

causes; historical changes over time in sources of revenue; and property, inheritance, business, and personal income taxation.

237. ADMINISTRATION OF PUBLIC AGRICULTURAL PROGRAMS. Spring term. Credit two hours. Primarily for graduate students. Undergraduate registration by permission of the instructor. F 2-4. Warren 260. Professor LUTZ.

An examination of government organizations for administering and financing public agricultural programs; a study of some problems of administration and finance, including organization of agencies, management of personnel, budgetary management, inter-agency relationships (national, state, and local), and relationships among national, state, and local levels of government. Course 130 or one or more courses in government and public administration are desirable before taking this course.

MARKETING AND FOOD DISTRIBUTION

140. MARKETING. Fall or spring term. Credit three hours. Lectures: fall term, M W F 10; spring term, M W F 11 except for weeks when field trips are taken, then M F lectures only. Warren 45. Field trips, T W or Th 1:30-5:30. Professor DARRAH.

A study of how farm products are marketed. Special attention is given to the consumption of farm products, the factors that affect consumption, production areas, market channels, the operation of different marketing agencies, marketing services, and costs. One all-day and five half-day trips are taken to visit marketing agencies.

143. PRICING AND DISTRIBUTION OF MARKET MILK. Fall term. Credit 4 hours. Lectures, T Th 10. Warren 245. Discussion period, M or T 1:40-4:00. Warren 260. Professor SPENCER.

Special attention is given to the marketing system for milk; characteristics of supply and demand for milk, how milk prices are determined, and how they are affected by various factors; and the regulation of milk prices by state and federal orders.

145. FIELD STUDY OF FOOD INDUSTRIES. Spring term. Credit two hours. Registration by permission. W 1-2, Warren 31. Associate Professor EARLE.

Observations are made of the organization and operation of businesses in the food industry. Trips are made to manufacturers, processors, wholesalers and retail firms throughout the term. Four days of spring vacation are spent in New York City and Philadelphia visiting food distribution firms.

146. DAIRY ORGANIZATION AND MANAGEMENT. Spring term. Credit 3 hours. Lecture and discussion, M W 11-12:30. Warren 245. Professor ———.

Management problems of milk dealers, including procurement, plant operation, selling and distribution, pricing policies, and industry relations.

Intended especially for students majoring in Dairy Industry or in Agricultural Business. Should be preceded by course 143 or the equivalent.

147. MARKETING INSTITUTIONS. Spring term. Credit two hours. Prerequisite, course 140 or its equivalent. Enrollment limited to 40. F 12. Warren 245. Professor BRUNK.

Economic functions performed by various types of specialized marketing agencies, with an emphasis on their physical operating patterns. Five days of spring vacation are spent in New York City inspecting and studying the major terminal marketing institutions. Total cost of the trip need not exceed \$50 in addition to transportation to and from New York.

148. FOOD DISTRIBUTION. Fall term. Credit three hours. Registration by permission. M W F 10. Warren 31. Associate Professor EARLE.

An analysis of the factors affecting food distribution costs, prices and the consumption of food products; a study of the structure and the changing pattern of the food industry, with a description and analysis of the services performed by the various marketing agencies.

149. *FOOD INDUSTRY MANAGEMENT*. Spring term. Credit three hours. Registration by permission. M W F 10. Warren 31. Associate Professor EARLE.

A study of management principles as they apply to the operation of organizations in the food industry.

240. *INTRODUCTION TO MARKETING RESEARCH*. Spring term. Credit two hours. Enrollment limited to graduate students. W 4-6 p.m. Warren 260. Professor BRUNK.

Objectives of marketing research; organization of research agencies; selecting and planning projects; preliminary investigation procedures; surveys; experimental designs; methods engineering; case studies; field and office supervision; preparation of reports; and application of results.

241. *FOOD MERCHANDISING AND PROMOTION*. Fall term. Credit two hours. Enrollment limited to graduate students. Discussion W 4-6. Warren 260. Professor BRUNK.

A seminar course exploring alternative merchandising and promotional devices used in the foods industry with special attention given to identification of basic forces having an impact on buying behavior.

246. *RESEARCH IN THE PRICING AND DISTRIBUTION OF MILK*. Spring term. Registration by permission of the instructor. Credit two hours. T 7-9 p.m. Warren 117. Professor SPENCER and Professor ———.

Selection and delineation of problems to be studied; a critical review of past and current research; planning new research projects; research organization and finance; ways of bringing about more general acceptance of findings and more prompt adoption of recommendations from research projects in this field.

248. *SEMINAR IN FOOD DISTRIBUTION*. Fall term. Credit two hours. Registration by permission. F 2-4 p.m. Warren 401. Associate Professor EARLE.

Leading authorities in the food industry are guest discussion leaders. Emphasis is placed on the relation of the food industry to the economy, sources of supply, and a descriptive survey of the functions and trends among marketing organizations in the food industry. Topics discussed are concurrent with those in course 148.

249. *SEMINAR IN FOOD INDUSTRY MANAGEMENT*. Spring term. Credit two hours. Registration by permission. F 2-4 p.m. Warren 401. Associate Professor EARLE.

Leading authorities of the food industry are guest discussion leaders. Emphasis is placed on the management aspects of operating and coping with the problems of firms in the food industry. Topics discussed are concurrent with those in course 149.

LAND ECONOMICS AND AGRICULTURAL POLICY

50. *AGRICULTURAL GEOGRAPHY*. Fall term. Credit four hours. Lectures, M W F 9 or 11. Warren 45. Discussion, W Th or F 2-4 or W 7-9 p.m. Juniors, seniors, and graduate students should register in the F 2-4 discussion section. Warren 345. Professor ———.

The economics and geography of the world's agriculture, providing a basis for understanding past development and future changes in agriculture. Elementary economic principles, historical development, physical geography, and population growth are studied in their relation to agricultural development and the economic problems of farmers. Particular emphasis is placed upon study of the agriculture of various farming regions of the United States, their economic problems and competitive situation.

151. *PUBLIC PROBLEMS OF AGRICULTURE*. Fall term. Credit three hours. Open to juniors, seniors, and graduate students. Lectures, T Th 9. Warren 45. Discussions: W or Th 2-4. Warren 160. Professor ROBINSON.

A review of the economic characteristics of agriculture as an industry and the problems associated with agriculture which are likely to call for government action. Federal farm programs suggested or enacted during recent decades are analyzed. Among the topics discussed are farm price supports, land tenure, credit arrangements, and soil-conservative programs.

152. *AGRICULTURAL LAND ECONOMICS*. Spring term. Credit three hours. Primarily for juniors, seniors, and graduate students. For undergraduates, courses 50 and 102 should precede or accompany this course. Lectures, T Th 8. Warren 145. Discussion and laboratory, primarily for undergraduate students, Th 2-4; primarily for graduate students, T 2-4. Warren 160. When field trips are taken, the laboratory period is from 1 to 5:30. Associate Professor CONKLIN.

Physical land variability; systems of physical land classification; fundamental economic concepts; traditional and revised theories of land use and farming returns; systems of economic land classification; patterns of change in land use; the effect of institutional arrangements upon land use; problems of conservation; and factors involved in land-policy formation. Two field trips are taken.

159. *FOOD ECONOMICS*. Spring term. Credit three hours. Designed especially for students in the School of Nutrition and in the College of Home Economics. Not open to students in the College of Agriculture except by permission of the instructor. Lectures and discussion, M W F 8. Savage 100. Professor DEGRAFF.

Economic aspects of food, including production, distribution, and consumption, with special emphasis on the economics of diet.

250. *SEMINAR IN FOOD AND POPULATION*. Spring term. Credit two hours. Open only to graduate students. Registration by permission. W 7:30 p.m. Savage 130. Professor DEGRAFF.

Demographic behavior, population and food supply, comparative agriculture.

251. *SEMINAR IN AGRICULTURAL POLICY*. Spring term. Credit two hours. Open only to graduate students. M 2-4. Warren 160. Professor ROBINSON.

An analysis of current agricultural policies and proposed programs in the United States and selected foreign countries.

252. *SPECIAL PROBLEMS IN AGRICULTURAL LAND ECONOMICS*. Fall or spring term. Credit one or more hours. Open only to graduate students. Prerequisite, course 152 and permission of the instructor. Associate Professor CONKLIN.

Special work on any subject in the field of land economics that is of particular interest to the student. The student normally is expected to prepare a report on his work that is suitable for mimeograph reproduction and distribution.

253. *INTRODUCTION TO METHODS OF RESEARCH IN AGRICULTURAL LAND ECONOMICS*. Spring term. Credit three hours. Open only to graduate students. Courses 152 and 207 and at least three hours of statistics should precede or accompany this course. S 9-12. One or more field trips, S 9-6. Associate Professor CONKLIN.

A critical discussion of research in agricultural land economics.

254. *ECONOMICS OF AGRICULTURAL DEVELOPMENT*. Spring term. Credit three hours. Primarily for graduate students. Undergraduate registration by permission of the instructor. T 4-6, and one other hour to be arranged. Professor

A discussion of the special problems of agricultural development, particularly in low per capita income areas and countries. Attention will be devoted to the

relationship between development in agriculture and in other sectors of the economy, capital and capital formation, the role of land and land reform, increasing efficiency in resource use, coordination problems in agricultural development, and the like.

DEPARTMENTAL SEMINAR AND RESEARCH

195. *UNDERGRADUATE RESEARCH*. Fall and spring terms. Credit one to three hours depending upon the problem undertaken and the extent and quality of work done. A student desiring to register in this course must obtain the written permission of a professor who will supervise the work. Open to seniors with grade averages of 80 or higher.

The course is designed to afford opportunities for outstanding undergraduates to carry out independent studies of suitable problems under appropriate supervision.

290. *SEMINAR IN AGRICULTURAL ECONOMICS EXTENSION*. Fall term. Credit two hours. Primarily for graduate students. M 2-4. Warren 448. Professor C. A. BRATTON.

The scope and nature of agricultural economics extension work will be considered. This will include: early development of extension work in agricultural economics, objectives of agricultural economics extension; how programs are developed; extension methods used; and the importance of coordinating research and extension projects. Current economic extension programs will be examined in detail.

The seminar is designed to familiarize students with the extension phase of agricultural economics.

299. *SEMINAR*. Fall and spring term. M 4. Warren 401. For graduate students taking either a major or minor in the Department. Departmental staff.

AGRICULTURAL ENGINEERING

Four-year students in the College of Agriculture, with a major interest in a semi-technical agricultural engineering program, may elect a varied sequence of courses that will prepare them for opportunities with many of the industries, organizations, and agencies serving agriculture or, for farming enterprises which increasingly require understanding and application of engineering principles. A suggested sequence of courses may be obtained directly from the department.

Students interested in a professional career in Agricultural Engineering for research, teaching, extension, design, product development, and manufacturing must take a prescribed sequence of courses that leads to a Bachelor of Agricultural Engineering degree granted by the College of Engineering. The detailed curriculum may be found in the College of Engineering Announcement.

1. *FARM MECHANICS*. Fall or spring term. Credit three hours. Lectures, T Th 10. Computing period, F 12. Riley-Robb 125. Laboratory, M T W Th or F 2-4:30. Riley-Robb 160.

A course planned to give training in understanding the farm application of physical principles, mechanical methods and appliances. Topics for discussion include pumps, water systems, plumbing, surveying, hoists and elevators, farm wiring, electric motors, refrigeration, and forced air drying.

2. *INTRODUCTION TO AGRICULTURAL ENGINEERING*. Spring term. Credit two hours. Lectures M W 11. Riley-Robb 225. Limited to students in the five-year Agricultural Engineering Curriculum. Selected Staff.

A course to introduce the application of engineering principles to problems in agriculture, with a brief history of the development of agricultural engineering in the United States. Problems that are of primary interest to the agricultural

engineer are used to provide understanding of the application of principles and to test the students' comprehension of the subject matter.

10. *HOUSEHOLD MECHANICS*. Fall or spring term. Credit three hours. For women students. Not open to freshmen. Lectures, T Th 12. Caldwell 100. Laboratory, W Th or F 2-4:30. Riley-Robb 140. Assistant Professor GUEST.

A course intended to develop ability to think and reason in terms of mechanical devices. As a part of this training, laboratory exercises are on automobiles, sewing machines, vacuum cleaners, refrigerators, water systems, plumbing, wiring systems, and some of the simpler machines and tools used in homes.

21. *FARM SURVEYING*. Fall term. Credit three hours. Prerequisite, Trigonometry. Lectures, M W 10. Recitation, F 10. Riley-Robb 105. Laboratory, M T or W 2-4:30. Riley-Robb 15. Associate Professor LEVINE.

A study of the use and care of the simpler surveying equipment. Special emphasis is placed on their application to farm problems. This course cannot be substituted for the surveying requirement of the five-year Agricultural Engineering program.

31. *FARM STRUCTURES*. Fall term. Credit three hours. Prerequisites, Intermediate Algebra and Physics. Lectures, M W F 8. Riley-Robb 105. Associate Professor LEVINE.

A course in the elementary problems of farm buildings; a study of basic structural requirements, insulation, ventilation, and functional requirements for farm animals.

32. *FARM STRUCTURES LABORATORY*. Fall term. Credit two hours. Open only to agricultural engineering students who are currently taking or have previously taken course 31 and Drawing 1. Recitation, Th 1. Laboratory, Th 2-5. Riley-Robb 72. Associate Professor LEVINE.

A course designed to teach some of the practical applications of basic design principles to farm-building construction. It includes practical work in the mixing and testing of concrete, visits to some of the farm buildings on the campus to see different types of construction, and some work on the general design and layout of farm buildings for efficiency of operation.

40. *WOODWORKING AND CARPENTRY*. Fall or spring term. Credit two hours. Open to all students. Lecture, T 9. Riley-Robb 125. Laboratory, M T or Th 1-4:30. Riley-Robb 70. Limited to twenty-five students per section. Professor FOSS.

A course designed to acquaint the student with the common woodworking, carpentry, concrete, tool-fitting, and wood-finishing jobs common to the farm and home. The skill in use of both hand and power tools is emphasized in the construction and repair of farm equipment. A field trip is included to a local wood-working plant and sawmill.

42. *FARM METAL WORK*. Fall or spring term. Credit two hours. Open to all students. Lecture, Th 9. Riley-Robb 125. Laboratory including metal lathe work, M 1:30-4:30. Laboratory not including metal lathe work, T 8-11, or Th or F 1:30-4:30. Riley-Robb 60 and 64. Limited to 20 students per laboratory section. Assistant Professor LECHNER.

A course giving instruction and practice in the fundamentals of electric arc welding, oxyacetylene welding, sheet metal work, pipe fitting, hot and cold metal work, and metal lathe work as they apply to farm shop work for both repair and construction jobs.

43. *ADVANCED METAL AND WOODWORK*. Fall or spring term. Credit one or two hours. Prerequisite, courses 40 and/or 42 and permission of instructor. Metalworking or construction laboratory may be selected. Metalworking laboratory for one credit T 1:30-4:00. For two credits one additional 2½ hour laboratory to be arranged. Construction laboratory to be arranged for one or two credits. Riley-Robb 60, 64 or 70. Professor FOSS and Assistant Professor LECHNER.

Metalworking instruction will be given in the fundamental principles of the use of metal lathe, milling machine, and shaper work skills. Instruction will also be given in advanced electric arc and oxyacetylene welding, in metallizing and in sheet metal layout.

The student may select a construction project which will provide him the opportunity to learn advanced metal and woodworking skills.

101. *ELECTRICITY ON THE FARM*. Spring term. Credit three hours. Open to juniors and seniors. Prerequisite, course 1 or Physics 104 or the equivalent. Lectures, T Th 10. Riley-Robb 105. Laboratory, T or Th 2-4:30. Riley-Robb 164. Professor SHEPARDSON.

The course deals with the application of electricity for light, heat, and power on farms, with emphasis on the principles of operation, selection, and installation of electrical equipment for the farmstead. Laboratory sections are combined for one half-day field trip.

102. *FARM POWER*. Fall term. Credit three hours. Open to juniors and seniors. Prerequisite, course 1 or Physics 103 and 104, or the equivalent. Lectures, T Th 11. Riley-Robb 125. Laboratory, M T W or Th 2-4:30. Riley-Robb 78. Professor TERRY.

A study of the principles of operation and adjustment of internal combustion engines and their farm applications. Principal emphasis on farm tractors, including care and operation, power transmission, power requirements, and economic factors.

103. *FIELD MACHINERY*. Spring term. Credit three hours. Open to juniors and seniors. Prerequisite, course 1 or Physics 103 and 104, or the equivalent. Lectures, T Th 11. Riley-Robb 125. One recitation period, F 8, 9, 10, 11, or 12. Riley-Robb 225. Laboratory, M T W or Th 2-4:30. Riley-Robb 78. Associate Professor MILLIER.

A study of the use, care, operation, and adjustment of farm field machines. Machines in each of the major groups, tillage, seeding, harvesting, processing, spraying and dusting, fertilizing, and crop loading are included.

121. *FARM PRACTICE IN SOIL AND WATER CONSERVATION*. Spring term. Credit two hours. Prerequisite, Agronomy 1 or equivalent. Course 21 is recommended. Must be taken with Agronomy 121. Lecture, F 8. Riley-Robb 105. Laboratory, M or T 2-4:30. Riley-Robb 72. Associate Professor LEVINE.

A beginning course in principles and methods used in soil and water conservation. Emphasis is on New York State condition. Engineering aspects of soil conservation receive primary consideration.

202. *FARM POWER*. Fall term. Credit three hours. Prerequisite, Engineering 3601 or the equivalent. Lectures, laboratory and computing periods. Time and place to be arranged. Professor TERRY.

Thermodynamic principles applied to internal combustion engines. Application of kinematics and dynamics to tractor design and field use. Elements involved in proper construction, selection, and operation of farm tractors. Emphasis on writing of engineering reports.

203. *AGRICULTURAL MACHINERY DESIGN*. Spring term. Credit three hours. Prerequisite, Engineering 3341 or the equivalent. Two lectures; one laboratory. Time and place to be arranged. Associate Professor GUNKEL.

The principles of design and development of agricultural machines to meet functional requirements. Emphasis is given to stress analysis, selection of materials of construction, and testing procedures involved in machine development.

221. *SOIL AND WATER ENGINEERING*. Spring term. Credit three hours. Prerequisite, Engineering 2132, 2302, and Agronomy 1, or their equivalents. Two lectures; one laboratory. Time and place to be arranged. Professor ———.

An advanced course in the application of engineering principles to the problems of soil and water control in agriculture. Includes design and construction of drain-

age systems and farm ponds; and design and operation of sprinkler systems for irrigation.

231. *FARM STRUCTURES DESIGN*. Spring term. Credit three hours. Prerequisite, Mechanics 1153 and Engineering 2731 or their equivalents. Two lectures; one laboratory. Time and place to be arranged. Professor BOYD.

An advanced course in the application of structural design principles to farm buildings. Includes functional requirements, characteristics of materials, structural design, and the principles of environmental control in farm buildings.

251. *SPECIAL PROBLEMS IN AGRICULTURAL ENGINEERING*. Fall or spring term. Credit one or more hours. (Normally reserved for seniors in upper two-fifths of class.) Prerequisite, adequate ability and training for the work proposed, and permission to register. Staff.

Special work in any branch of agricultural engineering on problems under investigation by the department or of special interest to the student, provided, in the latter case, that adequate facilities can be obtained.

252. *SEMINAR*. Fall and spring terms. Required of graduate students. Time to be arranged.

Presentation and discussion of research and special problems in agricultural engineering. Staff.

253. *SPECIAL TOPICS IN AGRICULTURAL ENGINEERING*. Fall and spring terms. Credit one hour. Open only to seniors. T 12. Riley-Robb 225. Professor FRENCH.

Presentation and discussion of the opportunities, qualifications, and responsibilities for positions of service in the various fields of Agricultural Engineering.

AGRONOMY

Students majoring in Agronomy have a choice of three curricula: (1) General Agronomy; (2) Field Crops; and (3) Soil Science (including Soil Conservation). The first curriculum is for students with a general interest in the production of crops as influenced by soil properties, crop management, and culture. Ample opportunity will be given for adequate training in Agronomy and related agricultural fields. Somewhat less emphasis is placed on the sciences in the General Agronomy curriculum.

The Field Crops and Soil Science Curricula are for students who want to specialize in these more specific fields. They will be expected to take more basic courses in the physical and biological sciences. Students interested in preparation for advanced graduate training should choose either the Field Crops or Soil Science curriculum.

SOIL SCIENCE

1. *THE NATURE AND PROPERTIES OF SOILS*. Fall or spring term. Credit five hours. Prerequisite, Chemistry 102 or 106 and Geology 115. Lectures, M W F 9. Caldwell 100. Laboratory, M T W Th or F 2-4:30. Caldwell 49. Two recitations, to be arranged. Graduate students auditing this course are expected to take the examinations. Each student will be required to furnish a pint sample of soil from a commercial field. Assistant Professor NIELSEN.

A comprehensive course dealing with the composition, properties, and plant relations of soils, with particular reference to the fundamental principles of maintaining soil productivity.

6. *SOILS*. Spring term. Credit three hours. Prerequisite, Biochemistry 2 or its equivalent. Primarily for freshmen in the two-year course. Four-year students admitted only with permission of instructor. Lectures, T Th 9. Caldwell 100. Discus-

sion—laboratory, M T W Th or F 2-4:30. Warren 37. Associate Professor LATHWELL.

A course dealing with the composition, properties, and plant relations of soils, with particular reference to the practical use of lime, fertilizers, and other means of maintaining soil fertility and of controlling soil erosion.

90. *UNDERGRADUATE AGRONOMY SEMINAR*. Fall and spring terms. Credit one hour for each term. Prerequisite, junior standing in the College of Agriculture. Th 12. Criticism by appointment. Caldwell 143. Assistant Professor NIELSEN.

Each student is expected to give a talk on an article from the recent scientific literature in Agronomy. Additional outside reading will be required.

101. *SOIL CLASSIFICATION AND SURVEY*. Spring term. Credit three hours. Prerequisite, course 1 or 6 or the equivalent. Lectures, T Th 10. Caldwell 100. Laboratory, M or T 2-4:30. Caldwell 143. Field work replaces the laboratory as soon as weather permits; time to be arranged. Professor CLINE.

Soil formation, classification, and geography. Field work consists of practice in soil surveying.

103. *ORGANIC SOILS*. Fall term. Credit two hours. Given in alternate years. Prerequisite, course 1. Lectures, T Th 9. Warren 160. Professor DAWSON.

Physical and chemical properties of organic soils used for crop production and soil conditioning. One all-day Saturday field trip.

[104. *FOREST SOILS*. Fall term. Credit two hours. Given in alternate years. Prerequisite, course 1 and Botany 31. Time and place to be arranged. Occasional field trips. Associate Professor STONE.] Not given in 1959-1960.

Ecology of forest soils and principles of forest-soil management, including biology, and relation to soil development and hydrology. An informal three- or four-day field trip through the Adirondack region is made prior to registration for the fall term; attendance is urged although not required. Consult instructor for details.

105. *SOIL AND CROP MANAGEMENT*. Fall term. Credit three hours. Primarily for advanced undergraduates and graduate minors in Agronomy. Prerequisite, courses 1 or 6 and 2 or 11, or permission of the instructor. Lectures, T Th 9. Warren 201. Laboratory, W or Th 2-4:30. Caldwell 143. Associate Professor LATHWELL.

The application of the principles of soil science and crop production to complete soil-management systems under common conditions in New York. Emphasis is on the use and evaluation of rotations, manure, fertilizers, lime, and supporting practices for crop production in systems that maintain soil productivity. Laboratories consist of (1) field trips to study operating farms, and (2) problems in planning systems of management under specified farm conditions. A few field trips to near-by farms.

106. *SOIL MICROBIOLOGY*. Fall term. Credit three hours. Prerequisite, Agronomy 1 or Bacteriology 1. The lectures without the laboratory may be taken for two hours' credit with the permission of the instructor. Lectures, T Th 8. Caldwell 143. Laboratory, F 2-4:30. Caldwell 201. Assistant Professor ALEXANDER.

A study of the major groups of soil microorganisms, and the biochemical functions of the soil population.

108. *CHEMICAL AND PHYSICAL PROPERTIES OF SOILS*. Fall term. Credit four hours. Primarily for advanced undergraduates and graduate minors in Agronomy. Prerequisites, course 1 and Quantitative Analysis. Lectures, M W F 11. Warren 245. Laboratory, T or Th 2-4:30. Caldwell 294. Professors DAWSON and R. D. MILLER.

A sequel to course 1 in which chemical and physical aspects of important soil phenomena are developed in more detail. Particular attention is given to the chemistry of nutrient elements in soil and to the physics of water retention and movement in soil. Laboratory exercises acquaint the student with some of the more important chemical and physical techniques used in soil investigations.

110. *AGRONOMY LITERATURE*. Spring term. Credit one hour. Primarily for juniors and seniors. Time to be arranged. Assistant Professor NIELSEN.

Study of the research and extension periodicals reporting work in agronomy. An essay on an appropriate subject in agronomy is required of each student.

121. *FARM PRACTICE IN SOIL AND WATER CONSERVATION*. Spring term. Credit two hours. Prerequisite, course 1 or equivalent. Course 11 is recommended. Must be taken with Agricultural Engineering 121. Lectures, M W 8. Riley-Robb 105. Associate Professor ZWERMAN.

A beginning course in principles and methods used in soil and water conservation. Emphasis is placed on New York State conditions. Agronomic aspects of soil conservation receive primary consideration. One all-day field trip is taken on Saturday.

201. *SOIL CHEMISTRY, LECTURES*. Spring term. Credit three hours. Primarily for graduate students. Prerequisite, course 1 and Chemistry 201 or their equivalent. A course in physical chemistry is recommended. M W F 9. Warren 201. Professor PEECH.

Chemical and mineralogical composition of soils; chemical reactions and ionic equilibria in soils.

202. *CHEMICAL METHODS OF SOIL ANALYSIS*. Spring term. Credit three hours. Prerequisite, course 1, Chemistry 201 and 215 or the equivalent. Enrollment limited to twenty students. T Th 2-4:30. Caldwell 100. Professor PEECH.

Lectures, laboratory exercises, and demonstrations designed to familiarize the student with different chemical techniques for studying soils.

[203. *THE GENESIS, MORPHOLOGY, AND CLASSIFICATION OF SOILS*. Spring term. Credit three hours. Credit two hours for students who have had Agronomy 101. Given in alternate years. Professor CLINE.] Not given in 1959-1960.

The course deals with (1) the principles of classification as applied to soils, (2) the factors of soil formation and their effects on the soil, and (3) the characteristics, development, and use of the Great Soil Groups of the world. One all-day field trip is taken on a date to be arranged.

205. *SOIL FERTILITY, ADVANCED COURSE*. Spring term. Credit three hours. Prerequisite, course 1 and Chemistry 201 or its equivalent. Lectures, T Th S 9. Warren 145. Professor BRADFIELD.

A study of the soil as a source of the mineral nutrients needed for effective crop production and of the properties and use of liming materials, fertilizers, and manures.

[207. *SOIL PHYSICS, LECTURES*. Fall term. Credit three hours. Given in alternate years. Primarily for graduate majors in Agronomy. Prerequisite, course 1 and one year of college physics or permission of the instructor. Professor R. D. MILLER.] Not given in 1959-1960.

A study of physical properties and processes of soils, with emphasis on the fundamental physical principles involved.

208. *SOIL PHYSICS, LABORATORY*. Fall term. Credit three hours. Must be preceded or accompanied by course 207. Enrollment limited. M W 2-4:30. Caldwell 294. Professor R. D. MILLER.

Laboratory exercises and demonstrations designed to familiarize the student with different physical and physicochemical techniques used in soil investigations.

209. *RESEARCH IN SOIL SCIENCE*. Fall and spring terms. All members of the professorial staff.

210. *SPECIAL TOPICS IN SOIL SCIENCE*. Fall and spring terms. Credit one to three hours. The topics to be treated will be announced at the beginning of each term. Time to be arranged. Staff.

FIELD CROPS

2. *INTRODUCTION TO FIELD CROPS*. Spring term. Credit three hours. Open to freshmen. Upperclassmen and others who have the prerequisites should take course 11 rather than 2. Discussion period, W F 10. Caldwell 100. Laboratory, M T W or Th 2-4:30. Caldwell 250. Auditors not permitted. Not open to graduate students. Professor HARTWIG.

A study of the culture of the common field crops that are produced in the Northeastern States, with emphasis on the practical aspects. Rotations with their seed and fertilizer requirements are worked out for three or four type-farms where the objective is to produce feed and food.

11. *PRODUCTION OF FIELD CROPS*. Fall term. Credit four hours. Prerequisite, a course in soils. Graduate students must consult the instructor before registering. Auditors not permitted. Lectures, M W F 10. Caldwell 100. Laboratory, M T W Th or F 2-4:30. Caldwell 250. Professor HARTWIG.

A course dealing principally with the crops that are used for feeding livestock and poultry. Emphasis is placed on the hay, silage, pasture, and grain crops of the United States. Cultural methods, crop rotations, fertilizer practices, soil and climatic adaptation, and the better varieties of the important crops are considered.

112. *PASTURE AND HAY CROPS*. Spring term. Credit three hours. For juniors, seniors, and graduate students. Prerequisite, courses 1 and 11 or their equivalent, or courses 2 and 6 by permission. Lectures and discussions, T Th S 8. Caldwell 100. Three required field trips in April and May. M T W Th or F 1:30-5. Professor KENNEDY.

The establishment, maintenance, productivity, use, and quality of various pasture and hay crops are discussed, especially those for humid, temperate climates. Practical applications are emphasized. Of particular value to those interested in agronomy, animal production, and soil conservation.

115. *WEED CONTROL*. Spring term. Credit three hours. Graduate students may register only by permission. Prerequisite, Agronomy 11. Lectures, T Th 11. Caldwell 100. Laboratory, M 2-4:30. Plant Science 202. Professor FERTIG and Assistant Professor KINGSBURY.

The course deals with principles and methods of weed control. Emphasis is placed on principles of control by mechanical, cultural, and chemical methods, their adaptability and limitations. The laboratory covers the identification and habits of weeds common in the Northeast, weed seed identification, spray equipment and use. Field trips are scheduled.

211. *SPECIAL TOPICS IN FIELD CROPS*. Fall and spring terms. Credit one to three hours. The topic to be treated will be announced at the beginning of each term. Time to be arranged. Staff.

[213. *CROP ECOLOGY*. Spring term. Credit three hours. Given in alternate years. Prerequisite, course 11 and Botany 31 or their equivalent. Professor MUSGRAVE.] Not given in 1959-1960.

An analysis of the environment of crop plants and their ecological responses, with emphasis on the cereals and on the legumes and grasses for forage.

214. *GRASSLANDS AND GRASSLAND RESEARCH*. Fall term. Credit three hours. Given in alternate years. Prerequisite, course 112, Plant Breeding 102 or 203, and Botany 31, or their equivalent, and permission to register. Time to be arranged. Professor ———.

A study of ecological factors underlying the development, maintenance, and management of different grassland types for different uses, and the principles and practices of grassland and forage-crop investigations.

219. *RESEARCH IN FIELD-CROP PRODUCTION*. Fall, spring, and summer terms. All members of the professorial staff.

DEPARTMENTAL SEMINAR

290. *SEMINAR*. Fall and spring terms. Required of graduate students majoring or minoring in the department, S 11-12:00. Caldwell 100.

ANIMAL HUSBANDRY

A comprehensive program of courses is available to students interested in almost any phase of Animal Husbandry. In consultation with an adviser, a student may select a sequence of courses that would prepare him for: (1) livestocking farming—dairy cattle, beef cattle, sheep or swine; (2) service in extension; (3) work in meat packing or feed industries and (4) various agricultural businesses. For those interested in careers in teaching and/or research, the above course program may be modified to include more of the basic science courses. In this manner, the student may enter the more specialized fields of animal nutrition, animal breeding, animal physiology, animal genetics or meat processing.

Students are advised to register for courses, 1, 10, and 20 before taking the more advanced courses.

LIVESTOCK PRODUCTION

1. *INTRODUCTORY LIVESTOCK PRODUCTION*. Fall term. Credit three hours. Lectures, M W 8 or 10. Wing A. Laboratory, T Th or F 2-4:30, W 11-1. Judging Pavilion. Assistant Professor POND and assistants.

A survey course intended to give the student a concept of the scope of the livestock industry, a perception of its fundamental problems and an insight into the opportunities it offers. It includes the fundamentals of livestock production that form a basis for specialized knowledge in succeeding courses in Animal Husbandry and in other related fields. Animals specifically covered are beef cattle, sheep, swine and horses. Two scheduled evening prelims are given.

10. *LIVESTOCK FEEDING*. Fall or spring term. Credit four hours. Prerequisite, Chemistry 101, 105, or Biochemistry 2. Lectures: fall term, M W F 11; spring term, M W F 9. Wing A. Laboratory: fall term, Th or F 2-4:20. Wing A; spring term, M W Th or F 2-4:20. Wing C. Fall term, Associate Professor R. G. WARNER and assistants. Spring term, Professor S. E. SMITH and assistants.

The feeding of farm animals, including the general basic principles, feeding standards, the computation of rations, and the composition and nutritive value of livestock feeds.

HEALTH AND DISEASES OF ANIMALS. (VETERINARY 61). Spring term. Credit three hours. Not open to first-year students or to those who have had no course in animal husbandry. Lectures, M W F 11. Veterinary College. Room D 105. Professor GILMAN and collaborators.

The causes and the nature of the common diseases of livestock are discussed. Emphasis is placed on the prevention and control of animal diseases.

41. *LIVESTOCK JUDGING: BEEF CATTLE, SHEEP, AND SWINE*. Fall term. Credit two hours. Prerequisite, course 1. Should be scheduled in the sophomore or junior year. Lecture and laboratory period, W 2-5:10. Judging Pavilion. Professor J. I. MILLER.

A beginning course in judging market and breeding classes of beef cattle, sheep, and

swine, with major emphasis on a detailed study of the type of livestock which best meets present-day demands.

42. LIVESTOCK JUDGING: BEEF CATTLE, SHEEP, AND SWINE. Spring term. Credit two hours. Prerequisite, course 41 or permission to register. M Th 2-4:20. Judging Pavilion and Livestock Barns. Students may register for only one laboratory period for one hour of credit by permission of instructor. Professor J. I. MILLER.

A course in judging market and breeding classes of beef cattle, sheep, and swine, with major emphasis on a study of the type of breeding stock which best meets modern demands. One field trip of about two days' duration is made to give additional opportunities to study livestock in outstanding herds or flocks.

43. ADVANCED LIVESTOCK JUDGING. Fall term. Credit two hours. Registration by permission. M F 2-4:20. Livestock Barns. Professor J. I. MILLER.

An advanced type study of purebred market and breeding classes of beef cattle, sheep, and swine. Intended primarily to give additional training to successful students of course 42. Two 2-day trips are taken on week ends. Members of this group are selected to represent the institution in intercollegiate judging competitions.

60. BEEF CATTLE. Spring term. Credit three hours. Prerequisite, course 1 or permission to register. Lectures, W F 10. Wing A. Laboratory, F 2-4:20. Judging Pavilion and Beef Cattle barn. Professor J. I. MILLER.

A general course in beef-cattle production. The management, feeding, breeding, selection, and marketing problems involved in the beef-cattle enterprise are emphasized. A one-day field trip is taken to study successful beef production methods.

70. SWINE. Spring term. Credit three hours. Prerequisite, course 1 or permission to register. Lectures, W F 11. Wing A. Laboratory, T 2-4:20. Judging Pavilion and Swine Barn. Assistant Professor POND.

A general course in swine production. The breeding, feeding, management and selection of swine are studied, and practical exercises are included. A one-day field trip is taken.

80. SHEEP. Fall term. Credit three hours. Prerequisite, course 1 or permission to register. Courses 10 and 20 recommended. Lectures, T Th 10. Wing A. Practice, M 2-4:20. Judging Pavilion and Sheep Barn. Assistant Professor HOGUE.

A general course in the care, breeding, feeding, management and selection of sheep. Lectures and practice periods designed to give the student a practical knowledge of sheep production as well as some scientific background for improved practices in sheep production. A one-day field trip is taken.

MEATS

90. MEAT AND MEAT PRODUCTS. Fall or spring term. Credit three hours. Course 1 is recommended before registering for this course. Lecture, M 8. Fall term, Wing C; spring term, Wing A. Laboratory, M T or W 1-5. Registration limited to sixteen students in each section. Assistant Professor STOUFFER.

A course in livestock slaughtering, retail meat cutting, live animals and carcass relationships, and the storage and preservation of meat and meat products. A one-day field trip to packing plants will be taken.

92. MEAT AND MEAT PRODUCTS. Fall or spring term. Credit two hours. For women students. Not open to freshmen. Designed primarily for students in the College of Home Economics. Registration limited to sixteen students in each laboratory section. Lecture, Th 11. Fall term, Wing E; spring term, Wing C. Laboratory, Th or F 2-4:20. Meat Laboratory. Professor WELLINGTON and the Poultry Department staff.

A course dealing with the major phases of meats, poultry, and eggs; wholesale and retail buying, nutritive value of meats, cutting, freezing, curing, canning, cooking, and miscellaneous topics.

93. *MEAT CUTTING*. Fall or spring term. Credit one hour. Prerequisite, course 90 or 92, and permission to register. Enrollment limited to five students each term. One laboratory period each week, time to be arranged with the instructor. Mr. HOLLEY.

This course offers supervised practice in meat selection, cutting, and grading for students intending to specialize in meats work.

94. *MEAT JUDGING*. Fall term. Credit one hour. Prerequisite, course 90. Registration by permission. Lecture and laboratory period, W 11-1. Meat Laboratory. Professor WELLINGTON.

A course in market classes and grades of meat, judging, selection, and identification of carcasses and cuts. Field trips and practice hours are arranged to provide additional experience. Members of this class are selected to represent the institution in intercollegiate judging competitions.

DAIRY HUSBANDRY

50. *DAIRY CATTLE*. Fall or spring term. Credit four hours. Courses 10 and 20 are recommended before registering for this course. Lectures: fall term, T Th S 8; spring term, T Th S 10. Wing A. Laboratory: fall term, M 2-4:20 or S 9-11:20; spring term, M or Th 2-4:20. Wing A and Judging Pavilion. Fall term, Assistant Professor SCHMIDT and assistants. Spring term, Professor TÜRK and assistants.

This course deals with some of the economic aspects of the dairy industry; study of dairy breeds; factors in breeding and development of dairy cattle; milking methods and milk production problems; efficient feeding; and care, management, and health of the dairy herd. Practice in selection, herd management, formulating of rations, planning of breeding programs, and keeping of records.

51. *DAIRY-CATTLE JUDGING*. Spring term. Credit two hours. Prerequisite, course 50. Practice, W 2-4:20 and S 10-12. (In the last half of the semester, the Wednesday meetings are discontinued and the class meets all day Saturday.) Judging Pavilion. Professor TRIMBERGER.

A beginning course in the selection and judging of all breeds of dairy cattle. Practice includes all-day trips on Saturday during the latter part of the term to herds in the State.

52. *ADVANCED DAIRY-CATTLE JUDGING*. Fall term. Credit one hour. Prerequisite, course 51. Registration by permission. Practice hours to be arranged. Professor TRIMBERGER.

This course is intended primarily to give additional training in comparative judging to successful students of Course 51. Members of the class are selected to represent the institution in intercollegiate judging competitions.

150. *ADVANCED DAIRY PRODUCTION*. Spring term. Credit three hours. Prerequisite, course 50. Open only to juniors and seniors and second year two-year students. Lectures, T Th 11. Lecture, laboratory and discussion, T 2-4:20. Wing A. Professor TRIMBERGER.

Analysis of breeding and management programs in successful herds. Evaluation of the programs of dairy-cattle breed associations. Emphasis is placed on the application of the principles of dairy breeding, feeding, and management to the development and operation of a successful dairy farm.

ANIMAL BREEDING AND PHYSIOLOGY OF REPRODUCTION

20. *ANIMAL BREEDING*. Fall term. Credit three hours. Prerequisite, Botany I. Biology 1, or Zoology 103 and 104. Lectures, M W 9. Wing A. Recitation, demonstration, and laboratory, M T W Th or F 2-4:20. Wing C. Associate Professors R. W. BRATTON and FOOTE, and assistants.

An introduction to the anatomy and physiology of reproduction and the improvement of farm animals through the application of genetics. Emphasis is placed on traits of economic importance to the livestock industry.

120. *PROBLEMS IN ANIMAL BREEDING*. Fall term. Credit three hours. Prerequisite, course 20 or Plant Breeding 101. Lectures, T Th 11. Wing C. Laboratory, W or F 2-4:20. Wing E. Professor HENDERSON.

A consideration of the problems involved in the improvement of the larger farm animals and the application of genetics in their solution.

125. *PHYSIOLOGY OF REPRODUCTION*. Spring term. Credit two hours. Open to graduate students and upperclassmen. Prerequisite, a course in human or veterinary physiology. Lectures, M W 10. Wing C. Professor ASDELL.

An advanced course in reproduction, principally in mammals.

126. *APPLIED ANIMAL PHYSIOLOGY*. Fall term. Credit one hour. Open to upperclassmen and graduate students. T 9. Wing C. Professor ASDELL.

The application of physiological methods to problems of growth, reproduction, and lactation in farm animals.

127. *FUNDAMENTALS OF ENDOCRINOLOGY*. Fall term. Credit three hours. Lectures, T Th 10. Wing C. Laboratory to be arranged. Associate Professor HANSEL.

A general course in the physiology of the endocrine glands, and the roles played by each hormone in the regulation of normal body processes. The laboratory work is designed to illustrate the basic principles of endocrinology and their applications to more efficient production in all classes of livestock.

ANIMAL NUTRITION

110. *PRINCIPLES OF ANIMAL NUTRITION*. Fall term. Credit three hours. For seniors and graduate students. Prerequisite, a course in human or veterinary physiology and a course in organic chemistry or biochemistry. Lectures, M W F 10. Wing C. Professor LOOSLI.

The chemistry and physiology of nutrition and the nutritive requirements for growth, reproduction, lactation, and other body functions.

111. *LABORATORY WORK IN ANIMAL NUTRITION*. Fall or spring term. Credit three hours. Prerequisite, Quantitative Analysis, course 110, or its equivalent and permission of the instructor. Class limited to 18 students each term. M W F 2-4:20. Stocking 160. Fall term, Professor C. M. McCAY and assistants. Spring term, Associate Professor R. G. WARNER and assistants.

Each student engages in a series of short research projects with experimental animals, such as rats, dogs, and sheep. Both classical and modern techniques of animal experimentation are taught. The applications of biochemical methods to the solution of animal nutrition problems are included.

210. *SPECIAL TOPICS IN ANIMAL NUTRITION*. Spring term. Credit one hour. Registration by permission. Th 8. Wing E. Professors LOOSLI and S. E. SMITH.

A presentation and discussion of the knowledge and techniques of special fields of animal nutrition, with particular reference to farm animals.

215. *HISTORY OF NUTRITION*. Fall term. Credit one hour. Th 4:15. Savage 130. Professor McCAY.

The purpose of the course is to familiarize the student with the background literature in nutrition and to improve his technique in using the libraries. Each student prepares four written reports and summarizes these in brief oral reports to learn better ways to present technical information.

219. *SEMINAR IN ANIMAL NUTRITION*. Fall term. Credit one hour. Open to graduate students with major field of study in animal nutrition. Registration by permission. M 4:30. Rice 300. Animal Nutrition staff.

A critical review of the literature and other topics of special interest to graduate students in animal nutrition.

DEPARTMENTAL RESEARCH AND SEMINAR

200. *RESEARCH*. Fall and spring terms. Credit and hours by arrangement. For graduate and advanced students only. All members of departmental staff. Professor TURK in charge.

201. *SEMINAR*. Fall and spring terms. Required of all graduate students taking either a major or a minor subject in Animal Husbandry. Advanced undergraduates are admitted by permission, and, if a satisfactory report on an approved subject is presented, may receive not to exceed two hours' credit. M 11. Staff in Animal Husbandry.

BACTERIOLOGY

Students are accepted as majors in bacteriology only upon consent of the head of the Department or of a member of the staff designated to act for him. Acceptance is granted only to those students who follow the prescribed courses outlined by the Department and whose scholastic records are entirely satisfactory.

1. *GENERAL BACTERIOLOGY*. Fall term. Credit six hours. Prerequisite, Chemistry 102 or 106. Lectures, M W F 11. Stocking 218. Laboratory practice, M W F 2-4:30. Stocking 301. Professor H. W. SEELEY and assistants.

An introductory course; general survey of the field of bacteriology, with the fundamentals essential to further work in the subject.

2. *GENERAL BACTERIOLOGY*. Fall term. Credit three hours. Prerequisite, Chemistry 102 or 106. Not open to undergraduate students in the College of Agriculture. Lectures, M W F 11. Stocking 218. Professor H. W. SEELEY.

The same as the lecture part of course 1. By special permission, this course may be elected by graduate students and advanced students in certain professional courses.

3. *AGRICULTURAL AND HOME ECONOMICS BACTERIOLOGY*. Spring term. Credit three hours. Not recommended for first-year students. Not accepted as prerequisite for advanced courses. Lectures, M W F 11. Plant Science 233. Associate Professor VANDEMARK.

The basic principles of bacteriology and their application in agriculture, home economics, industry, and public health.

5. *AGRICULTURAL AND HOME ECONOMICS BACTERIOLOGY LABORATORY*. Spring term. Credit two hours. Limited to students who are taking or who have taken Bacteriology 3. T Th 8-9:50 or T Th 11-12:50. Stocking 301. Associate Professor VANDEMARK and assistants.

General laboratory techniques as applied in agriculture and household bacteriology.

6. *GENERAL BACTERIOLOGY LABORATORY*. Fall term. Credit three hours. Prerequisite Chemistry 102 or 106 and Bacteriology 2 or its equivalent. Not open to undergraduate students in the College of Agriculture. Laboratory, M W F 2-4:30.

Stocking 301. Professor H. W. SEELEY and assistants.

The same as the laboratory part of course 1. By special permission this course may be elected by graduate students and advanced students in certain professional courses.

101. *DAIRY BACTERIOLOGY*. Spring term. Credit three hours. Prerequisite, Bacteriology 1. Lectures, T Th 9. Stocking 119. Laboratory, T Th 10-12. Stocking 321. Professor NAYLOR and assistant.

A study of the microorganisms of importance in milk and milk products, with laboratory practice in the use of standard methods for microbiological testing and control of dairy products.

103. *ADVANCED BACTERIOLOGY*. Spring term. Credit six hours. Prerequisite, course 1 and organic chemistry. Lectures and laboratory practice, M W F 2-5:30. Stocking 119. Assistant Professor MACDONALD and assistants.

A systematic study of certain important groups of bacteria, together with advanced cultural and isolation procedures, and other specialized techniques.

105. *HIGHER BACTERIA AND RELATED MICROORGANISMS*. Fall term. Credit four hours. Prerequisite, course 1. Lectures, recitations, and laboratory practice, T Th 1:40-5. Stocking 119 and 321. Professor KNAYS and assistant.

A study of the higher bacteria, together with the yeast and molds that are of especial importance to the bacteriologist.

SOIL MICROBIOLOGY. (Agronomy 106). Fall term. Credit three hours. Prerequisite, Agronomy 1 or Bacteriology 1. The lectures without the laboratory may be taken for two hours' credit with the permission of the instructor. Lectures, T Th 8. Caldwell 143. Laboratory, F 2-4:30. Caldwell 201. Assistant Professor ALEXANDER.

A study of the major groups of soil microorganisms and the biochemical functions of the soil population.

PATHOGENIC BACTERIOLOGY. (See the *Announcement of the New York State Veterinary College*.)

210. *PHYSIOLOGY OF BACTERIA*. Spring term. Credit two hours. Prerequisite, course 1 and at least one additional course in bacteriology and one in organic chemistry. Lectures, T Th 9. Stocking 120. Professor DELWICHE.

The physiology of bacteria and the biochemistry of microbic processes.

212. *APPLIED AND INDUSTRIAL MICROBIOLOGY*. Fall term. Credit three hours. Given in alternate years. Prerequisite, course 1. Lectures, T Th 11 and S 10. Stocking 119. Staff.

A survey of the microbiology of food, water, sewage and industrial fermentations.

213. *MORPHOLOGY AND CYTOLOGY OF BACTERIA*. Fall term. Credit three hours. For seniors and graduate students. Lectures, T Th S 9. Stocking 119. Professor KNAYS.

The morphology, cytology and microchemistry of microorganisms.

[214. *VIROLOGY*. Spring term. Credit two hours. Given in alternate years. Prerequisites, courses 1 and 210 or the equivalent. Professor NAYLOR.] Not given in 1959-1960.

A study of the nature and properties of viruses with major emphasis on bacterial viruses.

215. *CHEMISTRY OF BACTERIAL PROCESSES*. Spring term. Credit two hours. For seniors and graduate students. Lectures, M W 11. Stocking 119. Professor DELWICHE.

The chemistry of metabolism, fermentation, and nutrition of microorganisms.

216. *GENETICS OF MICROORGANISMS*. Spring term. Credit two hours. For seniors and graduate students. Lectures, M W 12. Stocking 119. Professor ———.

An advanced course for students who have had thorough basic training in bacteriology and genetics.

220. *RESEARCH*. Fall or spring term. Credit one or more hours, by arrangement. For advanced students. Staff.

Special problems in any phase of bacteriology may be elected.

221. *SEMINAR*. Fall and spring terms. Without credit. Hours to be arranged. Stocking. Staff.

Required of graduate students in the department.

BIOCHEMISTRY AND NUTRITION

Students desiring to specialize in Biological Chemistry need to have a thorough foundation in mathematics, physics, chemistry, and biology. To this end, the student is advised to follow a course program which will yield a basic understanding of the fundamental principles of chemistry and their application to biological problems. Furthermore, the student is advised to follow a broad program in basic biology, including the study of bacteriology, botany, genetics, and zoology. The program is designed to permit the student to follow a career in the various phases of scientific agriculture and to form the basis for graduate study in Biochemistry.

2. *INTRODUCTORY AGRICULTURAL CHEMISTRY*. Fall term. Credit five hours. Open only to two-year students in the College of Agriculture. Lectures and recitations: M W F 9. Plant Science 233; T Th 9. Caldwell 100. Associate Professor NEAL and assistants.

Lectures, demonstrations, and recitations dealing with the fundamental principles of chemistry and their application to agricultural practices. This course is not accepted as a prerequisite for further courses in Chemistry or Biochemistry.

5. *AGRICULTURAL BIOCHEMISTRY*. Fall term. Credit three hours. Prerequisite, Chemistry 102 or 106 or the equivalent. May not be taken for credit by students who have completed a more advanced course in this Department. Lectures, T Th F 12. Savage 100. Associate Professor NEAL.

An elementary course for the general agricultural students, dealing with the biochemistry of crop and animal production, of the materials concerned, such as feeds, fertilizers, and insecticides, and of the products that result.

10. *ELEMENTS OF BIOCHEMISTRY, LECTURES*. Fall term. Credit four hours. Prerequisite, Chemistry 303 and 305 or Food and Nutrition 215. Lectures, M T Th S 8. Savage 145. Professor DANIEL.

Primarily for students in the College of Home Economics. An elementary course dealing with the chemistry of biological substances and their transformations (digestion and metabolism) in the animal organism.

11. *ELEMENTS OF BIOCHEMISTRY, LABORATORY*. Fall term. Credit two hours. Prerequisite or parallel, course 10. Laboratories, T Th 2-4:20 or W 2-4:20 and S 9-11:20. Savage 210. Professor DANIEL and assistants.

Laboratory practice with biochemical substances and experiments designed to illustrate chemical reactions which may occur in the animal body.

101. *GENERAL BIOCHEMISTRY, LECTURE*. Fall term. Credit four hours. Prerequisite, Organic Chemistry. Lectures, M W F S 8. Savage 100. Professor WILLIAMS.

For graduate and advanced undergraduate students, dealing with the chemistry of plant and animal substances and the reactions occurring in biological systems.

102. *GENERAL BIOCHEMISTRY, LABORATORY*. Fall term. Credit two hours. Prerequisite, Quantitative Analysis. Must be taken with or after course 101. Labora-

tory, M W or T Th 2-4:20. Savage 230. Professor WILLIAMS and assistants.

Laboratory practice with plant and animal materials and the experimental study of their properties.

110. *PHYSICAL ASPECTS OF BIOCHEMISTRY*. Fall term. Credit two hours. Prerequisites, nine semester hours of college Chemistry and introductory college Physics or the equivalent. Intended for advanced undergraduates and graduate students in the biological sciences. Lectures, T Th 9, and an occasional hour by arrangement. Savage 145. Assistant Professor HESS.

A discussion of certain fundamental principles relating to matter and energy, properties, of gases, liquids, and solutions, and chemical equilibrium which are helpful to an understanding of biological phenomena.

201. *BIOCHEMISTRY OF LIPIDS AND CARBOHYDRATES*. Spring term. Credit two hours. Prerequisites, courses 101 and 102 and Introductory Physical Chemistry, or the equivalent. Lectures, M W 9. Savage 100. Professor W. L. NELSON.

Discussion of the properties and biological role of the lipids and carbohydrates.

202. *BIOCHEMISTRY OF PROTEINS AND ENZYMES*. Spring term. Credit two hours. Prerequisites, courses 101 and 102 and Introductory Physical Chemistry, or the equivalent. Lectures, T Th 9. Savage 100. Assistant Professor HESS.

A discussion of the chemical and biological aspects of proteins and enzymes.

203. *ADVANCED BIOCHEMISTRY*. Laboratory. Spring term. Credit three hours. Prerequisite, to accompany or follow courses 201 and 202. Limited enrollment. Registration by permission of the instructor only. M W 2-5. Savage 230. Professor W. L. NELSON and assistants.

Laboratory experiments dealing with enzymes, co-factors, and substrates of importance in metabolic processes. Practice is given in the use of special techniques employed in isolation, characterization, and mode of action of enzymes and enzyme systems. Emphasis is placed on interpretation of data and written reports covering the various experiments.

[204. *RADIOACTIVE ISOTOPE TECHNIQUES IN BIOCHEMISTRY*. Laboratory. Spring term. Credit three hours. Prerequisite, permission of the instructor. Enrollment limited. Associate Professor GIBBS.] Not given in 1959-1960.

Laboratory exercises in the use of radioactive isotopes in the study of intermediary metabolism.

211. *INTERMEDIARY METABOLISM*. Spring term. Credit three hours. Prerequisite, courses 101, 102, and physical chemistry, or the equivalent. Primarily for graduate students, open to undergraduates by consent of the instructor. Lectures, M W F 11. Savage 145. Associate Professor GIBBS.

A course concerned with the intermediary metabolism of carbohydrates, lipides, and amino acids. Specific topics include application of thermodynamics to biological systems, pathways of sugar metabolism, metabolism of fats and phospholipides, metabolism of amino acids, the chemistry of autotrophy including the reduction of inorganic ions and the hormonal control of metabolism.

220. *SPECIAL TOPICS IN BIOCHEMISTRY AND NUTRITION*. Spring term. Credit one hour. Primarily for graduate students. Prerequisite, a course in biochemistry. Registration by permission. T 8. Savage 145. Professor WILLIAMS and Staff.

290. *BIOCHEMISTRY SEMINAR*. Fall and spring terms. Credit one hour. Registration by permission. F 4:15. Savage 145. Staff.

Assignments and discussions of recent advances in biochemistry.

292. *NUTRITION SEMINAR*. Spring term. Credit one hour. Registration by permission. M 4:15. Savage 100. Professor BARNES and staff.

Assignments and discussions of recent advances in the biochemistry and physiology of nutrition.

294. *FOOD BIOCHEMISTRY SEMINAR*. Fall term. Credit one hour. Registration by permission. T 4:30. Savage 130. Professor BARNES and staff members from the Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, New York.

Assignments and discussions of literature pertaining to the biochemical aspects of foods and food processing.

SELECTED TOPICS IN BIOCHEMISTRY

A series of courses given in alternate years.

15. *INSECT BIOCHEMISTRY*. Spring term. Credit two hours. Given in odd-numbered years. Prerequisite, permission of instructor. T Th 11. 145 Comstock. Assistant Professor YOUNG.

A discussion of biochemistry as applied to insects. Energy metabolism, detoxification, secretion, development, metabolism of insecticides, resistance.

140. *FOOD BIOCHEMISTRY*. Spring term. Credit two hours. Given in odd-numbered years. Prerequisite, course 101. Lectures, M W 10. Savage 145. Professor ROBINSON and Staff members from the Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, New York.

A discussion of some of the important nonmicrobial changes in foods, such as denaturation and the Maillard browning reaction. Emphasis is placed on the occurrence, significance, and prevention or control of the changes as they effect the color, odor, flavor, texture, or nutritive value of foods.

150. *BIOCHEMISTRY AND NUTRITION OF THE VITAMINS*. Spring term. Credit two hours. Given in even-numbered years. Prerequisite. Chemistry 303 and 305 or the equivalent. Course 101 or the equivalent, or course 5 or 10 by permission. Primarily for graduate students. Lectures, T Th 10. Savage 100. Professor DANIEL.

The chemical, physiological, and nutritional aspects of the vitamins.

160. *BIOGENESIS OF BIOLOGICALLY ACTIVE COMPOUNDS*. Fall term. Credit two hours. Given in odd-numbered years. Prerequisite, course 101 or the equivalent. Primarily for graduate students. Professor WRIGHT.

A consideration of the metabolic pathways by which certain structural and functional compounds of the cell originate.

170. *BIOCHEMISTRY OF NUCLEIC ACIDS*. Fall term. Credit two hours. Given in even-numbered years. Prerequisite, course 101 or the equivalent. Primarily for graduate students. Lectures, M W 9. Savage 145. Associate Professor HOLLEY.

The chemical and biological properties of the nucleic acids.

BIOLOGY

1-2. *GENERAL BIOLOGY*. Fall and spring terms. Credit three hours a term. The course may be entered only in the fall term. Not open to students who have had both Zoology 103-104 and Botany 1. If Biology 1 is taken after Zoology 103-104 or Botany 1, credit two hours a term. Lectures: fall term, M W 9, Comstock 245, or M W 11, Caldwell 100; spring term, M W 9 or 11, Comstock 245. Laboratory, M T W Th or F 2-4:30 or T 10-12:30. Roberts 392. Occasional evening lectures by guest speakers (attendance optional). Assistant Professor EISNER.

The course is designed to acquaint students majoring within or outside the animal and plant sciences with the established principles of biology, and with the body of research that led to the formulation of these principles. Specifically, the course

deals with the organization, integration, and maintenance of living organisms, and with their reproduction, heredity, behavior, and interactions. Emphasis is placed on an understanding of each topic in the light of modern evolutionary theory.

9. *BIOLOGICAL BASIS OF SOCIAL PROBLEMS*. Spring term. Credit three hours. If taken after elementary courses in Biology, Zoology, or Botany, credit two hours. No prerequisite. Lectures and demonstrations, T Th S 9. Comstock 145. Professor UHLER.

An elementary course designed especially to furnish a background in biological science for students in the College of Home Economics who intend to enter the field of nursery-school teaching, though open to other interested students as well. A survey course of biological principles, with emphasis on human structure, development, heredity, and eugenics.

105. *LABORATORY METHODS IN BIOLOGY*. Fall term. Credit three hours. Prerequisite, Biology 1-2, Botany 1-2, or Zoology 102 or 104. Lectures and laboratories, T or F 10-12:30 or T 7:30-10 p.m. and additional periods by appointment. Roberts 306. Professor UHLER.

For students who intend to teach or to follow some phase of biology as a profession. Subjects covered: collection, preservation, and storage of materials; the preparation of bird and mammal skins for study; injection of blood vessels and embalming; clearing and staining of small vertebrates; protozoological methods; and the preparation and staining of smears, whole mounts, and sections.

BOTANY

Students in botany may be accepted as specializing students at the end of their sophomore year only upon approval of the Department of Botany. They are required to take certain prescribed courses and must maintain a high scholastic average. Students wishing instruction in special groups of plants or in special subjects should consult the Department.

1-2. *GENERAL BOTANY*. Fall and spring terms. Credit three hours a term. If taken after Biology 1-2, credit two hours a term. Students may begin the course in the spring term. Lectures, T Th 9 or 11. Plant Science 233. One laboratory period a week, M T W Th or F 2-4:30, T 10-12:30, F or S 8-10:30 or S 9-11:30. Plant Science 240, 242, and 262. Professor BANKS, Dr. McDONOUGH, and assistants.

A course intended to acquaint the general student with the principles of Botanical Science, and to provide the basic knowledge necessary for those who intend to specialize in some aspect of Plant Science.

The fall term is devoted to a survey of the flowering plants, with emphasis placed on structure, function and reproduction. In the spring term emphasis is placed on the phyla of plants, representative life cycles and the importance of various groups in the study of biological principles. The evolution of plant groups is treated from the point of view of genetics and heredity. The principles of classification are introduced by means of field trips and the use of living material.

3. *POISONOUS PLANTS*. Spring term. Credit two hours. Registration is limited to students in the Veterinary College. Lecture, S 9. Laboratory, Th 2-4:30. Veterinary College, C 207. Assistant Professor KINGSBURY.

A discussion of the toxic effects of plants of the United States and Canada on domestic animals, the recognition of principal toxic species and the treatment and control of plant poisonings.

WEED CONTROL (Agronomy 115). Spring term. Credit three hours. Graduate students may register by permission. Prerequisite Agronomy 11. Not available to

Botany majors for credit in Botany. Lectures, T Th 11. Caldwell 100. Laboratory, M 2-4:30. Plant Science 202. Professor FERTIG and Assistant Professor KINGSBURY.

The course deals with principles and methods of weed control. Emphasis is placed on principles of control by mechanical, cultural, and chemical methods, their adaptability and limitations. The laboratory covers the identification and habits of weeds common in the Northeast, weed seed identification, spray equipment and use. Field trips are scheduled.

[56. *SEED ANALYSIS*. Spring term. Credit one hour. Prerequisite, courses 1-2 or the equivalent.] Not given in 1959-1960.

112. *FRESHWATER ALGAE*. Fall term. Credit three hours. Prerequisite, courses 1-2 or the equivalent. Lectures, T Th 11. Laboratory, F 2-4:30. Plant Science 202. Assistant Professor KINGSBURY.

A comprehensive survey of the freshwater algae, including structure, ecology, physiology, economic importance, and evolution where appropriate. The laboratory is designed, in addition to furnishing illustrative material for lecture topics, to provide a working familiarity with the local algal flora.

[113. *MARINE ALGAE AND THE BRYOPHYTES*. Spring term. Credit three hours. Prerequisite, courses 1-2 or course 112. Assistant Professor KINGSBURY.] Not given in 1959-1960.

While a continuation of course 112, this course is designed to be complete in itself. It includes a survey of the groups of the brown and red algae, a discussion of the landward migration, and surveys of the liverworts, hornworts, and mosses.

117. *TAXONOMY OF VASCULAR PLANTS*. Fall term. Credit four hours. Prerequisite, courses 1-2 or the equivalent and permission to register. Lectures, T Th 9. Plant Science 143. Laboratory, T Th 2-4:30. Mann 464. Professor CLAUSEN.

A survey of the kinds of seed plants and ferns, their classification, gross morphology, geographical distribution, and economic importance, together with an introduction to the principles and literature of taxonomy. Methods of identification are stressed.

118. *TAXONOMY AND ECOLOGY OF VASCULAR PLANTS*. Spring term. Credit four hours. Prerequisite, course 117 and either course 124 or Plant Breeding 101 and permission to register. Lectures, T Th 9. Plant Science 143. Laboratory, T Th 2-4:30. Mann 464. Professor CLAUSEN.

A continuation of course 117, including a consideration of evolutionary patterns in the seed plants and ferns; a demonstration of the principles and methods of taxonomy; and an introduction to problems of classification in the flora of North America. Trips are scheduled in laboratory periods and on several Sundays in the second half of the term.

217. *SEMINAR IN TAXONOMY AND ECOLOGY OF VASCULAR PLANTS*. Fall term. Credit one hour. Prerequisite, course 118. Required of graduate students taking work in taxonomy and ecology. M 12. Mann 464 and Plant Science 143. Professor CLAUSEN.

A consideration of problems in taxonomy and ecology.

123. *PLANT ANATOMY*. Fall term. Credit four hours. Prerequisite, courses 1-2 or the equivalent and permission to register. Lectures, T Th 8. Warren 145. Laboratory, either M W 2-4:30 or T Th 10-12:30. Plant Science 211. Assistant Professor BIERHORST.

A detailed study of the internal structure of vascular plants.

124. *CYTOLOGY*. Fall term. Credit four hours. Prerequisite, courses 1-2 or Zoology 102 or 104 or the equivalent. Lectures, M W 9. Plant Science 143. Laboratory, M W or T Th 10-12:30. Assignments to laboratory section must be made at time of registration. Plant Science 219. Associate Professor UHL.

The principal topics considered are protoplasm, cells and their components, nuclear and cell division, meiosis and fertilization, and the relation of these to the problems of development, reproduction, taxonomy, and heredity. Both plant and animal materials are used. Microtechnique is not included.

125. *MICROTECHNIQUE*. Spring term. Credit two hours. Prerequisite, courses 1-2 and permission to register. Hours to be arranged. Associate Professor UHL.

A laboratory course in methods of preparing plant material for microscopical study.

224. *CYTOGENETICS*. Spring term. Credit three hours. Prerequisite, course 124 and Plant Breeding 101 or the equivalent. Lectures, M W 9. Plant Science 143. Laboratory, M or W 10-12:30. Plant Science 219. Professor RANDOLPH.

An advanced course dealing mainly with the cellular mechanisms of heredity and including recent researches in cytology, cytotaxonomy, and cytogenetics.

126. *MORPHOLOGY OF VASCULAR PLANTS*. Spring term. Credit four hours a term. Prerequisite, courses 1-2 or the equivalent and permission to register. Given in alternate years. Lectures, M W 1:30-2:30. Plant Science 141. Laboratory, M W 2:30-5. Plant Science 211. Assistant Professor BIERHORST.

An advanced course in the comparative morphology, life histories, and phylogeny of the lower vascular plants, both fossil and recent.

[127. *MORPHOLOGY OF VASCULAR PLANTS*. Spring term. Credit four hours. Prerequisite, courses 1-2 or the equivalent and permission to register. Given in alternate years. Assistant Professor BIERHORST.] Not given in 1959-1960.

An advanced course in the comparative morphology, life histories, and phylogeny of the higher vascular plants, both fossil and recent.

COMPARATIVE MORPHOLOGY OF FUNGI. Given in the Department of Plant Pathology.

31. *PLANT PHYSIOLOGY*. Fall or spring term. Credit four hours. Prerequisite, courses 1-2 or Biology 1-2 and introductory chemistry. Lectures, T Th 10. Plant Science 143. Laboratory, T Th, or W F 2-4:30, or M 2-4:30, and S 8-10:30. Plant Science 227. Professor D. G. CLARK.

This course is designed to acquaint the student with the general principles of plant physiology. Topics such as water relations, photosynthesis, translocation, digestion, respiration, mineral nutrition, growth, and reproduction are studied in detail. Particular emphasis is placed, both in laboratory and classroom, on the discussion of principles and their application to plants.

230-231. *PLANT PHYSIOLOGY, ADVANCED LECTURE COURSES*. Fall and spring terms. Credit three hours a term. Limited to seniors and graduate students. Prerequisite, training in botany and chemistry to be determined in each case by the professor in charge. Course 230 advisable, but not essential, before 231. Lectures, M W F 10. Plant Science 143. Professor STEWARD.

Fall term: Cells and cell physiology; properties of protoplasm, its membranes and organelles; relations of cells, tissues and organs to water and solutes; water relations and stomatal behavior; inorganic plant nutrition; the essential nutrient elements. Spring term: Plant metabolism and organic nutrition (photosynthesis, respiration, nitrogen metabolism); translocation; physiology of growth and development.

232-233. *PLANT PHYSIOLOGY, ADVANCED LABORATORY*. Throughout the year, but may be entered in the spring term. Credit three hours a term. Prerequisites, courses in plant physiology, organic chemistry, and physics, and a passing grade in an examination covering these topics given at the first class meeting. Laboratory, T Th, or W F 2-5:30. Plant Science 241. Assistant Professor YOCUM.

Fall term: Photosynthesis, water relations, ion accumulation, responses to light

and gravity. Spring term: Respiration, nutrition, hormones, nitrogen metabolism, and photoperiodism.

[234. *PLANT PHYSIOLOGY, ADVANCED LECTURE COURSE*. Fall term. Credit two hours. Prerequisite, course 231 or adequate preparation in botany and chemistry. Professor ———.] Not given in 1959–1960.

This course deals primarily with physiology in relation to hormones, photoperiodism, and vernalization.

239. *SEMINAR IN PLANT PHYSIOLOGY*. Fall and spring terms. Required of graduate students taking work in plant physiology and open to all who are interested. F 11. Plant Science Seminar Room. Professors D. G. CLARK and STEWARD, Associate Professor THOMPSON, and Assistant Professor YOCUM.

The discussion of current problems in plant physiology; the presentation of reports on the research of graduate students and members of the staff.

171. *SPECIAL PROBLEMS IN GENERAL BOTANY, ANATOMY, CYTOLOGY, MORPHOLOGY, PALEOBOTANY, PHYCOLOGY, PHYSIOLOGY, TAXONOMY, AND ECOLOGY*. Fall and spring terms. Credit not less than two hours a term. By appointment. Professors BANKS, D. G. CLARK, CLAUSEN, RANDOLPH, and STEWARD, Associate Professor UHL and Assistant Professors BIERHORST, KINGSBURY, and YOCUM.

Students engaged in special problems or making special studies may register in this course. They must satisfy the instructor under whom the work is taken that their preparation warrants their choice of problem.

CONSERVATION

The Department of Conservation offers a wide variety of training in wildlife conservation and vertebrate zoology. The sequence for students in soil and water conservation is given in the Department of Agronomy, and a curriculum for those interested in conservation education has been developed in cooperation with the Department of Rural Education.

Students desiring to specialize in any of these aspects of conservation or vertebrate zoology may obtain a suggested list of courses for the four-year period by consulting the department. There is also available a pamphlet issued by the department which describes the curricula, employment opportunities, and facilities for instruction in greater detail than this announcement.

1. *CONSERVATION OF WILDLIFE*. Fall term. Credit two hours. Lectures, T Th 11 and occasional evenings. Fernow 122. Professors SWANSON, CLAUSEN, W. J. HAMILTON, JR., KELLOGG, RANEY and WEBSTER, Associate Professors CONKLIN, L. S. HAMILTON and HEWITT, Assistant Professors BARLOW and PIMENTEL and cooperating specialists.

An introduction to the wildlife resources of North America and their inter-relations with other resources; the importance of the flora and fauna in our economic and cultural life; the history of wildlife decimation, the present need for conservation, and the methods employed to reestablish the various species. Serves as an introductory course for conservation majors and is of general cultural and informational interest to students in other fields.

2. *FARM FORESTRY*. Spring term. Credit three hours. Lectures, M W 11. Laboratory, W 2–4:30. Fernow 210. Associate Professor L. S. HAMILTON.

Designed to give the student the basic information necessary to implement sound management practices in a woodland tract. Laboratories conducted in the field give actual practice in tree identification, log scaling, timber estimating, boundary surveying, tree marking and cutting in immature stands. Each student is assigned an area of woods to put his knowledge of forestry into practice.

3. *CONSERVATION OF NATURAL RESOURCES*. Spring term. Credit two hours. Lectures, T Th 10. Fernow 122. Associate Professor L. S. HAMILTON.

The natural resource problems of the United States: Soil, water, forests, wildlife, minerals, and recreational needs for an increasing population. River basin development; the conservation movement; public resource agencies and policies; current resource-use conflicts.

4. *MANAGEMENT OF WOODLANDS*. Fall term. Credit three hours. Lectures, M W 11. Laboratory, M 2-4:30. Fernow 210. Associate Professor L. S. HAMILTON.

Limited to those majoring in wildlife management and allied fields. A study of the forest community and forest management. Laboratories conducted in the field which apply management to specific forest stands.

Field trips, including a week-end trip to the Adirondacks, to inspect various types of cutting to show their effects on wildlife.

7-8. *TAXONOMY AND NATURAL HISTORY OF VERTEBRATES*. Fall and spring terms. Credit three hours a term. Prerequisite, Zoology 103 and 104 or 101 and 102. Lecture, M 8. Fernow 122. Laboratory, M W 2-4:30 or T Th 2-4:30. Fernow 14. Fall term, Professor RANEY. Spring term, Professor W. J. HAMILTON, JR.

Lectures on fishes, amphibia, reptiles, birds, and mammals, dealing with the principles of classification and nomenclature, characteristics, relationships, and bionomics of these groups. The laboratory gives practice in the identification of North American species. Field studies of the local fauna are undertaken during the fall and spring.

9. *GENERAL ORNITHOLOGY*. Spring term. Credit three hours. Lectures, M W 11. Fernow 122. Field and Laboratory, W or Th 2-4:30. Fernow 210. Associate Professor SIBLEY.

Introduction to the biology of birds; their structure, classification, adaptations for flight, migration, distribution, behavior, ecology, and evolution. Field and laboratory work on identification of local species. Field studies will include two all-day field trips.

22. *ICHTHYOLOGY*. Spring term. Credit three hours. Prerequisite, course 7-8 or permission to register. Lectures, T Th 8. Fernow 122. Laboratory, F 2-4:30. Fernow 14. Professor RANEY.

Evolution, relationships, structure, habits, ecology, and literature of fishes. Laboratory studies on structure and identification of North American fishes. Field studies on ecology and life histories include one all-day field trip.

25. *MAMMALOLOGY*. Fall term. Credit three hours. Prerequisite, course 7-8 or permission of instructor. Lectures, T Th 8. Fernow 122. Laboratory, F 2-4:30 or S 8-10:30. Fernow 14. Professor W. J. HAMILTON, JR.

Principal phases of mammalian life; origin, distribution, habits, and literature. Laboratory periods are devoted to methods of field collecting, census taking, life-history studies, preparation of skins and skeletons, and identification of North American species.

101. *SELECTED TOPICS IN CONSERVATION*. Fall term. Credit one hour. One meeting each week, to be arranged. Fernow 102. Professor SWANSON.

Primarily for graduate students who are also registered in course 1, but open to other graduate students and upperclassmen, by permission of instructor. Discussions of important conservation problems of current interest.

102. *PRINCIPLES OF WILDLIFE MANAGEMENT*. Fall term. Credit three hours. Prerequisite, consent of instructor. Lectures, M W F 10. Fernow 122. Associate Professor HEWITT.

Fundamental mechanisms of wildlife populations; ecological, social, and economic aspects of wildlife management.

103. *WILDLIFE MANAGEMENT LABORATORY*. Fall term. Credit one hour. Required of wildlife management majors registered in Conservation 102. Field and laboratory F 2-4:30, and several field trips to be arranged. Fernow 212. Associate Professor HEWITT.

104. *WILDLIFE MANAGEMENT METHODS*. Spring term. Credit three hours. Prerequisite, consent of instructor. Lecture, F 11. Laboratory, to be arranged. Fernow 212. Several all-day field trips. Associate Professor HEWITT.

Methods and techniques in the management of game species and their practical application in the field. Intended for students interested in professional wildlife management.

110. *ECONOMIC ZOOLOGY*. Spring term. Credit one hour. Prerequisite, course 7-8. F 8. Fernow 122. Professor EADIE.

Economics of amphibians, reptiles, birds, and mammals. Economic status, habits, and control of injurious species.

112. *LITERATURE OF ZOOLOGY, CONSERVATION, AND ECOLOGY*. Spring term. Credit one hour. Limited to upperclass students and graduates. W 9. Fernow 14. Professors W. J. HAMILTON, JR., RANEY, and EADIE.

The literature of zoology, ecology, and kindred fields, fish and fisheries, aquaria, amphibians, reptiles, birds, and mammals; wildlife management; preserves; game farms, animals in relation to recreation and economic zoology.

122. *ADVANCED ICHTHYOLOGY*. Fall term. Credit one or two hours. Prerequisite, courses 7-8 and 22, Elementary Statistics, and permission of instructor. Limited to seniors and graduate students. Hours to be arranged. Fernow 14. Professor RANEY.

Lectures (one hour) on speciation, intergradation, hybridization, distribution in fishes, and biometrical methods in vertebrate taxonomy. Methods of carrying on ecological and life-history investigations. Laboratory (one period) on taxonomic studies of eastern North American fishes.

126. *SYSTEMATIC ORNITHOLOGY*. Fall term. Alternates with course 127. Credit three hours. Prerequisite, course 7-8 or 9 and permission of instructor. Lecture and laboratory, M W 2-5. Fernow 210. Associate Professor SIBLEY.

The structure, classification, and natural history of the birds of the world. The geographical distribution and characteristics of orders, families, and principal genera. The principles and practices of systematics, scientific nomenclature, and the species problem.

[127. *THE BIOLOGY OF BIRDS*. Fall term. Alternates with course 126. Credit three hours. Prerequisite, course 9 and permission of instructor. Associate Professor SIBLEY.]Not given in 1959-1960.

Advanced study of sensory physiology, endocrinology, parasitology, growth and reproduction, behavior, and other phases of avian biology. Approximately half the semester is devoted to behavior studies, with lectures covering ethological theory and laboratory and field studies on captive and free-living birds.

It is recommended that, when possible, course 126 be taken before course 127.

131. *BIOLOGICAL ACOUSTICS*. Fall term. Credit three hours. Prerequisite, courses in animal physiology and physics. Lecture and laboratory, T Th 2-4:30 and one other period by appointment. Fernow 210. Professor KELLOGG.

A study of sound, as it affects animals, and as it is used in the study of animal behavior and communication. Modern methods of recording and analyzing sounds of animals, especially birds, will be emphasized.

LIMNOLOGY (ENTOMOLOGY AND LIMNOLOGY 171.) Spring term. Credit three hours. See full description under *Entomology and Limnology*.

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

The life histories and ecological requirements of some fresh-water game fishes; and the principles and techniques of fishery management.

174. *FISH CULTURE*. Spring term. Credit two hours. Prerequisite, permission of instructor. Lecture, M 12. Laboratory, M 2-4:30. Fernow 126. Associate Professor A. M. PHILLIPS, JR.

A study of the production of fish in hatcheries and hatchery management.

175. *FISHERY BIOLOGY LABORATORY*. Spring term. Credit two hours. Prerequisite, course 173 and permission of instructor. Limited to graduate majors and minors. T Th 1:30-5. Fernow 126. Professor WEBSTER.

Field and biometrical exercises in fishery management.

WATER POLLUTION CONTROL (CIVIL ENGINEERING 2531). Fall term. Credit three hours. See full description in *Announcement of the College of Engineering*.

180. *OCEANOGRAPHY*. Fall term. Credit three hours. Prerequisite, general zoology, botany, chemistry, and physics, or the equivalents. Lectures, T Th 10. Laboratory, Th 12. Fernow 122. Assistant Professor BARLOW.

Physical and chemical aspects of the oceans, particularly as background for marine ecology; geography and geology of the ocean floor; currents, tides; distribution of temperatures. Laboratory work in processing oceanographic data.

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

The sea as an environment; the physical and chemical characteristics of marine habitats; the productivity of the sea; the relation of hydrography to fisheries and faunal distributions.

190. *COMPARATIVE VERTEBRATE ETHOLOGY*. Fall term. Credit three hours. Prerequisite, course 7-8 and permission of instructor; courses in comparative vertebrate anatomy and physiology are highly desirable. Lectures, T Th 9. Fernow 122. Laboratory, T 2-4:30. Fernow 212. Primarily for graduate students; upperclassmen will be accepted to capacity of laboratory. Assistant Professor DILGER and assistant.

A survey of the methods and principles of vertebrate ethology for students specializing in this field or for those in other branches of zoology wishing to broaden their knowledge of animal behavior. Emphasis is placed on the causation, function, biological significance and evolution of species-typical behavior. The laboratories are designed to give first-hand knowledge of the material covered in lectures.

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

400. *FISHERY BIOLOGY*. Professor WEBSTER and Associate Professor A. M. PHILLIPS, JR.

401. *HERPETOLOGY*. Professors W. J. HAMILTON, JR. and RANEY.

402. *ICHTHYOLOGY*. Professor RANEY.

403. *MAMMALOLOGY*. Professors W. J. HAMILTON, JR. and EADIE.

404. *ORNITHOLOGY*. Professor KELLOGG, Associate Professor SIBLEY, and Assistant Professor DILGER.

405. *WILDLIFE MANAGEMENT*. Professors SWANSON, EADIE, and Associate Professor HEWITT.

406. *FORESTRY*. Associate Professors L. S. HAMILTON and MORROW.

407. *OCEANOGRAPHY*. Assistant Professor BARLOW.

410. *CONSERVATION SEMINAR*. Fall and spring terms. Without credit. Required of graduate students majoring in conservation, but open to all who are interested. Th 4:30-6:00 p.m. Fernow 122. Staff.

Discussions of literature and current research in the broad field of conservation of the vertebrates.

DAIRY INDUSTRY

Students in this department may choose between two basic programs, dairy industry and dairy science. In one, the emphasis is on the operation and management of dairy plants; the other emphasizes the chemistry and bacteriology of milk and milk products as a basis for quality control and research.

1. *INTRODUCTORY DAIRY SCIENCE*. Fall or spring term. Credit three hours. Prerequisite, Chemistry 102 or 106. Fall term: Lectures, T Th 11. Stocking 218. Laboratory, T or Th 2-4:30. Stocking 209. Spring term: Lectures, T Th 8. Stocking 218. Laboratory, Th 2-4:30. Stocking 209. Associate Professor SHIPE.

The scientific and practical aspects of milk and a survey of the dairy industry. Especial attention is given to the composition of milk and its physical and chemical properties, quantitative tests for fat and other constituents.

5. *BIOCHEMICAL ANALYSIS OF MILK AND CERTAIN FOOD PRODUCTS*. Spring term. Credit three hours. Open to juniors, seniors, and graduate students. Lecture demonstrations, W F 11. Stocking 218. Laboratory practice, F 11-4. Stocking 212 and 213. Professor KRUKOVSKY.

Certain phases of chemistry and quantitative analysis as applied to the quality control and improvement in the palatability and nutritional values of milk and fat containing food products, including the influences of the plant and animal.

102. *MARKET MILK*. Spring term. Credit five hours. Prerequisite, course 1, and Bacteriology 1 or its equivalent. Lectures, M W 10. Laboratory, M W 2-5. Stocking 120. Professor HOLLAND, Associate Professor MARCH, and assistants.

The scientific, technical, and sanitary aspects of the fluid-milk industry.

103. *MILK-PRODUCTS MANUFACTURING*. Fall term. Credit five hours. Prerequisite, course 1, Bacteriology 1, and organic chemistry or biochemistry. T Th 11-4:30. Stocking 120. Professor KOSIKOWSKI and assistant.

The principles and practice of making butter, cheese, and casein, including a study of the physical, chemical, and biological factors involved. Consideration is given also to commercial operations and dairy-plant management.

104. *MILK-PRODUCTS MANUFACTURING*. Spring term. Credit five hours. Prerequisite, course 102. T Th 11-4:30. Stocking 119. Associate Professor JORDAN and assistant.

The principles and practice of making condensed and evaporated milk, milk powders, ice cream, and by-products, including a study of the physical, chemical, and biological factors involved.

108. *COMMERCIAL GRADES OF DAIRY PRODUCTS*. Spring term. Credit one hour. Should be preceded by course 1. W 2-5. Associate Professor SHIPE.

The classification of dairy products and the factors involved in grading them.

111. *ANALYTICAL METHODS*. Spring term. Credit four hours. Prerequisite, college physics and quantitative analysis. Lectures, T Th 11. Laboratory practice, T 1-5. Stocking 119. Professor HERRINGTON and assistant.

A study of the more important operations and apparatus used in quantitative analysis, and their practical application.

113. *CHEMISTRY OF MILK*. Fall term. Credit two hours. Prerequisite, qualitative and quantitative analysis and organic chemistry. Lectures, T Th 8. Stocking 120. Professor HERRINGTON and Associate Professor SHIPE.

The subject matter changes from year to year. It may deal with colloidal phenomena in milk and its products. It may deal with the enzymes of milk, with milk proteins, with milk fat, or with chemical reactions and equilibria in dairy products. Graduate students may re-register in successive years and find little duplication of material.

130. *DAIRY ENGINEERING*. Fall term. Credit five hours. Prerequisite, Physics 103 and 104 or the equivalent and course 1. Lectures, M W F 10. Laboratory, M W 2-4:30. Recitation to be arranged. Stocking 119. Associate Professor JORDAN and Mr. HOFFER.

Engineering aspects of dairy-plant operations and a study of dairy-plant forms and records used in inventory control.

DAIRY BACTERIOLOGY. (See Bacteriology.)

210. *SPECIAL TOPICS IN DAIRY CHEMISTRY*. Fall term. Credit one hour. Registration by permission. Time to be arranged. Professor HERRINGTON.

The class undertakes, by cooperative effort, to prepare a comprehensive, written review of some topic in the field of dairy chemistry. The subject for review is changed each term and graduate students may register indefinitely.

251. *SPECIAL PROBLEMS IN DAIRY SCIENCE*. Fall or spring term. Credit one or more hours, by arrangement. For advanced students. Associate Professor JORDAN. Special problems in any phase of dairy science may be elected.

252. *SEMINAR*. Fall and spring terms. Time to be arranged. Stocking. Staff. Required of graduate students in the Department.

DRAWING

MECHANICAL

1. *MECHANICAL DRAWING*. Fall or spring term. Credit three hours. Lectures, T Th 8. Riley-Robb 105. Laboratory; fall term, W 1-5 or Th 1-5; spring term, W 1-5. Riley-Robb 425. Limited to 40 students per laboratory. Book and supply lists are available at the book stores. Mr. DART.

A course dealing with graphic presentation. The work includes lettering; use of instruments; orthographic projection involving plans, elevations, and sections; isometric drawing; auxiliaries, and the practical applications of these principles to simple problems.

2. *ADVANCED MECHANICAL DRAWING*. Spring term. Credit three hours. Prerequisite, course 1 or sufficient high school drawing. Lectures, W F 8. Laboratory, Th 1-5. Riley-Robb 425. Limited to 40 students per laboratory. Book and supply lists are available at the book stores. Mr. DART.

A continuation of course 1 with work on machine drawing, including assembly drawings; intersections; developments; descriptive geometry; sectional and auxiliary views; and the use of conventional symbols. Also studied are graphical methods related to other engineering courses and practical engineering problems; these include engineering graphs and charts; nomography; vector geometry and graphical calculus.

The student will be allowed to perform much of his drawing work with the aid of drafting machines.

3. *APPLIED DRAFTING*. Fall term. Credit three hours. Prerequisite, courses 1 and 2 or equivalents and permission of instructor. One lecture, two laboratories. Time to be arranged. Riley-Robb 425. Limited to sixteen students. Mr. DART.

A course designed to provide individuals interested in drafting with advanced applications of drafting principles and procedures to practical problems in the areas of structural drawing, mapping, and machine drawing; and utilization of advanced descriptive geometry applied to practical engineering problems. The course includes tours of local industrial companies to inspect drawing room facilities, to create an awareness of the interrelation among the engineer, draftsman, and production line; and to show the specific areas of drafting endeavor in relationship to the development of a product.

All drawing work performed by the student will be accomplished with the aid of drafting machines.

FREEHAND DRAWING AND ILLUSTRATION

9-10. *DRAWING FOR LANDSCAPE STUDENTS*. Throughout the year. Credit three hours a term. Fall term is prerequisite to spring term. Fall term, W F 2-4:30; spring term, M W F 11-1. Mann 500. Associate Professor BURCKMYER and Assistant Professor LAMBERT.

A course planned to develop (1) practical ability in the sketching of outdoor planting and landscaped features; (2) facility in lettering; (3) knowledge of isometric and perspective construction from plans and elevations. Sketch-book assignments, to be done outside of class, will be given throughout the year.

11. *FREEHAND DRAWING*. Fall or spring term. Credit three hours. For beginning students. Lecture, T or W 10. Six hours of time, including the lecture period, are to be spent in the drawing room, preferably in two-hour units. These hours must be scheduled between 9 and 11 M T W Th F or T 2-4. Mann 500. Associate Professor BURCKMYER and Assistant Professor LAMBERT.

The objective is to develop accuracy of observation and skill in delineation. Practice is given in outdoor sketching and in the drawing of still-life set-ups, interior scenes, and human figures. The principles of freehand perspective are taught and applied. The course is designed to aid those who plan to work in nature study, biological sciences, and home economics. Sketch-book assignments to be done outside of class will be given throughout the year.

12. *FREEHAND DRAWING AND ILLUSTRATION*. Fall term. Credit two hours. Prerequisite, Drawing 11 or the equivalent. Lecture, M or Th 10. Six hours of time, including one lecture period arranged during the first week, are to be spent in the drawing room, preferably in two-hour units. These hours may be scheduled between 9 and 12 M T W Th F. Mann 500. Assistant Professor LAMBERT.

This course carries on from the object drawing of the beginning course to the organization of a complete illustration. The subject matter is derived largely from quick, on-the-spot sketches. Composition, perspective relationships, and ways of rendering are all considered. The work is planned primarily to help students who

expect to use their sketching ability in landscape work, interior decorating, and in the illustrating of their own papers, bulletins, and books.

14. *WATER COLOR ILLUSTRATION*. Spring term. Credit two hours. Prerequisite, course 11 or the equivalent. Six hours of practice must be scheduled, preferably in two-hour units, between 9 and 12 M T W Th F or T W 2-4. Mann 500. Associate Professor BURCKMYER and Assistant Professor LAMBERT.

The student learns to mix colors, lay washes, and plan the values of his composition before he tries illustration in color.

16. *SPECIAL PROBLEMS*. Fall or spring term. Credit two hours. For advanced students only. Three hours of practice required for each hour of credit. Prerequisite, course 10, 12, or the equivalent. Mann 500. Associate Professor BURCKMYER.

For students who wish to attain proficiency in some particular type of illustration or technique.

17. *SCIENTIFIC ILLUSTRATION*. Spring term. Credit two hours. Prerequisite, course 11 or permission of the instructor. Six hours of practice to be scheduled, preferably in two-hour units. These hours may be scheduled between 9 and 12 M T W Th F. Associate Professor BURCKMYER.

This course surveys illustration methods suitable for different scientific fields and gives training in the techniques of pen and ink, scratch board, stipple board, wash, and color overlays. Instruction is given in the use of the camera lucida, pantograph, projectoscope, and other time-saving methods of getting accurate results as quickly as possible. Methods of reproducing illustrations are studied with relation to cost and problems of publication.

ENTOMOLOGY AND LIMNOLOGY

For related work see the courses listed under the heading "Conservation" in this *Announcement*, and under "Zoology" in the *Announcement of the College of Arts and Sciences*.

Students are accepted as majors in entomology only upon the consent of the head of the Department or of a member of the staff designated to act for him. Except in certain fields, this will normally be done only at the end of the sophomore year. Certain prescribed courses are required, and a high scholastic average is expected.

GENERAL ENTOMOLOGY

10. *INTRODUCTORY ENTOMOLOGY*. Fall or spring term. Credit three hours. Lectures: fall term, W F 11; spring term, T Th 9. Comstock 245. Laboratory: fall term, W Th or F 2-4:30; spring term, M T W Th or F 2-4:30. Comstock 100. Professor WATKINS and assistants.

A survey of the structure, biology, and classification of insects; types of insect control; and the major groups of insecticides, their formulation and application. Laboratory exercises on the anatomy and biology of insects, with practice in the identification of representative forms including many of the commoner species of economic importance.

116. *INSECT ECOLOGY*. Fall term. Credit three hours. Prerequisite, Biology 1 or Zoology 102 or 104, or equivalent. Lectures, Th 2-4, Comstock 145. One laboratory a week by appointment. Assistant Professor PIMENTEL.

A fundamental biological science dealing with the function of organisms in populations and in their non-living physical and chemical surroundings in which special attention will be given to population dynamics, origin and evolution of the living

system, the natural regulation of animal populations, and the physiological and ecological requirements of an organism as a functional unit (temperature, moisture, light, food, etc.). Principles of ecology will be illustrated by individual laboratory or field research problems dealing with insects and other animals or plants selected by the student.

[218. *TECHNICS OF BIOLOGICAL LITERATURE*. Fall term. Credit two hours. Given in alternate years. Associate Professor FRANCLEMONT.] Not given in 1959-1960.

History of the development of entomological literature and a critical study of the biologists' works of reference. Practice in the use of indices and bibliographies, and practice in the preparation of the latter.

INSECT MORPHOLOGY

122. *INSECT MORPHOLOGY*. Spring term. Credit four hours. Prerequisite, course 10 or permission of instructor. Lectures, T Th 10. Comstock 145. Laboratories, M W 2-5. Comstock 270. Professor ———.

The principles of morphology, as illustrated by the insects. Emphasis is placed on special problems in morphogenesis, adaptive radiation, and functional anatomy. The various topics are considered in the light of modern evolutionary theory, and an effort is made to relate them to recent behavioral and physiological work.

224. *INSECT HISTOLOGY*. Fall term. Credit two hours. Prerequisite, course 122 or permission of instructor. Two laboratories a week by appointment. Comstock 265. Professor ———.

Special original problems to be worked out individually or by small groups.

INSECT TAXONOMY

130. *INTRODUCTORY INSECT TAXONOMY*. Spring term. Credit four hours. Prerequisite, course 10. Lectures, T Th 10. Comstock 300. Laboratory, T Th 2-4:30. Comstock 300. Associate Professor EVANS.

An introduction to the classification, nomenclature, and distribution of insects. Laboratory practice in the identification of orders, families, and representative genera of insects; methods of collection and preparation of insect specimens. Field trips are taken in the late spring.

231. *TAXONOMY OF INSECTS EXCLUSIVE OF THE LARGER ORDERS OF HOLOMETABOLA*. Fall term. Credit four hours. Given in alternate years. Prerequisite, course 130. Lectures, W F 10. Comstock 300. Laboratories, F 2-4:30 and one other by arrangement. Comstock 300. Associate Professor EVANS.

Lectures on the classification, bionomics, and evolution of the orders and families of insects, exclusive of the larger orders of Holometabola. Laboratory studies on the literature and on the characters and classification of representative genera and species. Continuation of taxonomy of Holometabola is in courses 232, 233, and 234.

[232. *TAXONOMY OF THE IMMATURE STAGES OF HOLOMETABOLA*. Fall term. Credit three hours. Given in alternate years. Prerequisite, course 231 or permission of the instructor. Associate Professors EVANS and FRANCLEMONT.] Not given in 1959-1960.

Lectures on the structure and habits of insect larvae. Laboratory studies of the literature, comparative morphology, and identification of the immature stages of the Holometabola.

[233. *TAXONOMY OF THE HOLOMETABOLA: COLEOPTERA AND DIP-TERA*. Spring term. Credit three hours. Given in alternate years. Prerequisite,

course 231 or permission of the instructor. Associate Professors EVANS and FRANGLEMONT.] Not given in 1959-1960.

Lectures on the classification, bionomics, and evolution of the Coleoptera and Diptera. Laboratory studies on the literature and on the characters and classification of representative genera and species of these orders.

234. *TAXONOMY OF THE HOLOMETABOLA: LEPIDOPTERA AND HYMENOPTERA*. Spring term. Credit three hours. Given in alternate years. Prerequisite, course 231 or permission of the instructor. Lecture, W 10. Comstock 300. Laboratories, W F 2-4:30. Associate Professors FRANGLEMONT and EVANS.

Lectures on the classification, bionomics, and evolution of the Lepidoptera and Hymenoptera. Laboratory studies on the literature and on the characters and classification of representative genera and species of these orders.

[235. *PROCEDURES IN TAXONOMY*. Fall term. Credit two hours. Given in alternate years. Prerequisite, course 130. Associate Professor FRANGLEMONT.] Not given in 1959-1960.

A study of zoological nomenclature; the preparation of taxonomic papers, including descriptions, keys, and illustrations; methods of analyzing taxonomic data.

ECONOMIC ENTOMOLOGY

141. *GENERAL ECONOMIC ENTOMOLOGY*. Fall term. Credit three hours. Prerequisite, course 10 or the equivalent. Lectures, T Th 9. Comstock 145. Laboratory, T 2-4:30. Comstock 100. Professor WATKINS and assistants.

Lectures on the life histories and habits of insects injurious to the major plant and animal crops of the United States, and on methods used in their control; laboratory exercises on the commoner pests and more important insecticides.

[241. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY*. Fall term. Credit three hours. Given in alternate years. Prerequisite, course 141 or permission to register. Professors SCHWARDT and GYRISCO.] Not given in 1959-1960.

A course for graduate and advanced undergraduate students dealing with fundamental principles of insect control, with discussion of some of the major problems in agricultural entomology. Topics covered: insect pests of livestock and of stored grain and forage crops.

[242. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY*. Spring term. Credit three hours. Given in alternate years. Prerequisite, course 141 or permission to register. Professors BRANN and DEWEY.] Not given in 1959-1960.

A continuation of course 241. Topics treated; insecticide application equipment; and insect pests of fruit.

243. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY*. Fall term. Credit three hours. Given in alternate years. Prerequisite, course 141 or permission to register. Lectures, M W F 11. Comstock 145. Assistant Professor MORSE and ———.

A continuation of courses 241 and 242. Topics covered: insect pests of woody and ornamentals and large scale insect eradication and control programs.

244. *SPECIAL TOPICS IN ECONOMIC ENTOMOLOGY*. Spring term. Credit three hours. Given in alternate years. Prerequisite, course 141 or permission to register. Lectures, M W 11. Comstock 145. Laboratory, F 11-1. Comstock 100. Assistant Professor PIMENTAL.

A continuation of courses 241, 242, and 243. Topics covered: insect pathology and the biological control of insects.

PARASITOLOGY AND MEDICAL ENTOMOLOGY

151. *PARASITOLOGY*. Spring term. Credit three hours. Given in alternate years. Prerequisite, Biology 1-2 or Zoology 102 or 104. Course 10 is also recommended. Lecture, W 9. Comstock 145. Laboratories, Section 1: Th 2-4:30 and S 8-10:30; Section 2: F 2-4:30 and S 10:30-1. Comstock 200. Professor TRAVIS.

A study of the principal protozoan and helminth parasites of man and other vertebrates, with special emphasis given to life histories and recognition.

[152. *MEDICAL ENTOMOLOGY*. Fall term. Credit three hours. Given in alternate years. Prerequisite, Biology 1-2 or Zoology 102 or 104. Course 10 is recommended. Professor TRAVIS.] Not given in 1959-1960.

A study of insects and other arthropods that are the causative agents of disease in man and other animals, or are the vectors, or are the intermediate hosts of disease-producing organisms. Laboratory studies stress life histories and recognition.

[154. *WILDLIFE PARASITOLOGY*. Fall term. Credit two hours. Given in alternate years. For qualified graduate and undergraduate students with a special interest in the parasites of wildlife. Prerequisite, permission to register. Professor TRAVIS.] Not given in 1959-1960.

A technical course that stresses the life histories and the recognition of parasites associated with wildlife species.

253. *PARASITOLOGY TECHNIQUES*. Spring term. Credit two hours. Given in alternate years. Prerequisite, course 151 or may be taken concurrently with course 151. Undergraduates by permission. Lecture, T 9. Comstock 200. Laboratory, T 2-4:30. Comstock 200. Professor TRAVIS.

A laboratory study of the techniques used by research and practical workers in the field of parasitology.

[255. *MEDICAL ENTOMOLOGY TECHNIQUES*. Fall term. Credit two hours. Given in alternate years. Prerequisite, course 152 or may be taken concurrently with course 152. Undergraduate students by permission. Professor TRAVIS.] Not given in 1959-1960.

A laboratory study of the techniques used by research and practical workers in the field of medical entomology.

APICULTURE

Advanced and graduate students taking courses 122 and 223 and specializing in apiculture are permitted to use the honeybee as illustrative material in the laboratory work of these courses.

61. *INTRODUCTORY BEEKEEPING*. Spring term. Credit two hours. Lectures, T Th 11. Comstock 245. Professor DYCE.

This course is intended to afford a general knowledge of the fundamentals of beekeeping, including the life history, instincts, and general behavior of honeybees. Special attention is given to the role of bees in the cross-pollination of agricultural crops, as well as production of honey and beeswax.

261. *ADVANCED BEEKEEPING*. Throughout the year. Credit three hours a term. Given in alternate years. Prerequisite, courses 10 and 61 and previous beekeeping experience. By appointment. Professor DYCE and Assistant Professor MORSE.

An advanced course for those specializing in apiculture. Considerable time is devoted to a study of the entire field of beekeeping. Laboratory work covers bee behavior, external and internal anatomy, disease diagnosis, honey and beeswax production, and preparation for market, and the management of colonies for pollination service.

[262. *SPECIAL TOPICS IN BEEKEEPING*. Throughout the year. Credit three hours a term. Given in alternate years. Registration by permission; open to qualified juniors, seniors, and graduate students. Professor DYCE and Assistant Professor MORSE.] Not given in 1959-1960.

A technical course designed for advanced students, and covering scientific investigation in all phases of the subject. Special attention is given to improved methods of apiary and honey-house management and the preparation of honey for market. Current literature on beekeeping is assigned, reviewed, and evaluated by students. Lectures and discussions are supplemented by field trips.

LIMNOLOGY

171. *LIMNOLOGY*. Spring term. Credit three hours. Prerequisite, nine hours of biological science, including course 10 or the equivalent, a course in general physics, and a course in general chemistry. Lecture, F 10. Comstock 145. Laboratories and field trips, F 2-4:30 and S 8-10:30. Comstock 110. Associate Professor BERG.

The ecology of streams, lakes, and ponds, and factors that determine their biological productivity.

272. *ADVANCED LIMNOLOGY*. Fall term. Credit three hours. Prerequisite, course 171 and permission to register. Normally limited to graduate students majoring or minoring in limnology. Lecture and laboratory, T 1:30-5 and one additional laboratory or field trip, by arrangement. Comstock 110. Associate Professor BERG.

A more advanced treatment of the problem of the biological productivity of inland waters.

FISHERY BIOLOGY AND FISH CULTURE. See full description under "Conservation."

INSECT PHYSIOLOGY

285. *INSECT PHYSIOLOGY*. Fall term. Credit five hours. Given in alternate years. Prerequisite, course 122, Chemistry 106, and Physics 104 or 108. Lectures, M W F 9. Comstock 145. Laboratories, M W 2-4:30. Comstock 50. Professor PATTON.

An introductory course for upperclassmen and graduate students. The physiology of insect systems is discussed and demonstrated by a series of laboratory exercises.

INSECT BIOCHEMISTRY (BIOCHEMISTRY 15). Spring term. Credit two hours. Given in odd-numbered years. Registration by permission of instructor. T Th 11. Comstock 145. Prerequisite, insect physiology 285 or biochemistry 101. Assistant Professor YOUNG.

A discussion of biochemistry as applied to insects. Energy metabolism, detoxification, secretion, development, metabolism of insecticides, resistance.

INSECT TOXICOLOGY

[295. *CHEMISTRY AND TOXICOLOGY OF INSECTICIDES*. Fall term. Credit six hours. Given in alternate years. Prerequisite, general chemistry and organic chemistry. Undergraduate students by permission. Professor DEWEY and Assistant Professor WEIDEN.] Not given in 1959-1960.

The fundamental chemical and physical properties of insecticides and the principles of evaluating their effects on insects.

RESEARCH

300-399. *RESEARCH*. Fall and spring terms. Credit to be arranged. Prerequisite,

permission to register from the professor under whom the work is to be taken. Comstock or Roberts.

307. *BIOLOGY*. Assistant Professor EISNER and Professor UHLER.

310. *INSECT ECOLOGY*. Assistant Professor PIMENTEL.

320. *INSECT MORPHOLOGY, HISTOLOGY, AND EMBRYOLOGY*. Professor BUTT.

330. *TAXONOMY*. Associate Professors DIETRICH, FRANCLEMONT, and EVANS.

340. *ECONOMIC ENTOMOLOGY*. Professors SCHWARDT, RAWLINS, WATKINS, BRANN, DEWEY, MATTHYSSE, and GYRISCO; Associate Professor NAEGELE; Assistant Professors WOOLEY, MUKA, SEMEL, and LISK.

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

361. *APICULTURE*. Professor DYCE and Assistant Professor MORSE.

370. *LIMNOLOGY*. Associate Professor BERG.

385. *INSECT PHYSIOLOGY AND BIOCHEMISTRY*. Professor PATTON and Assistant Professor YOUNG.

395. *CHEMISTRY AND TOXICOLOGY OF INSECTICIDES*. Professor DEWEY and Assistant Professor WEIDEN.

SEMINAR

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

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

EXTENSION TEACHING

1. *ORAL AND WRITTEN EXPRESSION*. Throughout the year. Credit three hours a term. Fall term is prerequisite to spring term. Primarily for students of the two-year courses. Lectures and practice: fall term, M W F 8 or 11 or T Th S 10; spring term, M W F 8, 9, or 11, Warren 231. Criticism, by appointment, daily 8-5 and S 8-1. Associate Professors FREEMAN and MARTIN, and Messrs. LUEDER and ———.

Practice in oral and written presentation of topics in agriculture and other fields, with criticism and individual appointments on the technique of public speech. Designed to encourage interest in public affairs, and, through demonstrations and the use of graphic materials and other forms, to train for effective self-expression in public. Special training is given to competitors for the Eastman Prizes for Public Speaking and the Rice Debate Stage. In addition, some study is made of representative work in English literature. Part of the work in the second term is a study of parliamentary practice.

101. *ORAL AND WRITTEN EXPRESSION*. Fall or spring term. Credit two hours. Open to juniors and seniors. The number in each section is limited to twenty students. Lectures and practice: fall term, M W 9, T Th 9, 10, or 11, W F 10, Warren 131; spring term, M W 9, T Th 9 or 11, Warren 131. Criticism, by appointment, daily 8-5, S 8-1. Professor PEABODY, Associate Professors FREEMAN and MARTIN, and Mr. LUEDER.

Practice in oral and written presentation of topics in agriculture and other fields, with criticism and individual appointments on the technique of public speech. Designed 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 is given to competitors for the Eastman Prizes for Public Speaking and in the Rice Debate contest. (See page 117.)

102. *ORAL AND WRITTEN EXPRESSION*. Spring term. Credit two hours. Prerequisite, course 101, of which course 102 is a continuation. Lectures and practice, T Th 10 or W F 10. Warren 131. Criticism, by appointment, daily 8-5, S 8-1. Professor PEABODY and Associate Professor FREEMAN.

Part of the work of the course consists of a study of parliamentary practice.

104. *ADVANCED ORAL EXPRESSION*. Spring term. Credit two hours. Prerequisite, courses 101 and 102 and permission of the instructor. Limited to nine students, M W 12. Warren 131. Professor PEABODY.

An advanced course of study and practice in oral expression as directly related to the needs of the county agricultural agent, the home demonstration agent, the 4-H Club agent, the extension specialist, and the vocational teacher.

JOURNALISM

15. *AGRICULTURAL AND HOME ECONOMICS JOURNALISM*. Fall term. Credit three hours. M W F 10. Warren 245. Professor WARD.

An introductory course dealing with the farm press, daily and weekly newspapers, magazines, trade journals, book publishing, advertising, radio, television, and other fields related to agricultural and home economics journalism. The operations of the major mediums of communication and the techniques of writing for each are studied.

110. *NEWS WRITING*. Spring term. Credit two hours. Prerequisite, course 15. Th 2-4. Warren 232. Professor KNAPP.

Primarily the writing of agricultural and home-economics news for publication. The course includes criticism, discussions, and consultations on published material written by students.

112. *AGRICULTURAL ADVERTISING AND PROMOTION*. Spring term. Credit two hours. Open to juniors and seniors, and to other students by permission of the instructor. W 2-4. Warren 245. Professor WARD and guest lecturers from advertising agencies.

The use of commercial advertising and sales promotion methods and media in promoting the sale of products and new or improved farm and home practices and programs. Includes market analysis, planning of the advertising and/or promotion units, selection of media, preparation of copy, and sales-promotion pieces.

113. *WRITING FOR MAGAZINES*. Spring term. Credit two hours. Not open to freshmen. M 2-4. Warren 260. Professor WARD.

A course dealing chiefly with the writing of fact articles for publication in agricultural, home economics, or general magazines. Students may write on any subjects they choose. The articles and publication markets are analyzed.

RADIO-TELEVISION

120. *RADIO BROADCASTING AND TELECASTING*. Spring term. Credit three hours. Not open to freshmen. M W F 9. Roberts 131. Associate Professor KAISER.

An introductory course to familiarize students, particularly those in agriculture and home economics, with the best methods of presenting ideas by radio and television. Practice includes auditions and criticisms for all members of the class in preparing and presenting radio talks; continuity writing and program arrangements.

122. *TELEVISION PRODUCTION AND PROGRAMMING*. Fall term. Credit two hours. Open to juniors, seniors, and graduate students. T 2-4. Roberts 131. Associate Professor KAISER.

A survey of television as a means of getting information to the public. A study is made of the techniques employed in televising informational-type programs. Students prepare formats and scripts and prepare and present programs before a closed-circuit camera. Evaluation or criticism of the programs is made by the instructor and the class.

VISUAL AIDS

130. *PHOTOGRAPHY*. Spring term. Credit two hours. Lectures and laboratory, S 9-12. Roberts 131. Open to juniors, seniors, and graduate students. Limited to twenty-five students. Registration by permission only. Primarily intended for those who plan to enter fields of agriculture and home economics in which a knowledge of photographic principles is important. Professor E. S. PHILLIPS.

A course that deals with the techniques of photography to be used in newspapers, magazines, bulletins, and for film strips, motion pictures, and other media.

131. *VISUAL AIDS: THEIR SCOPE, PREPARATION, AND USE*. Fall term. Credit two hours. Lecture and demonstration, S 9-11. Roberts 131. Open to juniors, seniors, and graduate students. Professor E. S. PHILLIPS and departmental staff.

A course designed to familiarize the student with the forms, purposes, preparation, and use of all types of visual aids (slide sets, motion and news photography, exhibits, posters, and other media), useful to teaching, promotion, or public-relations problems in agriculture and home economics. Includes practice in selection of and planning specifically assigned problems.

FLORICULTURE AND ORNAMENTAL HORTICULTURE

Instruction in the Department of Floriculture and Ornamental Horticulture is planned for students with the following interests: (1) commercial plant production, distribution, or utilization, including the management of greenhouses, nurseries, and wholesale and retail establishments; (2) developing a landscape service, including the planning, construction, planting, and maintenance of small properties; (3) superintendence of parks, golf courses, cemeteries, arboretums, or garden centers; (4) the culture and use of ornamental plants in the home garden and in the home.

Special curricula are set up to meet the needs of those students desiring training in the above fields.

Undergraduate students may plan their course as preparation for graduate training leading to university teaching, or research positions with universities, experiment stations, or industry.

Courses 1, 3, 10, 12, 13, 115, and 123, are required of all students majoring in the Department. These students must also satisfy the Department practice requirement based on experience with ornamental plants and their culture.

GENERAL COURSES

GENERAL HORTICULTURE. See Vegetable Crops 3.

1. *GENERAL FLORICULTURE AND ORNAMENTAL HORTICULTURE*. Fall term. Credit three hours. Intended primarily for departmental majors. Lectures, M W 10. Plant Science 37. Laboratory, T or W 2-4:30. Plant Science 15. Assistant Professor LANGHANS.

An elementary course covering the principles and practices of growing ornamental plants in the garden, greenhouse, and home.

2. *INTRODUCTION TO LANDSCAPE DESIGN*. Fall or spring term. Credit three hours. Open to all students except department majors. Lectures, M W F 9. East Roberts 222. Professor ———.

A consideration of the principles of landscape design as applied to the small-residence property.

5. *FLOWER ARRANGEMENT*. Fall or spring term. Credit two hours. Enrollment limited to 18 students for each laboratory section. Fall term: lecture, Th 9. Plant Science 37; laboratory, W or Th 2-4:30, or Th 10-12:30. Plant Science 22. Spring term: lecture, T 10. Plant Science 37; laboratory, T or W 2-4:30 or Th 10-12:30. Plant Science 22. Assistant Professor Fox.

A study of the principles and methods of arranging flowers and other plant materials for decorative use in the home and for exhibition.

PLANT MATERIALS

10. *TAXONOMY OF CULTIVATED PLANTS*. Fall term. Credit four hours. Intended primarily for departmental majors. Prerequisite, Botany 1 or its equivalent. Lectures, W F 10. Plant Science 29. Laboratory, W F 2-4:30. Plant Science 29. Assistant Professor INGRAM.

A study of the kinds of cultivated ferns and seed plants and their classification into families and genera. Emphasis is placed on methods of identification, the preparation and use of the analytical keys, the distinguishing characteristics of the families concerned and their importance in ornamental horticulture.

12. *HERBACEOUS PLANT MATERIALS*. Spring term. Credit three hours. Prerequisite, course 10 or permission to register. Lectures, T Th 8. Plant Science 37. Laboratory, W 10-12:30 or 2-4:30. Plant Science 15. Associate Professor LEE.

A study of the ornamental herbaceous plants used in landscape and garden plantings. Emphasis is placed on the identification, use, and culture of bulbs, annuals and perennials.

13. *WOODY-PLANT MATERIALS*. Spring term. Credit four hours. Prerequisite, course 10 or permission to register. Lectures, T Th 9. Plant Science 37. Laboratory and field trips, M and W or F 2-4:30. Plant Science 29. Professor CORNMAN.

A study of the trees, shrubs, and vines used in landscape planting. Emphasis is placed on their characteristics and values for use as landscape material. The class visits Rochester parks.

113. *WOODY PLANT MATERIALS, ADVANCED COURSE*. Fall term. Credit two hours. Given in alternate years. Prerequisite, course 13. Lecture and laboratory to be arranged. Professor CORNMAN.

A course dealing with the important groups of landscape materials and the literature of the subject. A knowledge of the ordinary woody plants for landscape use in the Northeast is presumed. Emphasis is on less-known northern plants and upon plant groups basic in landscape design in other regions of the United States. Opportunities for practice in the determination of unknowns and in the use of the literature are provided. A trip is taken to Washington, D.C. and vicinity.

NURSERY MANAGEMENT

114. *TURF*. Spring term. Credit two hours. Given in alternate years. Prerequisite, Agronomy 1 and permission to register. Lecture, W 11. Plant Science 37. Laboratory, Th 2-4:30. Plant Science 29. Professor CORNMAN.

A course dealing chiefly with the principles, practices, and materials for the con-

struction and maintenance of lawn areas. Some attention is given sports turf. A week-end inspection trip is taken to experimental test plots and special turf areas.

115. *PLANT PROPAGATION*. Fall term. Credit three hours. Prerequisite, courses 12 and 13 and Botany 31 or the equivalent, or permission of the instructor. Lectures, T Th 8. Plant Science 37. Laboratory, Th 2-4:30. Greenhouses and nurseries. Assistant Professor ———.

The germination of seeds, rooting of cuttings, multiplication of bulbs, and propagation of plants by budding and grafting are studied from the standpoint of the basic mechanisms governing the initiation and development of roots and shoots, including the physiology of dormancy, growth regulators, and germination. The class visits the seed-testing laboratory at Geneva and nurseries at Newark, New York.

117. *NURSERY CROP PRODUCTION AND MAINTENANCE*. Spring term. Credit four hours. Prerequisite, course 123. Lecture, M W F 8. Plant Science 37. Laboratory, T 2-4:30. Greenhouses and Nursery. Professor PRIDHAM.

The problems of commercial propagation and growing of nursery plants to marketable stage. Digging, storage, and packaging of nursery stock and commercial planting and maintenance practices are included. Plant growth is considered in relation to soil and climatic factors of site. Control of growth by watering, cultivation, and pruning of landscape plants in garden and park planting is stressed. Field problems and observational trips are included in laboratory work.

COMMERCIAL FLORICULTURE

123. *ENVIRONMENT AND PLANT GROWTH*. Fall term. Credit four hours. Prerequisite, course 115, Botany 31, Agronomy 1, and the practice requirement. Lectures and recitations, M W F 9. Plant Science 37. Laboratory, M 2-4:30. Greenhouses. Professor J. G. SEELEY.

A comprehensive study of the application of basic science to the culture of ornamental plants. One all-day trip is taken to commercial greenhouses.

124. *FLORIST CROP PRODUCTION*. Spring term. Credit four hours. Prerequisite, course 123. Lectures, M W F 9. Plant Science 37. Laboratory, W 2-4:30. Greenhouses. Assistant Professor BOODLEY.

A course dealing with the commercial production of florist crops; emphasis is upon the practical problems concerned. Several trips are made to near-by commercial greenhouses.

125. *FLOWER-STORE MANAGEMENT*. Spring term. Credit two hours. Prerequisite, course 5 and permission to register. Lecture, one hour to be arranged. Plant Science 22. Laboratory, M 2-4:30. Plant Science 22. Assistant Professor Fox.

Lectures devoted to flower-shop management, business methods, merchandising, and marketing of floricultural commodities. Laboratories to include the application of subject matter and the principles of commercial floral arrangement and design. A required two-day field trip is made to flower shows and to wholesale and retail florist establishments.

LANDSCAPE SERVICE

3. *ELEMENTARY LANDSCAPE DESIGN*. Fall term. Credit three hours. Intended primarily for departmental majors. Lectures, T Th 11. Laboratory, Th 2-4:30. Plant Science 433. Assistant Professor SCANNELL.

Principles of design, with practice in the use of drawing instruments and graphic interpretation of ideas.

32. *INTERMEDIATE LANDSCAPE DESIGN*. Spring term. Credit three hours.

Prerequisite, courses 3, 12, and 13 and Drawing 10. Lecture, M 11. Laboratory, T Th 10-12:30. Plant Science 433. Professor ———.

The application of the principles of design to the specific problems of the small residential property. A terminal course for those not intending to major in this field.

132. *PLANTING DESIGN*. Fall term. Credit three hours. Prerequisite, course 32. Lecture, W 12. Laboratories, W 2-4:30 and F 10-12:30. Plant Science 433. Professor ———.

An advanced course in design, with emphasis on plant combinations and uses in association with structures and gardens. Practice in drawing and estimating planting plans.

133. *ADVANCED LANDSCAPE DESIGN*. Spring term. Credit four hours. Prerequisite, course 32. Lecture, M 12. Laboratory, M W 2-4:30 and one additional period. Plant Science 433. Assistant Professor SCANNELL.

Practice in making landscape plans for real situations are an essential part of this course. Residential housing, industrial, and commercial landscape treatments are included.

141. *NURSERY-LANDSCAPE CONSTRUCTION*. Fall term. Credit three hours. Prerequisite, Agricultural Engineering 21. Lectures and laboratory, T Th 8-11. Plant Science 433. Assistant Professor SCANNELL.

Particular emphasis on principles of earth work, drainage, and the construction of small structures. Practice in interpreting and drawing construction details and the reading and drawing of grading plans.

142. *CONSTRUCTION SPECIFICATIONS AND ESTIMATING*. Spring term. Credit two hours. Prerequisite, course 141. Lecture and laboratory, W F 10-12:30. Plant Science 433. Assistant Professor SCANNELL.

Emphasis on interpreting specifications written by others. Contract documents and bidding procedures.

DEPARTMENTAL SEMINAR

241. *SEMINAR*. For departmental staff and graduate students. Fall and spring terms. Time to be arranged.

250. *SPECIAL PROBLEMS IN FLORICULTURE AND ORNAMENTAL HORTICULTURE*. Fall or spring term. Credit two or more hours. Prerequisite, adequate training for the work, and permission to register; primarily for graduate students. Professor J. G. SEELEY and staff.

Special work on problems under investigation by the department, or of special interest to the student, provided adequate facilities are available. Students must satisfy the staff member under whom the work is to be taken that their preparation warrants their choice of problem.

FOOD SCIENCE AND TECHNOLOGY

The curriculum in food technology is specifically designed to prepare students for: (1) Production and research; or (2) Sales and management positions in the food industry. Both programs are designed to give the student a broad background in the basic sciences, as well as a more specialized concept in a study of foods. Those interested in the first program will be encouraged to take allied courses pertaining to food, such as dairy, animal husbandry, poultry, pomology and vegetable crops. Those interested in the second program will combine courses in food technology with courses in business management, accounting, organization and administration.

1. *INTRODUCTORY FOOD SCIENCE*. Fall term. Credit two hours. Especially

for freshmen and sophomores. Lectures, M W 10. Stocking 218. Professor ———.

A survey course to orient the student in the broad field of food science and processing. The course includes the economic importance of the food industry and the relation of engineering operations and processes in the production, processing, and handling of the raw products through distribution of the processed foods.

101. *PRINCIPLES OF FOOD TECHNOLOGY*. Throughout the year. Credit three hours a term. Prerequisite, Chemistry 102 or 106, Bacteriology 1, Physics 104. Lectures: fall term, T Th 10. Riley-Robb 205; spring term, M W 11. Riley-Robb 125. Laboratory, Th 2-4:30. Riley-Robb 147A. Professor ———.

Outlines the broad field of food economics, the processing, production and distribution of raw material to finished product, with emphasis on canning, freezing, and dehydration. The fundamental chemical and physical properties of foods, and their nutritive components, food additives and preservatives, and the principles of manufacture are discussed. Laboratory practice involves actual processing and preservation of various food products.

106. *FOOD PROCESSING AND QUALITY CONTROL*. Throughout the year. Credit three hours a term. Prerequisite, courses 101 and 121. Primarily for Food Technology students interested in management. Fall term, M W 10. Riley-Robb 15. Laboratory, F 2-4:30. Riley-Robb 44. Spring term, T Th 8. Riley-Robb 15. Laboratory F 2-4:30. Stocking 410. Professor ———.

A study of the principles and practice of commercial food processing and manufacturing methods such as canning, freezing, dehydration, and fermentation. Laboratory food analysis and quality control methods and techniques for examining, inspecting, and grading processed foods are considered. Emphasis is given to labeling, adulteration, and sanitation in production and distribution.

190. *FOOD TECHNOLOGY SEMINAR*. Throughout the year. Credit one hour a term. Prerequisite, credit for or concurrent registration in course 101. Lecture, fall term, T 11; spring term, F 11. Riley-Robb 205. Professor ———.

A discussion of current literature on industrial aspects of food technology and related topics and special lectures.

COURSES IN FOOD ENGINEERING

FOOD ENGINEERING. (See Dairy Industry 130.)

**ELEMENTARY CHEMICAL ENGINEERING (ENGINEERING 5110)*. Spring term. Credit three hours. Prerequisite, Chemistry 102 or 106, Physics 104, and three years of high school mathematics. Primarily for students in agriculture or nutrition. Not open to students in Chemical Engineering. Lectures, M W 10, F 8. Olin 158. Associate Professor FINN.

Lectures and problems on energy and material balances, evaporation, heat transfer, fluid flow, filtration, etc.

METEOROLOGY

1. *BASIC PRINCIPLES OF METEOROLOGY*. Fall term. Credit three hours. Prerequisite, Physics 103 or one year of high school physics. Lectures, T Th 11. Plant Science 143. Laboratory, T W or Th 2-4:30. Plant Science 114. Professor DETHIER.

Simplified treatment of the physical processes that produce commonly observed weather phenomena, including discussions of radiation, temperature, humidity, evaporation, condensation and precipitation, clouds, pressure systems and winds,

*This course does not count as an agricultural elective for students in the College of Agriculture.

the general circulation and secondary circulations, air masses and fronts, cyclones and anticyclones, hurricanes, tornadoes, and thunderstorms, and elementary climatology and microclimatology. In the laboratory, emphasis is on common and useful meteorological instruments, observations, and weather map. Practical applications are stressed.

A basic objective of this course is to develop a practical and useful unified picture of the atmosphere and its weather changes. The course also illustrates some methods and achievements of modern science, and is a survey course in meteorology.

106. *MICROCLIMATOLOGY*. Spring term. Credit three hours. Prerequisite, course 1 or permission of the instructor. Lectures, M W 11. Plant Science 141. Laboratory, Th 2-4:30. Plant Science 114. Professor DETHIER.

A study of factors influencing climate in the atmospheric layer directly adjacent to the earth's surface, and the variation of climate due to vegetation or small-scale topographic features. The emphasis is on these small-scale atmospheric conditions viewed as environment for plants, animals, and man.

212. *SPECIAL TOPICS IN METEOROLOGY*. Fall or spring term. Credit one or more hours. Prerequisite, permission of the instructor. Professor DETHIER.

Study of meteorological topics more advanced than or different from those in other courses. Subject matter depends on the background and desires of those enrolling.

PLANT BREEDING

Four-year students interested in specializing in genetics, plant breeding, or statistics may obtain suggested sequences of courses by consulting the head of the department, R. P. Murphy. Professional careers in these fields ordinarily involve advanced study. Therefore, undergraduate course work in most instances will be directed toward preparation for graduate study. Appropriate fundamental courses in biology, mathematics, chemistry, and English will make up the bulk of the curriculum. For those who plan to continue study at the graduate level, course work in foreign language is required.

GENETICS

1. *HUMAN HEREDITY AND EUGENICS*. Spring term. Credit two hours. (Students who have had course 101 are allowed one-hour credit.) Prerequisite, Zoology 104, Botany 1-2, or Biology 1-2. Lectures, W F 10. Discussion period, M 10, attendance voluntary. Warren 245. Professor SRB.

An introduction to the laws of heredity, a survey of heritable characters in man, and discussions of the relationship between heredity in man and social problems.

This course is intended primarily for students who have not previously had a college course in genetics and who wish to obtain a knowledge of principles of heredity, especially as applied to man.

101. *GENETICS*. Fall term. Credit four hours. Prerequisite, a beginning course in biological science. Courses in cytology and in taxonomic botany and zoology are found helpful. Lectures, M W F 8. Plant Science 233. Laboratory, T 8-10, or M W Th or F 2-4. Plant Science 146. Associate Professor EVERETT and assistants.

A general study of the fundamental principles of genetics in plants and animals. Discussions of simple cases of inheritance, gene action and interaction, gene linkage, and the chromosome theory of heredity, inheritance of quantitative characters, inheritance of sex, effects of inbreeding and crossing, cytoplasmic inheritance, the origin of heritable variations and their relation to evolution. Laboratory studies of hybrid material in plants and breeding experiments with *Drosophila*.

201. *BIOCHEMICAL GENETICS*. Spring term. Credit two hours. Prerequisite, course 101 and a course in organic chemistry. Lectures, M W 8. Plant Science 141. Professor SRB.

The nature and function of hereditary units studied in terms of physiology and biochemistry. Students are expected to do extensive reading in the periodical literature of genetics and to prepare a term paper.

204. *EXPERIMENTAL EVOLUTION*. Spring term. Credit two hours. Prerequisite, course 101 or the equivalent. Lectures, T Th 11. Discussion period to be arranged, attendance voluntary. Plant Science 37. Associate Professor B. WALLACE.

A study of factors which influence the genetic structure of Mendelian populations and which are involved in race formation and speciation.

PLANT BREEDING

102. *PLANT BREEDING*. Spring term. Credit three hours. (Students who have had course 101 are allowed two hours credit.) Prerequisite, Botany 1-2. Lectures, T Th 8. Plant Science 141. Laboratory, T 2-4:30. Plant Science 146. Professor MUNGER.

A study of the principles and practices used in developing, evaluating, distributing, and maintaining improved crop varieties. Approximately one-third of the course is devoted to a study of elementary genetics. Designed primarily for students who wish a general knowledge of plant breeding. Students who expect to engage professionally in plant breeding should take courses 101 and 203 instead of this course. Lectures supplemented by periods in the greenhouse and experimental fields. A one-day field trip is taken.

203. *METHODS OF PLANT BREEDING*. Fall term. Credit three hours. Prerequisite, course 101. Botany 1, and a course in at least one of the following: field crops, vegetable crops, floriculture, or pomology. Lectures, T Th 8. Plant Science 141. Laboratory, T 2-4:30. Plant Science 146. Professor MURPHY.

A course designed primarily for graduate students, but open to properly qualified seniors who expect to engage in plant breeding. A study of the principles and practices of plant breeding. Lectures, supplemented by periods in the greenhouse and experimental fields. A one-day field trip is taken.

STATISTICS AND BIOMETRY

*210. *STATISTICAL METHODS I*. Fall term. Credit one, three, or four hours. Prerequisite, graduate standing or permission of instructor. T Th S 10. Warren 345. Laboratory to be arranged. Associate Professor STEEL.

The distributions of statistics encountered in biological and other fields are considered from the point of view of elementary probability notions and by sampling from known populations. The results, with principles of experimentation, are applied to the conduct of experiments and interpretation of results. The nature and validity of experimental error are treated. Topics include point and interval estimation, tests of hypotheses, the simpler experimental designs and their analyses of variance, linear regression and correlation.

*211. *STATISTICAL METHODS II*. Spring term. Credit one, three, or four hours. Prerequisite, course 210 or the equivalent. T Th S 10. Warren 345. Laboratory to be arranged. Associate Professor STEEL.

*An additional hour per week is devoted to algebraic derivations and manipulations associated with the statistical techniques and computational procedures of the lectures and laboratory. The purpose is to give the student a better understanding of statistics and to improve his background for further work in statistics, such as course 213. This optional hour carries one hour credit and may be taken with or without the regular three hours credit.

The work of 210 is continued. Topics include factorial experiments, individual degrees of freedom, analysis of covariance, analysis of variance of two-way classifications with disproportionate numbers, multiple and curvilinear regression, curve fitting, the treatment of discrete data, some recent developments in statistics.

212. *EXPERIMENTAL METHODS*. Spring term. Credit one hour. Designed for major and minor graduate students in the Department. Prerequisite, course 211 or the equivalent. F 2-4. Plant Science 141. Associate Professor LOWE.

The use of statistical methods and experimental design in problems of plot technique and related agricultural research.

213. *DESIGN OF EXPERIMENTS I*. Fall term. Credit three hours. Prerequisite, course 211, including the one hour of algebra, or the equivalent. M W F 8. Plant Science 141. Laboratory to be arranged. Professor FEDERER.

Plot, pen and laboratory techniques, extensions and variations of the completely randomized complete block and latin square designs, the factorial experiment and confounding, lattice designs, crossover designs, augmented and other designs, covariance analyses, tests for ranked means, sample size and variance component analyses.

214. *DESIGN OF EXPERIMENTS II*. Spring term. Credit three hours. Prerequisite, course 213 or the equivalent. M W F 8. Warren 31. Discussion period to be arranged. Professor FEDERER.

A continuation of the work discussed in course 213 with a discussion from selected topics on long-term experiments, combination of results from several experiments, sequential experimentation, variance component analyses, estimation procedures, linear hypotheses, heritability studies, multivariate analyses, and related topics.

219. *SPECIAL TOPICS*. Term to be arranged. Credit three hours. Prerequisite, course 211 or the equivalent and permission of the instructor. Time and place of lectures to be announced. Professor FEDERER, Associate Professor STEEL, or Assistant Professor ROBSON.

The topics to be discussed will depend upon the needs of the students.

DEPARTMENTAL SEMINAR AND RESEARCH

150. *UNDERGRADUATE RESEARCH IN PLANT BREEDING, GENETICS, AND STATISTICS*. Fall, spring, or summer. Credit one or more hours by arrangement with instructor. Open to properly qualified seniors. Prerequisite, course 101 or 102 and permission to register. Members of the departmental staff.

222. *SEMINAR*. Fall and spring terms. Without credit. Required of graduate students taking either a major or a minor in this Department. Open to qualified seniors. F 4:30. Plant Science. Seminar Room. Members of the departmental staff.

PLANT PATHOLOGY

The department offers programs of instruction in plant pathology and in mycology. These programs are developed for students planning a career in state or federal regulatory work, in technical service, in agricultural chemical sales, as county agents, in farm advisory services, as laboratory technicians, or in other agricultural positions.

Students interested in teaching or research in plant pathology or mycology are advised to take the general biological sciences curriculum with emphasis on the plant sciences.

1. *ELEMENTARY PLANT PATHOLOGY*. Fall or spring term. Credit three hours. Prerequisite, Botany 1-2 or the equivalent. Lecture, Th 11. Plant Science 336.

Recitation, T 11. Laboratory, T W Th or F 2-4. Plant Science 341 and 343. Conferences to be arranged. Professor ———.

An introductory course dealing with the nature, cause and control of disease in plants. Representative diseases of cultivated crops are studied in the laboratory.

2. *PRINCIPLES OF PLANT DISEASE CONTROL*. Fall or spring term. Preference to undergraduate students in fall and to graduate students in spring. Credit three hours. Prerequisite, course 200 or 1, or the equivalent. Lecture, T 11. Room to be arranged. Laboratory, T Th 2-4:30. Plant Science 342. Professor L. J. TYLER and assistant.

A consideration of the principles and methods of controlling plant diseases. This includes studies on exclusion by laws, regulations, quarantine, inspection, and disinfection; eradication by pruning, seed selection, rotation, disinfection, and other means; protection by spraying, dusting, wound dressing, and the like; immunization by selection, breeding, and feeding. Number taking the course limited to twenty-four.

111. *PATHOLOGY OF SHADE TREES AND SHRUBS*. Spring term. Credit three hours. Given in alternate years. Prerequisite, course 1, 200, or permission to register. Lecture, M W 11. Plant Science 336. Laboratory, M or T 2-4:30. Professor WELCH.

For student preparing for nursery or landscape work, park superintendents, arborists, city foresters or other horticultural professions; dealing with recognition, diagnosis and treatment of diseases of woody plants.

200. *GENERAL PLANT PATHOLOGY*. Fall term. Credit four hours. For graduate students. Prerequisite, a course in introductory plant pathology and permission to register. Lecture, T 11. Plant Science 336. Laboratory, three periods weekly, two on T W Th or F 2-4 and one at the student's convenience. Plant Science 353. Professor BOOTHROYD.

This course is designed to give the entering graduate student an introduction to the basic features and techniques of the science of phytopathology and to provide an adequate foundation for successful prosecution of research in this field.

201. *ADVANCED PLANT PATHOLOGY*. Spring term. Credit four hours. Designed for students specializing in plant pathology. Prerequisite, courses 2, 200, 121, or 221, and permission to register. Lecture, T Th 9. Plant Science 336. Laboratory, T Th 10-12:30. Plant Science 353. Professors KENT, MAI, and BURKHOLDER.

A presentation and analysis of the experimental and empirical knowledge of plant diseases. The phenomena of inoculation, infection, susceptibility, and susceptible reactions are critically considered. Attention is given to the diseases caused by fungi, bacteria, and nematodes.

205. *PLANT VIROLOGY*. Fall term. Credit three hours. For graduate students with majors or minors in plant pathology. Open in special cases to other graduate students interested in virology. Prerequisite, permission to register. Lecture, T Th 10. Plant Science 336. Laboratory, M 1-3. Potato Greenhouse. Professor ROSS.

This course is designed to provide advanced graduate students with basic information on the nature and properties of plant viruses and on the diseases they cause.

206. *PLANT NEMATOLOGY*. Spring term. Credit two hours. For graduate students with majors or minors in plant pathology. Open in special cases to other students interested in nematology. Prerequisite, permission to register. Two two-hour periods per week at students' convenience. Professor MAI.

Anatomy, morphology and taxonomy of plant parasitic forms and non-parasitic soil-inhabiting forms of nematodes are studied. Plant pathogenic forms also are considered from the standpoint of host-pathogen relationships, host ranges, life cycles, and the symptoms they cause. Principles and methods of control are discussed.

121. *COMPARATIVE MORPHOLOGY OF FUNGI*. Spring term. Credit four hours. Given in alternate years. Prerequisite, Botany 1-2 or its equivalent, and permission to register. Lectures, M W 10. Plant Science 336. Laboratory, M W 2-4:30. Plant Science 326. Associate Professor KORF.

An introductory course in mycology. Emphasis is placed on morphology rather than on taxonomy.

[221. *MYCOLOGY*. Fall and spring terms. Credit five hours each term. Given in alternate years. Prerequisite, Botany 1-2 or the equivalent and permission to register. Associate Professor KORF.] Not given in 1959-1960.

A two-term course more intensive than the preceding, designed especially for students specializing in mycology or plant pathology. Emphasis is placed on morphology and taxonomy, but other aspects of mycology are embraced. Practice in identification of specimens is afforded in various groups, and field work in fall and spring is encouraged.

222. *ADVANCED MYCOLOGY*. Fall or spring term, providing laboratory space is available. Credit from three to five hours. Prerequisite, course 121 or 221, and permission to register. Weekly conferences, laboratory periods, and occasional lectures, to be arranged. Plant Science 326. Associate Professor KORF.

A special-problems course designed for students majoring or minoring in mycology or in mycological phases of plant pathology. The type of problem selected varies to suit the student's needs and inclinations. He is expected to gain an insight into research methods and the literature. The course offers an opportunity for intensive work on a restricted phase of the subject, such as physiology, morphology, or taxonomy.

244. *MYCOLOGY CONFERENCES*. Fall and spring terms. Credit one hour. Required of all majors and Ph.D. minors in mycology, but open to others by permission. Time to be arranged. Plant Science 422. Associate Professor KORF.

A weekly discussion period designed to supplement the formal mycology courses by giving additional emphasis to problems in morphology, taxonomy, nomenclature, genetics, cytology, and physiology.

[231. *HISTORY OF PLANT PATHOLOGY*. Fall and spring terms. Credit one hour. Prerequisite, course 1 and a reading knowledge of French and German.] Not given in 1958-1959.

241. *UNDERGRADUATE RESEARCH*. Fall or spring term, or both. Credit three hours or more. Registration by permission. Not less than three laboratory periods of three clock hours each week. Professors, Associate Professors, and Assistant Professors of the departmental staff.

This course is designed to afford opportunity for selected undergraduates to test their inclination and ability to do research work. The student is expected to prosecute with interest and enthusiasm, under informal direction of the professor, some problem or problems mutually agreed upon.

242. *SEMINAR*. Fall and spring terms. Required of graduate students taking work in the Department. T 4:30-6. Plant Science Seminar Room.

243. *LITERATURE REVIEW*. Fall and spring terms. Members of the staff and graduate students. Optional. Biweekly. Time to be arranged.

POMOLOGY

Students who desire to do their major work in pomology may obtain a suggested sequence of courses for the four-year period by consulting the Department.

GENERAL HORTICULTURE. (See Vegetable Crops 3.) Those who want a general course in horticulture covering flowers, fruits, and vegetables should take this course.

1. *TREE FRUITS.* Fall or spring term. Credit three hours. Should be preceded or accompanied by an elementary course in botany. Lectures, T Th 8. Warren 131. Laboratory: T or W 2-4:30; Plant Science 107. Fall term: Professor EDGERTON; spring term: Professor SMOCK.

A study of the general principles and practices of tree-fruit culture and their relation to the underlying sciences. Topics to be covered include propagation, varieties, orchard management, and growth and fruiting habits. Practical work is presented in grafting, pruning, site and soil selection, and planting.

2. *SMALL FRUITS.* Spring term. Credit three hours. Should be preceded or accompanied by an elementary course in botany. Lectures, T Th 8. Plant Science 143. Laboratory, Th 2-4:30. Plant Science 107. Professor BOYNTON.

A study of the general principles and practices in the culture of grapes, strawberries, brambles and bush fruits, and their relation to the underlying sciences. Fruiting and growth habits are covered, with practical work in pruning, planting, and propagation. One or two Saturday field trips will be taken.

111. *POST-HARVEST PHYSIOLOGY, HANDLING, AND STORAGE OF FRUITS.* Fall term. Credit three hours. Prerequisite, course 1 or 2. Lectures, T Th 8, Plant Science 143. Laboratory, Th or F 2-4:30. Plant Science 107. Professor SMOCK.

The chemistry and physiology of fruits as they affect quality and marketability are studied. Handling methods, maturity indices, and storage practices are considered. Practical work involves grading and inspection of fruits and storage of fruit in different ways. One Saturday field trip is required.

112. *ADVANCED LABORATORY COURSE.* Spring term. Credit two hours. S 8-1. Plant Science 107. Intended for students doing their major work in pomology. Professors HOFFMAN, BOYNTON, and EDGERTON.

This course is designed to give more extended practice in the various orchard operations than can be given in course 1. Special attention is given to problems of pruning, grafting, orchard-soil selection and management, pollination, and spray practice. One or two field trips extending into the afternoon are made.

121. *ECONOMIC FRUITS OF THE WORLD.* Fall term. Credit three hours. Given in alternate years. Prerequisite, course 1 or permission to register. Lectures, M W F 8. Plant Science 114. Professor BOYNTON.

A study of all species of fruit-bearing plants of economic importance, such as the date, the banana, the citrus fruits, the nut-bearing trees, and the newly introduced fruits, with special reference to their cultural requirements in the United States and its insular possessions. All fruits not considered in other courses are considered here. The course is designed to give a broad view of world pomology and its relationship with the fruit industry of New York State.

[131. *ADVANCED POMOLOGY.* Fall term. Credit three hours. Given in alternate years. Prerequisite, courses 1 and 2 and Botany 31. Professor HOFFMAN.] Not given in 1959-1960.

A comprehensive study of the source of knowledge and opinions as to practices in pomology. The results of experiences and research pertaining to pomology are discussed, with reference to their application in the solution of problems in commercial fruit growing.

[231. *SPECIAL TOPICS IN EXPERIMENTAL POMOLOGY.* Spring term. Credit three hours. Given in alternate years. Open to qualified seniors and to graduate students. Professors HOFFMAN, BOYNTON, SMOCK, and EDGERTON.] Not given in 1959-1960.

In this course the student is expected to review critically and to evaluate the more important original papers relating to various phases of pomological research. Recent experimental methods applicable to the topic are fully considered.

200. *SEMINAR*. Fall and spring terms. Without credit. Required of students taking course 201 and graduate students in pomology. T 11. Plant Science Seminar Room. Members of the departmental staff.

201. *RESEARCH*. Fall, spring, or both terms. Credit two or more hours a term. Prerequisite, course 131. Professors HEINICKE, HOFFMAN, SMOCK, BOYNTON, and EDGERTON and Associate Professor FISHER.

POULTRY HUSBANDRY

The poultry industry offers opportunities in all phases of production, distribution, technical service, research, and teaching. Individual preference and aptitudes should be considered in making a choice. Suggested sequences of courses are available to students interested in production or in a business allied to it, and to those interested in a career in research, teaching, or commercial work in such specialized biological science fields as genetics, nutrition, physiology, or food technology. Adequate high school preparation in mathematics, science, and English is very desirable, particularly for students interested in the latter fields.

1. *INTRODUCTION TO POULTRY SCIENCE*. Fall term. Credit three hours. Lectures, M W F 10. One recitation period, to be arranged. Warren 231. Associate Professor BAKER, assisted by other members of the staff.

A general course dealing with the principles of poultry production.

[50. *MARKET EGGS AND POULTRY*. Fall term. Credit two hours. Given in alternate years. Associate Professor BAKER.] Not given in 1959-1960.

A detailed study of the interior and exterior qualities of eggs, abnormalities, egg grades, and standards; practice in candling, grading, and packing. Grades and standards of market poultry; killing, dressing, and packing. General market information. Two field trips are taken.

[80. *POULTRY FARM MANAGEMENT*. Spring term. Credit three hours. Given in alternate years. Prerequisites, course 1 or its equivalent. Professor MARBLE.] Not given in 1959-1960.

Management of the hatchery, young stock and laying flock. Practical management problems of the hatcheryman and commercial poultryman will be studied.

150. *POULTRY MEAT AND EGG TECHNOLOGY*. Fall term. Credit three hours. Given in alternate years. Prerequisites Chemistry 303, or its equivalent, and Bacteriology 1. Open to graduate students, juniors and seniors. Lectures, T Th 9. Rice 101. Laboratory, M 2-4. Rice 100. Associate Professor BAKER.

This course includes a discussion and study of some of the important microbial and nonmicrobial changes in poultry meat and eggs as well as the chemical composition and preservation of these products. Development of new products is also emphasized.

170. *POULTRY HYGIENE AND DISEASE*. Fall term. Credit two hours. Prerequisite, Bacteriology 1 or 3, and Animal Physiology 10, or Human Physiology 303. Lectures and laboratory, Th 2-4:30. Veterinary College. Dr. CHALQUEST.

The course deals with the nature of the infectious and parasitic diseases of poultry and with the principles of hygiene applicable to poultry farming for the prevention and control of diseases.

190. *POULTRY PROBLEMS*. Fall or spring term. Credit, one, two, or three hours. Open to juniors or seniors. Prerequisite, written permission of staff member

concerned. Investigation of some problem in the field of poultry husbandry by the student under the direction of a member of the staff. Professor BRUCKNER.

209. *SEMINAR IN POULTRY BIOLOGY*. Fall and spring terms. For graduate students. F 4:15. Rice 201. Members of the departmental staff.

A survey of recent literature and research in poultry biology.

ANATOMY, GENETICS, AND PHYSIOLOGY

20. *POULTRY BREEDS, BREEDING, AND JUDGING*. Fall term. Credit three hours. Given in alternate years. Lectures or recitation, T Th 10. Rice 101. Laboratory, T or W 2-4. Judging Laboratory. Professor MARBLE.

Selecting and judging birds for production and breed characters; origin, history, and classification of breeds; introduction to breeding.

120. *POULTRY GENETICS*. Spring term. Credit three hours. Open to graduate students, seniors, and juniors. Given in alternate years. Prerequisite, Zoology 104. Plant Breeding 101, or their equivalents and permission of the instructor. Lectures, M W F 9. Rice 201. Professor HUTT.

A survey of inherited characters in domestic birds, cytology, linkage, inbreeding, hybrid vigor, resistance to disease, genetic principles in poultry breeding, physiology of avian reproduction, infertility, embryonic mortality, and avian endocrinology.

124. *ANIMAL GENETICS*. Spring term. Credit three hours. For veterinary students only. Lectures, T Th 9. Discussion period, W 2. Rice 300. Professor HUTT.

Principles of genetics; sex determination and sex linkage; inherited characters in domestic animals, with special reference to lethal genes and genetic resistance to disease; progeny-testing; in-breeding and cross-breeding.

[130. *PHYSIOLOGY OF AVIAN REPRODUCTION*. Fall term. Credit three hours. Given in alternate years. Prerequisites, Zoology 104 and either Zoology 476 or Animal Husbandry 127. A course in Physiology is highly desirable. Open to graduate students, juniors and seniors. Assistant Professor VAN TIENHOVEN.] Not given in 1959-1960.

Sex and its manifestations. Anatomy, embryology, and histology of the reproductive organs; endocrine manifestations with respect to reproduction; photoperiodicity, gametogenesis, fertilization, and parthenogenesis; embryonic development; sexual behavior; interaction or reproduction and nutrition.

140. *ANATOMY OF THE FOWL*. Fall term. Credit three hours. Open to juniors, seniors, and graduate students. Given in alternate years. Prerequisite, Zoology 104, and permission of the instructor. Lectures, T Th 8. Rice 101. Laboratory, F 2-4. Rice 100. Professor COLE.

The lectures, supplemented by laboratory periods for study and dissection, are designed to acquaint the student with the anatomy of the fowl.

230. *PHYSIOLOGY OF THE AVIAN EMBRYO*. Spring term. Credit two hours. For graduate students. Given in alternate years. Lecture and laboratory, M 2-4. Rice 201. Professor ROMANOFF.

A consideration of biological potentialities of the fresh egg and of fundamental principles of embryonic development, with special emphasis on various factors leading to congenital malformation and prenatal death.

NUTRITION

110. *POULTRY NUTRITION*. Spring term. Credit three hours. Prerequisite, chemistry and physiology or permission of instructor. Not open to freshmen. Lectures, M W F 8. Rice 300. Professor HILL.

The principles of poultry nutrition and their application to poultry feeding and feed manufacturing.

[210. *ADVANCED POULTRY NUTRITION*. Spring term. Credit two hours. For graduate students. Not given every year and not unless ten or more students apply for the course. Registration by appointment. Professor SCOTT.] Not given in 1959-1960.

A study of one or more important fields of research in poultry nutrition, a critical consideration of the experimental methods used in conducting the investigations, and discussion of further studies needed, including the planning of the experiments.

219. *SEMINAR IN ANIMAL NUTRITION*. Fall term. Credit one hour. Open to graduate students with major field of study in animal nutrition. Prerequisite, Animal Husbandry 110 or the equivalent. Registration by permission. M 4:30. Wing E. Animal Nutrition staff.

A critical review of the literature and other topics of special interest to graduate students in animal nutrition.

RURAL EDUCATION

PROGRAM FOR THE PREPARATION OF SECONDARY-SCHOOL TEACHERS*

With careful planning, it is possible to meet the requirements for a Bachelor of Science degree in Agriculture and, at the same time, the certification requirements for teaching. Therefore, students who desire to prepare for teaching science or vocational agriculture should plan their programs with the appropriate adviser in nature study and science teaching, or in agricultural education.

Those planning to teach science in secondary schools should take Psychology (Rural Education 10 or Psychology 101) during their freshman or sophomore years. In the junior year they should take Educational Psychology (Rural Education 111) and Methods of Teaching Science in Secondary Schools (Rural Education 128). They complete the required courses in the senior year by registering for Practice in Teaching Science in Secondary Schools (Rural Education 129). Electives are chosen to complete the 18 hours of professional credit required for a Provisional Certificate. A permanent certificate requires an additional year.

Students planning to teach vocational agriculture should have a conference with a member of the staff in Agricultural Education to ascertain the requirements in agriculture, science, and education. This should be done immediately after deciding to teach so as to avoid conflicts and delay in completing all of the requirements. The professional courses required are: Rural Education 131 in the junior year, Rural Education 111, 132, and 134 in the fall term of the senior year, and Rural Education 190 or 194 in the spring term of the senior year. A major portion of the work in the fall term of the senior year is apprentice teaching in one of the rural high schools. Students enrolling in Rural Education 132 and 134 are required to report for course work and apprentice teaching September 8, 1959.

NATURE STUDY, SCIENCE AND CONSERVATION EDUCATION

[106. *OUTDOOR LIVING AND CAMP ADMINISTRATION*. Fall term. Credit three hours. Registration by permission of instructor only. Associate Professor ROCKCASTLE.] Not given in 1959-1960.

*For other courses in education, consult the Announcement of the Schools of Education and of Industrial and Labor Relations and of the Colleges of Home Economics and Arts and Sciences.

107. *TEACHING OF ELEMENTARY SCHOOL SCIENCE*. Fall or spring term. Credit two hours. Registration by permission. Fall term: S 9-12. Spring term: W 2-5. Stone 7. Associate Professor ROCKCASTLE.

The content and methods of elementary-school science and nature study, with field work and laboratory experience useful in classroom and camp. Designed particularly for those who are preparing to teach or supervise elementary science or nature study.

108. *FIELD NATURAL HISTORY*. Fall or spring term. A full year course; may be taken either term or both terms. Credit two hours. Open to juniors, seniors, and graduate students, and to sophomores with instructor's permission. Limited to twenty students per section. Fall term: lecture, T 4:30. Stone 7. Field trip, T 2-4:30. Associate Professor ROCKCASTLE. Spring term: lecture, T or F 4:30. Stone 7. Weekly field trips, T or F 2-4:30, begin with the first meeting. Friday section primarily for those experienced in field biology. Associate Professor FISCHER.

The course is devoted to studies of local plants and animals, their ecology and their relations to humans. Applications to teaching science and conservation are emphasized.

[109. *OUR PHYSICAL ENVIRONMENT*. Fall term. Credit two hours. Open to juniors, seniors, and graduate students primarily interested in public school teaching. Associate Professor ROCKCASTLE.] Not given in 1959-1960.

A study of the commonplace machines and materials in our physical environment, and their effectiveness in demonstrating basic scientific principles. Frequent field trips and first-hand examination will be used in studying air, water, soil, light and sound, as well as some elementary mechanical and electrical devices. Emphasis will be placed on the physical environment as an aid to teaching the physical sciences in the public schools.

128. *METHODS OF TEACHING SCIENCE IN SECONDARY SCHOOLS*. Spring term. Credit three hours. Prerequisite, Educational Psychology 111 or the equivalent. For juniors and seniors. Th 2-5:30 and hours for observation to be arranged. Stone 7. Professor P. G. JOHNSON and assistant.

A consideration of methods and materials useful in teaching science in secondary schools. Observation of the work of experienced teachers constitutes an important part of the course.

129. *PRACTICE IN TEACHING SCIENCE IN SECONDARY SCHOOLS*. Fall or spring term. Credit six or twelve hours. Prerequisite, course 128 or 207 and permission of the instructor. For seniors and graduate students. Hours to be arranged. Professor P. G. JOHNSON and assistants.

Supervised practice in teaching science in secondary schools, with frequent conferences on teaching plans and problems.

202. *NATURAL HISTORY LITERATURE*. Fall term. Credit two hours. Open to seniors and graduate students interested in nature, science, and conservation education. T Th 10. Stone 7. Associate Professor FISCHER.

A survey of nature and science prose and poetry, with attention to their significance at elementary and secondary school levels, and for leisure reading.

203. *NATURAL HISTORY WRITING*. Spring term. Credit two hours. Open to seniors and graduate students interested in nature, science, and conservation education. T Th 10. Stone 7. Associate Professor FISCHER.

A course designed to improve natural history, science, and conservation writings. Subject matter, sources of information, types of articles, use of illustrations, and outlets for students' articles are covered.

205. *TEACHING OF CONSERVATION*. Spring term. Credit two hours. T Th 11. Stone 7. Associate Professor FISCHER.

Consideration of the principles, materials, and methods of conservation education useful to teachers and others engaged in teaching wise use of the resources of the nation.

207. *TEACHING OF SCIENCE IN SECONDARY SCHOOLS*. Fall term. Credit three hours. Registration by permission only. For graduates, Th 2-5:30. Stone 7. Professor P. G. JOHNSON and assistant.

A consideration of problems of selection and organization of subject matter, of choice and use of materials, and of methods of teaching science at the secondary-school level.

[209. *DEVELOPMENT OF NATURE AND SCIENCE EDUCATION IN THE UNITED STATES*. Fall term. Credit two hours.] Not given in 1959-1960.

226. *RESEARCH IN NATURE STUDY, SCIENCE, AND CONSERVATION EDUCATION*. Fall or spring term. Credit one hour. M 5-6. Stone 7. Professor P. G. JOHNSON, Associate Professors ROCKCASTLE and FISCHER.

A seminar dealing with special problems.

EDUCATIONAL PSYCHOLOGY

10. *PSYCHOLOGY*. Fall or spring term. Credit three hours. Recommended for freshmen and sophomores only. May not be taken for credit by students who have had Psychology 101 or equivalent. Two lectures plus one discussion section each week. Lectures, M W 10. Plant Science 233. Discussion sections, Th 8, 9, 10 or 11 or F 8, 9, 10, 11 or 12. Professor AHMANN.

A study of topics in psychology such as learning, perception, motivation, emotion, individual differences, and personal-social relationships.

111. *EDUCATIONAL PSYCHOLOGY*. Fall or spring term. Credit three hours. Prerequisites, Course 10 or Psychology 101. Not open to freshmen or students who have taken Child Development and Family Relations 315. Lectures, M W F 9. Warren 145. Professor GLOCK.

Consideration of the outstanding facts and principles of psychology bearing upon the problems of education.

117. *PSYCHOLOGY OF ADOLESCENCE*. Spring term. Credit two hours. Designed especially for teachers and prospective teachers; others admitted only by permission of instructor. Not open to freshmen or sophomores. Prerequisite, a course in general psychology. T 4-6. Warren 31. Associate Professor ANDRUS.

A survey of the nature of adolescent growth and development, with emphasis on the consideration of some of the causal factors pertaining to adolescent behavior.

211. *EDUCATIONAL PSYCHOLOGY*. Fall term. Credit three hours. Permission of instructor required. For mature students with teaching experience. M W F 11-12:30. Stone 201. Professor GLOCK.

Special emphasis is given to the topics of learning, adjustment, and evaluation, and their relationship to the problems of the elementary and secondary school teacher.

[251. *EDUCATIONAL MEASUREMENT*. Spring term. Credit three hours. Candidates for a principal's certificate may register for two hours. Professor AHMANN.] Not given in 1959-1960.

A study of the construction of achievement tests and the use of aptitude tests, achievement tests, and other measuring instruments in the classification and guidance of pupils and improvement of instruction.

253. *INTRODUCTION TO EDUCATIONAL STATISTICS*. Fall term. Credit three hours. T Th 8:30-10. Warren 345. Professor AHMANN.

A study of common statistical procedures encountered in educational literature and research. The course includes the computation and interpretation of descriptive measures and tests of significance.

[254. *STATISTICAL INSTRUMENTS IN EDUCATION*. Spring term. Credit three hours. Prerequisite, course 253 or permission of the instructor. Professor AHMANN.] Not given in 1959-1960.

A study of the analysis of variance, the analysis of covariance, the discriminant function, test item analysis, and supporting topics.

255. *USE AND INTERPRETATION OF TESTS IN GUIDANCE AND PERSONNEL ADMINISTRATION*. Fall term. Credit two hours. Open to students in guidance or personnel administration and to classroom teachers who expect to work with standardized objective tests. Th 4-6. Stone 201. Associate Professor ANDRUS.

This course deals with the historical development, use, and interpretation of aptitude tests as a basis for guidance and selection.

EXTENSION, ADULT, AND HIGHER EDUCATION

214. *COLLEGE TEACHING*. Fall term. Without credit. M 7-9 p.m. Warren 145. Professor ———.

Designed for those who plan to teach in higher institutions. Methods of teaching, organization of subject matter, motivation, learning, testing, grading, and similar problems are treated.

212. *EDUCATIONAL PSYCHOLOGY FOR EXTENSION WORKERS*. Fall term. Credit two hours. M 2-4. Warren 31. Professor WINSOR.

This course is designed for advanced students in extension education and administration.

223. *SEMINAR: THE COOPERATIVE EXTENSION SERVICE AS AN EDUCATIONAL INSTITUTION*. Fall term. Credit two hours. For graduate students majoring or minoring in Extension Education and others interested in broadening their knowledge of the Extension Service. W 2-3:30. Warren 31. Professor LEAGANS.

Major topics around which study and discussion will center include: factors associated with the creation of the Extension Service, its development, present scope, objectives, philosophy, administrative organization, and role as a public educational agency.

224. *PROGRAM BUILDING IN EXTENSION EDUCATION*. Fall term. Credit two hours. For graduate students in Extension Education and others interested in adult education. T 2-3:30. Warren 31. Professor LEAGANS.

A study of the basic problems, principles, and procedures in the process of extension program building in both agriculture and homemaking.

225. *TEACHING IN EXTENSION EDUCATION*. Spring term. Credit two hours. For graduate students in Extension Education and others concerned with teaching adults. T 2-3:30. Warren 201. Professor LEAGANS.

The course deals with the principles of teaching and learning and their application in extension teaching. Major problems, including the formulation of learning situations, selection, and organization of learning experiences, selection and use of extension methods and evaluation of teaching, are considered.

227. *SEMINAR: COMPARATIVE EXTENSION EDUCATION*. Fall and spring terms. Credit two hours each term. F 2-4. Warren 132. Limited to Ford Foundation Fellows in Extension Education except by invitation. Professors WINSOR and FENLEY.

This seminar deals with the development of Extension Education in different cultures, in different circumstances of economic, political, and social development, and in different agricultural resource environments. Its central objective is to help students develop a philosophy, a background of knowledge, and professional skill that will enable them to initiate, organize, and administer training programs for extension workers in other countries.

228. *ADVANCED SEMINAR IN EXTENSION EDUCATION*. Spring term. Credit two hours. Open only to graduate students with experience in Extension Education. W 2-3:30. Warren 232. Professor LEAGANS.

The seminar will select for close study professional problems that are currently of major concern in the Extension Service. Problems may be drawn from such fields as administration, supervision, personnel recruitment and training, scope of programs, integration, the unit approach, and the like. Selections will be made in the light of special interest of the seminar members.

[291. *SEMINAR IN THE DEVELOPMENT AND EXECUTION OF EDUCATIONAL PROGRAMS IN UNDERDEVELOPED AREAS OR COMMUNITIES*. Fall term. Credit two hours. Professor ———.] Not given in 1959-1960.

Designed for teachers, extension workers, missionaries, government workers, and others who expect to do educational work in underdeveloped areas of the free world. Analysis is made of the cultural, social, educational, and economic factors in selected areas as background for program development and teaching procedures.

Divisions that offer additional basic work in the field of Extension Education are:

- Rural Education
- Home Economics
- Rural Sociology
- Sociology and Anthropology
- Agricultural Economics

Extensive flexibility is permitted students in the selection of a course program to meet his special interests and professional needs.

AGRICULTURAL EDUCATION

131. *INTRODUCTION TO TEACHING VOCATIONAL AGRICULTURE*. Spring term. Credit one hour. Required of juniors and others entering the directed teaching program in the senior or following year. M 2-4:30. Warren 201. Assistant Professor TOM and staff in Agricultural Education.

The course gives an introduction to the origin, development, objectives, course of study, individual farming programs and method of teaching vocational agriculture in central schools.

132. *METHODS, MATERIALS, AND DIRECTED PRACTICE IN TEACHING VOCATIONAL AGRICULTURE IN THE SECONDARY SCHOOL*. Fall term. Credit nine hours. Professor HILL and staff in Agricultural Education.

Directed participation in off-campus centers in the specific and related problems of teaching prevocational and vocational agriculture on the junior and senior high school levels, to include adjustment in the school and community; evaluation of area resources, materials of instruction and school facilities; organization and development of local courses of study; launching and directing supervised farming programs; planning for and teaching all-day classes; advising Future Farmer chapters; and other problems relating to development of a balanced program for Vocational Education in Agriculture in a local area.

133. *SPECIAL PROBLEMS IN VOCATIONAL AGRICULTURE*. Graduate and

undergraduate. Fall or spring term. Credit one or two hours. W 1-2. Stone 201. Assistant Professor TOM and staff in Agricultural Education.

The purpose is to provide students an opportunity to study individually, or as a group, selected problems in vocational agriculture to meet the particular needs of the students.

134. *ORGANIZATION AND DIRECTION OF YOUNG FARMER PROGRAMS*. Graduate and undergraduate. Fall term. Credit two or three hours. F 3:45-5:45. Warren 31. Associate Professor CUSHMAN.

Emphasis will be placed on solving the problems encountered by teachers of agriculture in such phases of the young farmer program as: Making arrangements to have a program, determining instructional needs and planning programs of instruction, teaching young farmers in groups, giving individual on-farm instruction, organizing and advising the local young farmer association, and evaluating the young farmer program.

230. *SEMINAR IN AGRICULTURAL EDUCATION*. Spring term. Credit one hour. W 4:15-6. Stone 201. Staff in Agricultural Education.

Recommended for Master's candidates who have had teaching experience and doctoral candidates with majors and minors in agricultural education. The seminar will be primarily centered around current problems and research in the field.

[231. *SUPERVISING STATE PROGRAMS OF VOCATIONAL AGRICULTURE*. Fall term. Credit two hours. Offered in alternate years. Open to students with experience in teaching vocational agriculture, or by permission. Professor ———.] Not given in 1959-1960.

232. *ADVANCED METHODS AND MATERIALS OF TEACHING VOCATIONAL AGRICULTURE*. Fall term. Credit two or three hours. M F 2-3:30. Stone 201. Assistant Professor TOM.

Consideration is given to an analysis of selected teaching techniques and to the selection, preparation, and use of instructional materials in vocational agriculture.

233. *PLANNING COURSES OF STUDY AND FARMING PROGRAMS IN VOCATIONAL AGRICULTURE*. Spring term. Credit two or three hours. M F 2-3:30. Stone 201. Professor HILL.

Guiding principles, objectives, and sources of information will be developed for planning the courses of study and teaching calendar. Consideration will be given to principles, meaning, and function of farming programs, and how they are planned and used as a means of instruction.

235. *PLANNING AND CONDUCTING PROGRAMS OF TEACHER PREPARATION IN AGRICULTURE*. Fall term. Credit two hours. Given in alternate years. M 3:45-5:45. Warren 232. Professor HILL.

Open to persons with teaching experience in vocational agriculture who are preparing for or are engaged in the preparation of teachers or in related educational service.

236. *ORGANIZATION AND ADMINISTRATION OF VOCATIONAL AGRICULTURE*. Spring term. Credit two hours. W 2-4. Stone 201. Associate Professor CUSHMAN.

This course is designed for teachers, high school principals, teacher trainers, supervisors, and others who are responsible for the administration of vocational agriculture programs or who wish to qualify for this responsibility. Emphasis will be placed on interpreting the vocational acts and on problems of administration at the local and state level.

[239. *TEACHING GENERAL AGRICULTURE IN THE SECONDARY SCHOOL*. Spring term. Credit two hours. Assistant Professor TOM.] Not given in 1959-1960.

The organization, purpose and content of courses in agriculture in junior and senior high schools to serve those who elect to study agriculture for its general educational values in preparation for rural living.

339. *EVALUATING PROGRAMS OF VOCATIONAL AGRICULTURE*. Spring term. Credit two hours. Given in alternate years. Open to students with experience in teaching vocational agriculture, or by permission. T 2-4. Stone 201. Associate Professor CUSHMAN.

Students will study objectives and evaluative criteria and develop criteria and procedures for evaluation of programs of agricultural education in the secondary schools.

ADMINISTRATION AND SUPERVISION

219. *PERSONNEL ADMINISTRATION IN EDUCATIONAL INSTITUTIONS*. Spring term. Credit two hours. Open to graduate students in education. Th 4-6. Warren 31. Associate Professor ANDRUS.

A study of the problems of human relations in educational institutions. The methods and principles of recruitment, selection, placement, maintenance, organization, and government of staff and employees are analyzed.

243. *PRINCIPLES AND PROCEDURES IN SUPERVISION*. Fall term. Credit three hours. M W F 10. Stone 201. Associate Professor WARDEBERG.

Nature and scope of supervision, fundamental principles, and basic procedures are considered.

261. *THEORY AND PRACTICE OF ADMINISTRATION*. Fall term. Credit two or four hours. S 9-10:30, 11-12:30. Warren 260. Professor ———.

An introduction to the study of administration. Both the science and the art are examined. Those preparing for the position of supervisor, principal, or superintendent should enroll for four credits. Others may take the first session for two credits.

262. *SECONDARY SCHOOL PRINCIPALSHIP*. Spring term. Credit three hours. S 9-12. Stone 201. Professor ———.

The responsibilities of the secondary school principal within the school building. Special attention will be given to the problems of the six-year high school.

264. *SCHOOL FINANCE AND FACILITIES*. Spring term. Credit three hours. Prerequisite, course 261 or equivalent. T 4:15-5:45 and one hour to be arranged. Warren 201. Professor ———.

Typical problems: How local school funds are levied, collected, and disbursed; budget making; bonding; state funds and their distribution; planning, utilization, and upkeep of school facilities.

[267. *LEGAL PROBLEMS OF THE SCHOOL ADMINISTRATOR*. Credit two hours.] Not given in 1959-1960.

CURRICULUM, ELEMENTARY AND SECONDARY EDUCATION

240. *THE ART OF TEACHING*. Spring term. Credit twelve hours. M F 8-4 and other hours to be arranged. Students may register only with the consent of the instructor. Conference Room, Stone. Associate Professor WARDEBERG.

For those enrolled in the fifth year program in elementary education. Students will be placed in elementary classrooms in Ithaca and surrounding communities for directed student teaching.

247. *SEMINAR IN ELEMENTARY EDUCATION*. Fall term. Credit four hours. T Th 10:30-12:00. Stone 201. Spring term. Credit three hours. Hours to be arranged. Associate Professor WARDEBERG.

Fall term includes September experience; materials and methods in mathematics, social studies and special curricular areas; organization of the elementary school for effective learning. Spring term will be a problems seminar based on the student teaching experience.

270. *SEMINAR IN EDUCATION*. Spring term. Credit one hour. Th 4-6. Conference room, Stone. Professor STUTZ, Associate Professor WARDEBERG, Assistant Professor ENNIS and ———.

Open to advanced graduate students only. Problems related to elementary and secondary education, curriculum, administrative procedures, and research will be discussed.

276. *CURRICULUM OF AMERICAN SCHOOLS*. Fall term. Credit two or three hours. Enrollment limited to graduate students, teachers, and other school specialists. M 4-6. Stone 201. Professor STUTZ.

A consideration of major problems, principles, and techniques in determining the school curriculum. Relation of curriculum principles and trends to specific curriculum problems of concern to members of the class. Persons taking the course for three hours of credit are required to assume extra responsibilities.

290. *PRINCIPLES OF SECONDARY EDUCATION*. Fall term. Credit three hours. Open to graduates and advanced undergraduates. Consent of instructor required. T Th 9-10:30. Warren 31. Assistant Professor ENNIS.

A consideration of certain logical principles of teaching in the junior and senior high schools.

313. *TEACHING READING AND THE LANGUAGE SKILLS*. Fall term. Credit three hours. M F 2:30-4. Warren 232. Associate Professor WARDEBERG.

Materials and techniques in effective teaching of the language arts in the elementary school; special emphasis on the teaching of reading. Open only to graduate level students.

GUIDANCE AND PERSONNEL

282. *EDUCATIONAL AND VOCATIONAL GUIDANCE*. Fall term. Credit two hours. For graduate students only. T 4:15. Stone 201. Professor A. G. NELSON.

Principles and practices of educational and vocational guidance. Historical and theoretical background of the guidance movement; educational, vocational, and community information needed; the study of the individual group; group methods; counseling; placement and follow-up; the organization, administration, and appraisal of guidance programs.

283. *COUNSELING*. Spring term. Credit two hours. For graduate students only. Prerequisite courses 255 and 282 or their equivalents. M 4:15-6. Warren 201. Professor A. G. NELSON.

Techniques for counseling with individuals concerning various types of educational, social, and vocational adjustment problems. Case studies.

284. *GROUP TECHNIQUES IN GUIDANCE*. Spring term. Credit two hours. M 9. Stone 201. Professor A. G. NELSON.

Methods and materials for presenting occupational and orientation information to students. Deals with classes in occupations, orientation groups, field trips, clubs, work-experience programs, and other group methods.

285. *OCCUPATIONAL AND EDUCATIONAL INFORMATION*. Fall term. Credit four hours. Permission of the instructor required. T Th 1. Field trips and laboratory, M afternoon. Stone 201. Professor A. G. NELSON.

Survey and appraisal of occupations and training opportunities; study of sources of educational and vocational information; job analysis; vocational trends. Field trips to places of employment.

289. *SUPERVISED PRACTICE IN TESTING AND COUNSELING*. Spring term. Credit three hours. For advanced graduate students only. Prerequisites, courses 255, 283, and 285, or their equivalents, and permission of the instructor. Hours for observation and practice to be arranged. Professor A. G. NELSON.

Practice in the administration, scoring, and interpretation of psychological tests. Observation and supervised experience in counseling at the Cornell Guidance Center. Case conferences and assigned readings.

GENERAL EDUCATION

190. *SOCIAL FOUNDATIONS OF EDUCATION*. Fall or spring term. Credit three hours. Not open to freshmen and sophomores. Consent of instructor required. Lecture, M W 10. Discussion sections, F 9, 10, 11. Warren 145. Assistant Professor ENNIS.

Evaluation of the school as a social institution with emphasis on the role of the school in a democratic society and the structure and function of American schools.

194. *PRINCIPLES OF VOCATIONAL EDUCATION*. Spring term. Credit two hours. Th 4:15. Stone 201. Professor W. A. SMITH.

The meaning, purpose, and methodology of vocational education and its place in the total school program. Applicable for administrators, supervisors, teacher trainers and teachers.

199. *INFORMAL STUDY IN EDUCATION*. Maximum credit, three hours each term. Members of the staff.

This privilege is granted to a qualified student of junior rank or above, when approved by his adviser from the Education staff who is personally responsible for the study.

297. *HISTORY OF EDUCATION IN THE MODERN PERIOD*. Spring term. Credit three hours. For graduate students only. M 4-6 and one hour to be arranged. Warren 31. Professor STUTZ.

A survey of education from the beginning of the seventeenth century to the present, with emphasis on public education and on policies and problems.

299. *EDUCATIONAL RESEARCH METHODS*. Fall term. Credit two hours. Recommended for master's degree candidates. T Th 8. Stone 201. Professor W. A. SMITH.

The meaning of research applied to problem selection, the research plan, selection of techniques and procedures, and preparing the research report.

300. *SPECIAL STUDIES*. Credit as arranged. Members of the staff.

Students working on thesis or other research projects may register for this course. The staff members concerned must be consulted before registration.

400. *INTERNSHIP IN EDUCATION*. Fall and spring terms. Credit from two to six hours, as arranged. Members of the staff.

Opportunity for apprentice or similar practical experience on the graduate level in administration, agricultural education, guidance, personnel administration, supervision, and other types of professional service in education.

RURAL SOCIOLOGY

Students who specialize in rural sociology may choose a sequence of courses designed (1) to provide a broad general training for work with farm and community organizations and in the social services, (2) to provide the foundation for later professional training in the field of social service, or (3) to prepare for a career in research, teaching and extension in rural sociology. In general, graduate study is required for those wishing to become professional sociologists.

1. *GENERAL SOCIOLOGY FOR STUDENTS OF RURAL LIFE*. Fall or spring term. Credit three hours. May not be taken by those who have credit for Sociology and Anthropology 101. Not open to freshmen except in second term upon approval of the instructor. Lectures and discussions, M W F 8. Warren 45. Professor ANDERSON.

This is a general introductory sociology course designed especially for students in agriculture and home economics. Its object is to create an understanding of the group, the ecological, and the institutional organization of society and how they function. Illustrations are chiefly from rural society. The general social organization is described to show the interrelatedness of society.

12. *EFFECTIVE COMMUNITY LIVING*. Fall or spring term. Credit three hours. Open to sophomores, juniors, and seniors. M W F 11-12:20. Warren 31. Fall term: Associate Professor REEDER; spring term: Professor THOMAS.

This course is primarily concerned with helping students to acquire the kinds of understanding, skills, and attitudes that are essential in functioning effectively as members of a rural community. Students practice organization skills in the solution of laboratory problems. Principles are emphasized in relation to their application.

105. *ORGANIZATION METHODS*. Spring term. Credit three hours. Prerequisite, course 1 or 12 or permission of the instructor. T Th 11-12:50. Warren 31. Associate Professor REEDER.

A study of the methods and techniques by which officers, group members, and administrators may increase the effectiveness of organizations. Primary emphasis is given to organizations and service agencies which are found in rural society, such as farm bureau, home bureau, Grange, 4-H, churches, schools, fraternal organizations, and civic clubs. The course is designed to give students experience in using some of the basic organization methods.

111. *RURAL COMMUNITY ORGANIZATION*. Fall term. Credit three hours. Prerequisite, course 1 or 12 or permission of the instructor. T Th 11-12:30. Warren 31. Associate Professor REEDER.

A consideration of the problems involved in helping people and organizations in a community work together to meet their common needs.

Problems which arise in helping schools, churches, farm organizations, and civic groups in integrating themselves into the life of the community is one part of this consideration. Students are given the opportunity to practice some organization techniques which have been found successful in community organization work.

[123. *PARTICIPATION IN SOCIAL AGENCIES*. Fall or spring term. Hours and credit to be arranged. Prerequisite, permission of the instructor. Preference in admission to this course will be given to students with experience in leisure-time agency programs (community centers, girl scouts, and the like.) Associate Professor TAIETZ.] Not given in 1959-1960.

This course is open to a limited number of mature students in the pre-professional social-work curriculum who are planning to take a beginning job in social work after graduation. A small number of opportunities are available for observation and limited participation in the practice of social casework in the following settings: medical, school, mental hygiene clinic, and the public welfare agency.

124. *THE SOCIOLOGY OF SOCIAL WORK*. Fall term. Credit three hours. Not open to freshmen or sophomores. Prerequisite, one course in sociology and one course in psychology. Lectures and discussions, M W F 9. Warren 260. Associate Professor TAIETZ.

A study of the structure and function of social work in the context of the dominant values in American society. The characteristics of the clientele, personnel, goals and problem-solving methods of social work are analyzed by means of pertinent sociological concepts and research.

132. *LEADERSHIP*. Spring term. Credit two hours. Prerequisite, permission of the instructor. Th 2-4. Warren 31. Professor POLSON.

A study of the theories of leadership, a review of the significant research in the area of leadership, the role of the professional leader, and a description and analysis of representative methods of recruiting and training lay leaders. Emphasis is on leadership in rural situations.

[134. *RURAL SOCIAL PROBLEMS AND PUBLIC POLICY*. Spring term. Credit two hours. Given in alternate years. Open to juniors and seniors by permission and to graduate students.] Not given in 1959-1960.

This course relates the problem concept to a theoretical frame of reference, traces the development of social problems in American rural life, analyzes the policy-making process, and treats the sociological aspects of such current public problems in the United States as low-income and under-employed farmers, migratory agricultural labor, and institutionalized social services. Each problem selected will be analyzed in terms of historical background, public policy, national programs and the consequences of the policy and program. Comparisons will be made with other countries.

[135. *FARMERS' ORGANIZATIONS*. Fall term. Credit three hours. Open to juniors, seniors, and graduate students. Professor ANDERSON.] Not given in 1959-1960.

A study of the important farmers' movements in the United States. The organization, programs, and policies of present state and national farmers' organizations, and their relations to national agricultural policies and to extension programs.

[137. *ADJUSTMENT IN THE MIDDLE AND LATER YEARS*. Spring term. Credit three hours. Associate Professor TAIETZ.] Not given in 1959-1960.

This course considers the adjustment in the middle and later years of life as a process of biological, psychological, and social change. Emphasis is placed upon changes in role and status, marital and family relationships, living arrangements, and employment. The provisions, public and private, that have been developed to meet the aged person's economic, social, psychological, medical, recreational, educational, and housing needs are described and evaluated.

207. *SOCIOLOGICAL THEORY*. Fall term. Credit three hours. Open to juniors, seniors, and graduate students. Prerequisite, permission of the instructor. M W F 11. Warren 232. Professor ANDERSON.

A critical analysis of sociological theories from the time of Auguste Comte to contemporary sociologists.

208. *SYSTEMATIC SOCIOLOGY*. Spring term. Credit three hours. Open to juniors, seniors and graduate students. Prerequisite, permission of instructor. M W F 11. Warren 232. Professor ANDERSON.

This course presents a frame of reference for sociological thinking, with special emphasis on the interrelationships of the concepts in a system of sociology.

211. *SEMINAR: THE COMMUNITY*. Spring term. Credit two hours. Open to seniors and graduate students. M 2-4. Warren 232. Associate Professor TAIETZ and Assistant Professor ELLENBOGEN.

An examination of contemporary theories and research on the small community and a formulation of needed research.

212. *RURAL SOCIOLOGY*. Fall term. Credit three hours. M W F 9. Warren 31. Open to seniors by permission and to graduate students. Professor LARSON.

Intended as a basic course in the sociology of rural life. Emphasis is on analysis of the structure and function of rural society in the United States and of the major component social systems. Comparisons are made with other rural societies. Some consideration is given to the implications of social structure and function for action programs.

213. *SEMINAR: RURAL SOCIOLOGY*. Spring term in alternate years. Credit two hours. Prerequisite, course 212. T 2-4. Warren 31. Professor LARSON.

A review of the development of rural sociology and of the theoretical points of view represented in systematic works. Emphasis is on sociological generalizations and on the integration of theory and research.

215. *RESEARCH DESIGN*. Fall term. Credit three hours. Open to graduate students. Th 1:30-4. Warren 31. Associate Professor RAMSEY.

Discussion of the relation of research design to theory and practice. Members of seminar will design research on problems of their own choosing.

216. *RESEARCH METHODOLOGY*. Fall term. Credit three hours. Prerequisite, course 215, one course in statistics and knowledge of the theory of the student's major field. Time to be arranged. Associate Professor RAMSEY.

Problems in the philosophy of science, in the testing of theory, and in applied research will be taken up from the point of view of the difference they make in the research process. Students will design research consistent with the position they take with respect to the problems in theory and application.

[217. *SEMINAR: THE DEVELOPMENT OF RESEARCH IN RURAL SOCIOLOGY*. Spring term. Credit three hours. Prerequisite, permission of the instructor. Professor ANDERSON.] Not given in 1959-1960.

A study of the development of research in rural sociology. Analysis of methods, objectives, and results in rural sociological research.

218. *SEMINAR: APPLICATIONS OF SOCIOLOGY TO PROBLEMS OF RURAL SOCIETY*. Throughout the year. Credit three hours. Open to graduate students. Fall term: T Th 11-12:30. Spring term: M W 11-12:30. Warren 201. Professor POLSON and members of the staff.

Application of sociological information, theory, and methods to the programs of institutions and agencies concerned with rural life. Special emphasis is placed on the problems of community development in countries other than the U. S. and Canada.

[220. *SEMINAR: COMPARATIVE RURAL SOCIAL LIFE*. Fall term. Credit two hours. Open to seniors, special students, and graduate students. Professor ANDERSON.] Not given in 1959-1960.

A comparison of the ecological, economic, and social organization of rural life in foreign lands, including European, South American, Middle East, and Oriental countries, with consideration of major social problems. The specific countries to be studied are determined by student interest.

250. *INFORMAL STUDY IN RURAL SOCIOLOGY*. Throughout the year. Credit to be arranged. Prerequisite, permission of the department staff member concerned. Members of the staff.

251. *RESEARCH IN RURAL SOCIOLOGY*. Throughout the year. Credit to be arranged. Prerequisite, permission of the staff member concerned. Members of the staff.

VEGETABLE CROPS

Students planning to specialize to a greater or less extent in vegetable crops should consult the department regarding choice and sequence of courses. An outline of suggestions is available.

3. *GENERAL HORTICULTURE*. Spring term. Credit four hours. Lectures, M W F 8. Plant Science 233. Laboratory, M T W Th or F 2-4:30. East Roberts 301. Professor PRATT.

An introductory course in general horticulture, including flower, fruit, and vegetable growing. Intended primarily for students who want a general knowledge but do not plan to specialize in any one of these fields.

10. *VEGETABLE JUDGING, GRADING, AND IDENTIFICATION*. Fall term. Credit one hour. M 4:30-6 or other time to be arranged if more suitable to group. East Roberts 223. Associate Professor SHELDRAKE.

Intended to prepare students for participation in vegetable-judging contests, to help them become more competent vegetable judges at local and county fairs, and to enable them to teach this subject better when they are serving as teachers of vocational agriculture, local 4-H club leaders, or as county 4-H club agents. The best students in the class are selected as the *Cornell Vegetable Judging Team* to compete in the national intercollegiate vegetable judging, grading, and identification contest in December.

The course includes potato grading, identifying potato grade defects, and identifying vegetable varieties, weeds, insects, and diseases, as well as judging vegetables.

11. *COMMERCIAL VEGETABLE PRODUCTION*. Spring term. Credit four hours. Lectures, M W F 11. East Roberts 222. Laboratory, W or F 2-4:30. East Roberts 301. Professor SWEET.

Intended for the students who wish to specialize in commercial vegetable growing, whether the vegetables are for the fresh market or for processing. A study of the general principles of vegetable growing. Consideration is also given to the economic importance, cultural requirements, marketing, and storage of important vegetables. Field trips are required.

12. *HANDLING AND MARKETING VEGETABLE CROPS*. Fall term. Credit three hours. Lectures, T Th 11. East Roberts 222. Laboratory, T or W 2-4:30. East Roberts 223. Professor HARTMAN.

Students registered for the Tuesday laboratory are scheduled to go on a field trip at 9:30 a.m., Wednesday, September 23.

The handling of vegetables at or after harvest, whether for fresh market or for processing: personnel, facilities, machinery and organization of the industry; quality maintenance, quality measurement and grade standards: Federal, state and other regulations; principles and practices in precooling, storage, packaging, prepackaging, transportation, and display.

22. *POTATO PRODUCTION AND PROCESSING*. Spring term. Credit three hours. Lectures, T Th 10. East Roberts 222. Laboratory, T or W 2-4:30. East Roberts 223. Professor ORA SMITH.

General principles and practical phases of potato production, storage, and processing are discussed. Growth processes and soil and environmental factors are emphasized as influencing production. Topics such as storage methods, grading, packaging, cooking quality, nutritive value, processing, and industrial uses of potatoes also are studied. Two field trips, one of which is all-day, are taken to potato farms and processing plants.

101. *VEGETABLE CROPS, ADVANCED COURSE*. Fall term. Credit four hours. Prerequisite, course 11 and Botany 31. Lectures, M W F 11. Laboratory, M 2-4:30. East Roberts 223. Assistant Professor OYER.

A course devoted to a systematic study of the literature dealing with practices in vegetable production. Results of experiments that have been conducted or are being conducted are studied, and their application to the solution of practical problems is discussed.

112. *HANDLING AND MARKETING VEGETABLE CROPS, ADVANCED COURSE*. Fall term. Credit four hours. Primarily for graduate students and those undergraduates who are specializing in marketing. Lectures, T Th 11. East Roberts 222. Laboratory, T or W 2-4:30. East Roberts 223. One-hour conference period, to be arranged. Professor HARTMAN.

Students registered for the Tuesday laboratory are scheduled to go on a field trip at 9:30 a.m., Wednesday, September 23.

This course has the same lectures, laboratories, and field trips as course 12. Much more outside reading of research publications in the field is required in course 112 than in course 12, and different examinations are given for the two courses.

[113. *KINDS AND VARIETIES OF VEGETABLES*. Fall term. Credit three hours. Given in even-numbered years. Prerequisite, course 3 or 11 or permission to register. Professor MINGES.] Not given in 1959-1960.

Laboratory work preceding the beginning of regular instruction is required.

This course involves a study of new and standard varieties and strains of vegetables, their origin, characteristics, adaptation, identification, and evaluation. The vegetable seed industry is also discussed. The main value of this course lies in the study of crops in the field.

225. *RESEARCH METHODS IN VEGETABLE CROPS*. Spring term. Credit four hours. Primarily for graduate students. Prerequisite, course 101. It is recommended that Botany 231 and 232 precede or accompany this course. Lectures, M W F 9. Laboratory, M 2-4:30. East Roberts 223. Assistant Professor OYER.

A study of research techniques peculiar to vegetable crops, with a study of the literature and the solution of research problems.

231. *UNDERGRADUATE RESEARCH*. Fall and spring terms. Credit one or more hours a term, by arrangement. For advanced undergraduate students. Registration by permission of the staff member who is to direct the research. Members of the staff.

Special problems may be elected in any line of vegetable work. Summer residence is often necessary in connection with experimental problems.

232. *SEMINAR*. Fall and spring terms. Required of graduate students taking either a major or minor in this Department. Th 4:15. East Roberts 222. Members of departmental staff.

COURSES IN OTHER COLLEGES THAT MAY BE OFFERED TO MEET THE SPECIFIC REQUIREMENTS OF REGULAR STUDENTS IN THE COLLEGE OF AGRICULTURE

Reference should be made to the *Announcement of the College of Arts and Sciences*, or its supplements, for descriptions of English 111 and 112, Chemistry 101 and 102, or 105 and 106, Physics 103 and 104, Geology 115, and Zoology 103 and 104, which may be used to satisfy the requirements in those subjects, as listed on page 29.

MILITARY SCIENCE AND PHYSICAL EDUCATION

The *Announcement of the Independent Divisions and Departments* lists the courses that meet the University's requirements in Military Science and Physical Education.

GENERAL INFORMATION

THE BUILDINGS

THE BUILDINGS erected under the enactment of 1904 were first occupied in June 1907. The central group then erected consisted of a main administrative and classroom building, Roberts Hall, connected by covered loggias with the Dairy Building, now East Roberts, on the east, and with Stone Hall, now occupied by the Department of Rural Education, on the west. Subsequently, the Legislature provided for the erection of two large barns, a greenhouse range, a forestry building (Fernow Hall), a poultry husbandry building (Rice Hall), a soils building (Caldwell Hall), an auditorium (Bailey Hall), a classroom building (Wing Hall) and a stock-judging building for animal husbandry, several small poultry buildings, a sheep barn, a swine barn, a farm shop and tool shed, and an insectary. There are, in addition, a fish-breeding house in Cascadilla Creek, a seed-storage house, a cold-storage and packing house, and other small buildings on the farm. In 1920 the State authorized the College to plan a further development of its building program involving an expenditure of \$3,000,000. Under this building program plan \$500,000 was appropriated in 1920 for a new dairy building, and in 1922 provision was made for its equipment. The building came into use in the fall of 1923. A further appropriation of similar amount was used for completing the Dairy Building, erecting an additional greenhouse range, moving and remodeling the Agricultural Engineering laboratories, and constructing the foundation for the Plant Science Building. The last-named building was completed under an appropriation of \$1,100,000 made by the Legislature of 1928, and occupancy began with the second term of 1930-31. The Legislature of 1930 provided \$400,000 for the equipment of the Plant Science Building and appropriated \$100,000 for additional barns and other smaller buildings for the Department of Animal Husbandry. It also appropriated \$100,000 for the construction of the foundation of a building for the Departments of Agricultural Economics and Rural Sociology, and to this sum the Legislature of 1931 added \$500,000 for the completion of the building. The new barns for sheep, swine, and beef cattle were completed in 1931. The Departments of Agricultural Economics and Rural Sociology occupied their new building, Warren Hall, in February, 1933. In 1934-35 the completion of a new home economics building, Martha Van Rensselaer Hall, made it possible to move the Department of Entomology into the building previously occupied by the College of Home Economics. The building is now

named Comstock Hall. A new library for Agriculture and Home Economics was completed in 1952. The Department of Agricultural Engineering moved into a new building, Riley-Robb Hall, early in 1956.

LANDS FOR RESEARCH AND INSTRUCTION

Cornell University owns or leases about 12,000 acres of land. Of this, approximately 7,500 acres are used by the several departments of the College of Agriculture. About 600 acres more are in wildlife preserves and field stations and are used jointly by several departments of the University.

The type and amount of land assigned to each department varies according to its needs. Some departments, such as Agronomy, Plant Breeding, Floriculture and Ornamental Horticulture, and Vegetable Crops, need tillable land with certain types of soil on which to conduct field experiments. The Animal Husbandry Department needs large areas suitable for pasture and for the production of hay and corn for silage to feed experimental animals. The Department of Pomology has an area of about 100 acres that is used for orchard and small fruits, and the Department of Poultry Husbandry uses about the same acreage for poultry buildings and range.

Arable land not immediately needed by the individual departments for research and instruction is operated by the Office of Farm Services on an extensive basis. This office also acts as a service department, plowing and fitting some of the land used by other departments for experimental purposes. This system prevents the duplication of expensive machinery and uses the farm labor efficiently. The Departments of Animal Husbandry, Agronomy, Plant Breeding, and Pomology, because they have such large acres under cultivation, own their own equipment.

The tillable lands used by departments of the College comprise about 2,200 acres; about 465 acres more are in pasture. The remaining area used by the College consists of forest tracts and of lands used as wildlife preserves and field stations. The Department of Conservation alone operates almost 5,000 acres, of which the Arnot Forest, about twenty miles southwest of Ithaca and consisting of more than 4,000 acres, and the Adirondack Forest of 624 acres, are the most extensive. The wildlife preserves and field stations include a biology field station at the head of Cayuga Lake, wildlife reservations at McLean and Ringwood (each only a short distance from Ithaca), and a wildlife preserve at Slaterville.

LIBRARIES

The Colleges of Agriculture and Home Economics are served by the Albert R. Mann Library of about 240,000 volumes. This is supple-

mented by the other libraries of Cornell University, containing more than 1,600,000 volumes, many of which also relate directly to agricultural and home economics subjects. In addition to materials on applied agriculture and home economics, the Mann Library contains extensive collections dealing with such related sciences as botany, biochemistry, bacteriology, genetics, entomology and medicine. It also includes large collections in economics, sociology, and education, and smaller collections on a variety of other subjects. Of major importance are the numerous complete files of foreign and domestic periodicals and government publications, of which more than 6,500 are received currently.

The principal collection on entomology and limnology is in Comstock Hall, and on plant pathology and mycology in the Plant Science Building, with the departments they serve. Small departmental collections of reprints, bulletins, and duplicate books and journals for use of faculty and graduate students are also provided in several other buildings.

The Albert R. Mann Library building, completed in 1952, has a capacity of 400,000 volumes and 600 reading-room seats. The first floor is devoted primarily to books assigned for class reading, with rooms seating 300 persons. Also on this floor are rooms for typing and for small groups studying together, and the Ellis Room containing books and periodicals for informal reading. On the second floor are the reference, bibliography and periodical reading rooms, offices and work rooms, the main loan desk, and the card catalog. The catalog provides a record of the library materials in all libraries and departmental collections of the Colleges. The library has a comprehensive collection of bibliographies, as well as a card catalog of publications of the United States Department of Agriculture.

The Library is open, with librarians on duty to assist readers, from 8:00 a.m. to 10:00 p.m. daily except Saturday, when it closes at 5:00 p.m. On Mondays through Fridays the first floor remains open for the use of reserve books until 11:30 p.m.; it is also open from 1 to 11:30 p.m. on Sundays. Students may borrow most books, except those on reserve, for periods of two weeks. Information on library regulations and suggestions for use of the Library are provided all new students in orientation meetings each fall. More detailed information appears in a handbook distributed at that time.

SCHOLARSHIPS

GENERAL INFORMATION

Scholarships available only to students in the College of Agriculture are listed on the following pages. To apply for any of these awards, qualified persons should file a College of Agriculture Scholarship Appli-

cation at the office of Resident Instruction, 192 Roberts Hall, Ithaca, New York.

Scholarships and other financial aids are open to prospective students in any undergraduate division of the University through the Office of Admissions, Cornell University, Ithaca, New York. After a student has completed a semester of residence with a satisfactory record, he may apply for financial assistance at the Office of Financial Aids, 147 Edmund Ezra Day Hall.

Recipients of Regents College Scholarships, Regents Scholarships for Children of Deceased or Disabled Veterans and Special State Scholarships for Children of Disabled or Deceased Soldiers, Sailors, or Marines, who enroll at the New York State College of Agriculture, apply the amount of money they receive toward their college expenses. Recipients of Regents Scholarships for Engineering and Scientific Studies may utilize these scholarships in the College of Agriculture if they register in the five-year course in Professional Agricultural Engineering. The local guidance counselor or high school principal should be consulted for information about the rules of administration.

SCHOLARSHIPS AWARDED BY THE COLLEGE OF AGRICULTURE

SEARS, ROEBUCK SCHOLARSHIPS

The Sears, Roebuck Agricultural Foundation has provided fifteen scholarships for farm-reared freshmen entering in 1959-1960. The value of each scholarship is \$200. The awards are made on the basis of financial need and of scholastic promise in the field of agriculture. A scholarship of \$250 is available for an outstanding sophomore who held one of these scholarships in his freshman year. Applications are to be addressed to the Office of Resident Instruction, Roberts Hall, Ithaca, New York, and must be completed by February 15.

NEW YORK STATE BANKERS ASSOCIATION SCHOLARSHIP

A scholarship of \$200 is offered for 1959-1960 by the New York State Bankers Association to a young man who has been a 4-H Club member and who is recommended by his 4-H Club agent. It is awarded for the freshman year on the basis of financial need, scholarship, and the promise of service to agriculture. The 4-H Club agent in each county of New York State may recommend one candidate to whom he will forward an application form. Applications must be on file in the Office of Resident Instruction, Roberts Hall, Ithaca, New York, by February 15.

THE CARL E. LADD MEMORIAL SCHOLARSHIPS

A fund in memory of Carl E. Ladd, Dean of the College from 1932

until his death in 1943, provides scholarships with an annual value of \$200 each. Eighteen scholarships are open to young men and women from New York farms who are members of any class in the College of Agriculture. The awards are made on the basis of financial need, promise for future leadership, and school record. Applications from prospective students are to be sent to the Office of Resident Instruction, Roberts Hall, Ithaca, New York, by February 15. Students in residence should file applications by June 1.

GEORGE LAMONT EDUCATIONAL FUND

The George LaMont Educational Fund was established by gifts from George B. LaMont and his son T. E. LaMont, owners of the LaMont Fruit Farm in Albion, Orleans County, New York. The income from the fund provides one or two scholarships, of \$200 each, for Orleans County farm boys of good moral character, who have a record in school and out that shows ability and application, and who are in need of financial assistance. Awards are for one year and usually are made only to boys entering college.

Application blanks are distributed by the principals and teachers of vocational agriculture in Orleans County high schools. The completed application and the supporting form are to be addressed to the Office of Resident Instruction, Roberts Hall, Ithaca, New York. Both must be received by February 15.

THE ROBERTS SCHOLARSHIPS

The Roberts Scholarship Funds, a gift of the late Dr. Charles H. Roberts, of Oakes, Ulster County, New York, provides five scholarships, each retainable for one year, but not open to newly entering students. 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 coming from rural districts. The awards are made after the close 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 at the Office of Resident Instruction of the College by June 1. The present value of each scholarship is \$250.

BORDEN AGRICULTURAL SCHOLARSHIP AWARD

The Borden Company has established an annual scholarship award to recognize and assist outstanding students who give promise of future achievement. It is awarded to the student in the College of Agriculture who has taken at least two courses in dairying and who, upon entering

his senior year, has the highest average grade for all of his previous college work of any of the similarly eligible students. The value is \$300 payable upon registration in the College for the senior year.

THE BURPEE AWARD IN HORTICULTURE

An annual award of \$100 is made possible through a grant from the W. Atlee Burpee Company, Seed Growers, Philadelphia, Pennsylvania, and Clinton, Iowa. The purpose of this award is to encourage outstanding students in the study of vegetable growing and flower growing. It is to be awarded at the beginning of the senior year and is to be divided equally between two students, one in the field of floriculture and ornamental horticulture and the other in vegetable crop production. To be eligible, the student shall have completed Botany 31 or its equivalent, and at least two courses in the Department concerned, and shall have signified intention of specializing in that Department.

HERVEY S. HALL SCHOLARSHIP

The Hervey S. Hall Scholarship, established by bequest of Miss Mary F. Hall, of Spencer, New York, and having an annual value of \$120, is to be awarded to a properly qualified student of either sex, a resident of New York, pursuing a course in agriculture leading to the degree of Bachelor of Science, and in need of financial aid. It is "to be granted first to a student from the town of Spencer, New York, should a suitable candidate appear, or a student from Tioga County, or from the State at large." Application for this scholarship should be made at the Office of Resident Instruction by June 1.

THE ROBERT M. ADAMS 4-H MEMORIAL SCHOLARSHIP

The Robert M. Adams 4-H Memorial Scholarship was established in honor of Professor R. M. Adams by the 4-H Clubs of the State. The scholarship yields approximately \$50 a year. Students who are New York residents are eligible to apply after their first year in the College, and those who have been 4-H Club members are given first consideration. The award is based on financial need, character, ability, and scholarship. Application for this scholarship should be made at the Office of Resident Instruction by June 1.

WOMAN'S NATIONAL FARM AND GARDEN ASSOCIATION SCHOLARSHIPS

The New York State Division of this Association has provided the following two scholarships:

A SCHOLARSHIP IN HONOR OF ITS FIRST PRESIDENT, MRS. FRANCIS KING . . . The value of the scholarship is \$500, payable over a two-year period. The award is made biennially to a woman of the

sophomore class in the College of Agriculture. Character, interest in agriculture, scholarship, and financial need are considered. Applications should be made at the Office of Resident Instruction, Roberts Hall, Ithaca, New York, before June 1.

A SCHOLARSHIP IN RECOGNITION OF ITS HONORARY PRESIDENT, MRS. WALTER DOUGLAS... Junior or senior women in the College of Agriculture who have achieved high standing are eligible to apply for the award of \$200. Character and financial need are considered, with preference given to girls who have been active in a 4-H Club. Application should be made at the Office of Resident Instruction by June 1.

ESSO 4-H SCHOLARSHIP

The Esso Standard Oil Company has established four-year scholarships of \$200 a year to be awarded, two each year, to students entering the College of Agriculture. The awards are made, on the basis of merit, ability, and need, to boys who have satisfactorily completed at least three years of 4-H Club work including the preceding year, and who graduate from high school with a scholastic standing in the upper half of the class. The recipient receives \$200 each year for four years, provided he remains in college and maintains a satisfactory record.

Application blanks may be obtained from the 4-H Club agent in each county. Applications must be on file in the Office of Resident Instruction, Roberts Hall, Ithaca, New York, by February 15.

WARD W. STEVENS HOLSTEIN SCHOLARSHIP

A fund in honor of Ward W. Stevens provides a scholarship to a male undergraduate student in either the two-year or the four-year course in the College of Agriculture, who has completed at least one-half of his course. The value of the scholarship in 1959-1960 is \$500. It may be awarded to one student or divided between two students. A student who has held the scholarship is eligible to reapply. The award is based on exceptional ability in the judging and handling of dairy cattle, high scholastic rank in dairy-husbandry courses, need of financial assistance, and special interest in the Holstein breed of cattle. Applications should be received in the Office of Resident Instruction, Roberts Hall, Ithaca, New York, by June 1.

BEATTY AGRICULTURAL SCHOLARSHIP

The Beatty Agricultural Scholarship fund, a gift of the late Harrison L. Beatty, provides a scholarship of approximately \$200 to a student entering the College of Agriculture from the Town of Bainbridge or from Chenango County. Grades in Regents Examinations receive major consideration in making the award. Application blanks may be

obtained from principals in Chenango County schools and must be sent to the Office of Resident Instruction, Roberts Hall, Ithaca, New York, by February 15.

THE DAIRY MARKETING RESEARCH FUND SCHOLARSHIP

The Dairy Marketing Research Fund has established a scholarship with an annual value of \$400. A candidate, to be eligible for an award, must have completed the work of the junior year and attained a cumulative average in all of his courses of 78 or above. In addition, he must have passed at least one course in each of dairy industry, dairy marketing, and dairy husbandry or farm management, except that no more than one of the named courses may be included in the schedule for the senior year. Consideration is also given to financial need, character, personality, and potential qualifications for contributing to improved relationships and techniques in the marketing of milk or the manufacture of dairy products. Application for the scholarship should be made on official forms and filed with all supporting information in the Office of Resident Instruction by June 1.

NEW YORK STATE CANNERS AND FREEZERS ASSOCIATION, INCORPORATED, SCHOLARSHIP

An annual scholarship of \$200 is provided by the New York State Canners and Freezers Association, Incorporated. It is available to a student who is a resident of New York State and gives evidence of preparing for a career in the processing of fruits and vegetables. Preference will be given to a student who is entering his junior year. In making the selection, the Committee on Scholarships takes into consideration scholastic record, financial need, leadership ability, and other desirable qualifications. Applications should be filed in the Office of Resident Instruction by June 1.

THE HEATLEY GREEN SCHOLARSHIP

The Heatley Green Scholarship Endowment was established under the will of Mrs. Green in memory of her husband, who had been a New York State farm boy and was a graduate of the College of Engineering at Cornell in the class of 1901. Mr. Green had believed strongly in proper training for successful farming, and this scholarship is to be used to help and encourage worthy undergraduate students of moderate means. The value of the scholarship for 1959-1960 is \$800. Awards are made on an annual basis and may be to one student or divided between two or more students of any class in the College of Agriculture. Applications must be filed at the Office of Resident Instruction, Roberts Hall, Ithaca, New York. The last date for prospective students is February 15 and for students in residence it is June 1.

WALTER R. CLARKE MEMORIAL ENDOWMENT

The Walter R. Clarke Memorial Endowment in memory of Mr. Clarke, a prominent fruit farmer who lived at Milton, New York, provides a scholarship of \$100 each year for a student of any class in the College of Agriculture who is primarily interested in fruit growing. Promise for successful work in this field is the basis for an award. Preference is given to students from the Hudson Valley area. Applications must be filed in the Office of Resident Instruction, Roberts Hall, Ithaca, New York. The last date for prospective students is February 15 and for students in residence it is June 1.

THE HUDSON H. LYON MEMORIAL SCHOLARSHIP

The endowment for this scholarship fund was established by the late H. H. Lyon of Bainbridge, New York. The income, amounting to about \$1200 a year, is to be used to aid students who are preparing for Protestant Christian missionary service, with preference to those who include agriculture in their training. Applications should be filed at the Office of Resident Instruction, Roberts Hall, Ithaca, New York. The last date for prospective students is February 15 and for students in residence it is June 1.

CORNELL DAIRY SCIENCE ASSOCIATION SCHOLARSHIP

This scholarship of \$300 is provided by the Cornell Dairy Science Association. It is awarded at the end of the sophomore year to a student with a major in dairy industry. A payment of \$75 is made at the beginning of each term of the junior and senior years, provided the recipient continues with a major in dairy industry. Applications for this scholarship should be filed in the Office of Resident Instruction by June 1.

RALSTON PURINA SCHOLARSHIP

The Ralston Purina Company offers an annual scholarship of \$500 to an outstanding undergraduate student in agriculture. The award is made each year to a student who will be entering his senior year or, under unusual circumstances, his junior year. The recipient must rank in the upper 25 per cent of his class scholastically. Evidence of leadership ability, moral character, participation in extra-curricular affairs, sincerity of purpose, and financial need are taken into account in making an award. Applications must be filed in the Office of Resident Instruction by June 1.

WILLIAM FREDERICK DREER FUND

A fund from the estate of William Frederick Dreer has been established to provide a worthy student specializing in floriculture or ornamental horticulture an opportunity for study and directed practice

in foreign countries for approximately one year. The award is currently \$2,000 and is available to either an undergraduate or graduate student within the period of his college course or upon its conclusion. Scholarship, character, maturity, seriousness of purpose, and promise of ability to make contributions to his field are considered in making awards. Applications should be on file at the Office of the Department of Floriculture and Ornamental Horticulture by December first preceding the June in which travel will start.

CORNELL-SWEDISH EXCHANGE SCHOLARSHIP

A male sophomore is chosen each year to spend his third college year at the Royal Agricultural College, Uppsala, Sweden. All expenses except transportation are paid by the Swedish students. In exchange a student from the Royal Agricultural College is chosen to come to Cornell and the students of the College of Agriculture pay his expenses.

Information and application blanks are available at the Office of Resident Instruction, 192 Roberts Hall. To be eligible a sophomore must have an average of 78 or above, and he must file an application by the end of the first week in January. The selection is made by a student-faculty committee early in February.

POMOLOGY CLUB SCHOLARSHIP

The Pomology Club provides one or more \$200 scholarships a year, to be awarded to sophomore, junior, or senior students who are specializing in pomology or have major interest in that field. Scholarship and financial need receive equal consideration in making awards, and qualified students are eligible for awards in succeeding years. Applications should be filed in the Office of Resident Instruction by June 1.

ALFRED C. HOTTES AMATEUR GARDENING SCHOLARSHIP

The Alfred C. Hottes Amateur Gardening Scholarship Fund, a gift of the late Alfred C. Hottes, provides a scholarship of \$200 each year. It is awarded to an undergraduate student in the College of Agriculture who by reason of his academic record, his character and his activities shows promise of advancing through his study and work the subject of Floriculture and Ornamental Horticulture as an amateur activity. In his application each applicant should point out how he might be expected to do this. Application should be made at the Office of Resident Instruction of the College by June 1.

NATIONAL PLANT FOOD INSTITUTE AGRONOMY ACHIEVEMENT AWARD

The National Plant Food Institute offers an annual award of \$200 to an outstanding undergraduate student. The award is made to a

student who intends to major in Agronomy and who has completed the elementary course in the department. The selection is based on scholastic achievement in the physical and biological sciences, as well as in general agriculture; on character and personality, especially as they relate to leadership; on active participation in the Agronomy Club; and on financial need. Applications are not required.

AARON H. RUBENFELD MEMORIAL SCHOLARSHIP

The Aaron H. Rubenfeld Memorial Scholarship was established by Middletown Milk & Cream Co., Inc., and Dellwood Dairy Co., Inc., of Yonkers, New York, in memory of their late president and founder, who believed in actively encouraging progress in the Dairy Industry. Candidates for this \$1,000 award must have completed their sophomore year in the College, show evidence of need for the financial assistance, have demonstrated interest in the dairy industry, and possess characteristics that indicate potential ability to contribute to improvement in the production, marketing, and manufacture of milk and milk products. With other qualifications equal, preference will be given to children of employees of either of these two companies and of producers shipping their milk to Middletown Milk & Cream Co., Inc., or its affiliates. Payment of \$250 is made to the recipient at the beginning of each semester in the junior and senior year. Applications should be filed at the Office of Resident Instruction not later than June 1.

DAIRYMEN'S LEAGUE AGRICULTURAL SCHOLARSHIP

A scholarship of \$500 a year is available for a male student, interested in farming, who possesses academic and personal qualifications that suggest ability to contribute to the advancement of agricultural science or practice. It will be awarded to an entering freshman in September, 1959, but in subsequent years students of any class will be eligible. Students, other than freshmen, to be eligible, shall have maintained an average of at least 75 each term. In making awards, preference shall be given, other qualifications being essentially equal, to candidates recommended, prior to March 1, by the Dairymen's League, Inc. Applications from entering freshmen must be received at the office of Resident Instruction, Roberts Hall by February 15 and from others by June 1.

EASTERN FROSTED FOODS ASSOCIATION SCHOLARSHIP

An annual scholarship of \$200 has been established by the Eastern Frosted Foods Association. It is to be awarded, at the end of the sophomore or junior year, to a student in food technology. In considering candidates the Committee on Scholarships shall give major emphasis to indications of ability to promote advancement of the industry, with

preference to those with special interest in freezing. Applications must be filed in the Office of Resident Instruction by June 1.

NEW YORK LIME ASSOCIATION SCHOLARSHIPS

The New York Lime Association provides eight annual scholarships of \$250 each, with two to be awarded to members of each of the four undergraduate classes. In selecting students for awards major interest in agronomy, scholastic achievement especially in the sciences, potential ability for leadership, and need for financial assistance shall be considered. The awards are normally given for one year but may be renewed if the student qualifies in competition with other members of his class. Applications for the freshman scholarships must be received at the Office of Resident Instruction by February 15 and for sophomore, junior, and senior year scholarships by June 1.

THE FRANK B. MORRISON MEMORIAL SCHOLARSHIPS

An endowment fund, established by Mrs. Frank B. Morrison in memory of her husband, a former head of the Department of Animal Husbandry, provides two annual awards of \$300 each. They are made to juniors or seniors of outstanding ability whose major interests are in animal husbandry. A committee from the faculty of the Animal Husbandry Department considers both academic achievement and personal qualities of leadership and character in recommending awards.

POULTRY CLUB SCHOLARSHIP

The Poultry Club supports an annual scholarship of \$300 to be awarded to an entering freshman who intends to specialize in Poultry Husbandry. Evidence of interest in the poultry industry, potential qualifications to contribute to the development of the industry, and financial need are to be considered in making the award. Applications should be received in the Office of Resident Instruction, Roberts Hall, Ithaca, New York, by February 15.

NEW YORK STATE TURF ASSOCIATION SCHOLARSHIP

An annual scholarship of \$400 is provided by the New York State Turf Association to be awarded to a promising and capable student, from any class in the College of Agriculture, who intends to make some phase of turf grass management his profession. Applications from entering freshmen should be received in the Office of Resident Instruction by February 15 and from students of other classes by June 1.

THIRD DISTRICT FEDERATED GARDEN CLUBS OF NEW YORK STATE

A scholarship of \$250 is provided by the Third District Federated Garden Clubs of New York State. It is awarded to an undergraduate

student majoring in the Department of Floriculture and Ornamental Horticulture who expects to make a career in this field. In making the award, consideration will be given to scholarship, financial need, and promise of future accomplishment in the field. Applications should be filed in the Office of Resident Instruction by February 15.

SCHOLARSHIPS FOR NONRESIDENTS

Twenty tuition scholarships are available for nonresidents of the State. They are awarded annually, and evidence of need is required. Applications must be filed in the Office of Resident Instruction, Roberts Hall, Ithaca, New York. The last date for prospective students is February 15 and for students in residence it is June 1.

OTHER SCHOLARSHIPS

Information about other scholarships open under certain conditions to undergraduates in the College of Agriculture may be obtained in the Office of Financial Aids, 147 Edmund Ezra Day Hall.

PRIZES

THE EASTMAN PRIZES FOR PUBLIC SPEAKING

With the object of developing qualities of personal leadership in rural affairs, Mr. A. R. Eastman of Waterville, New York, established annual prizes, the first of \$100 and the second of \$25, for public speaking on country-life subjects. These prizes are designated the Eastman Prizes for Public Speaking. Competition is open to any regular or special student in the College of Agriculture. The contest takes place usually during Farm and Home Week.

THE RICE DEBATE STAGE

To stimulate the study and public discussion of vital farm-life problems, the late James E. Rice, Professor of Poultry Husbandry, Emeritus, established annual prizes, the first of \$100 and the second of \$25. The contest is in the form of a debate. Preliminary trials are held in December, on a subject to be announced. The final competition is held usually in Farm and Home Week. All regular or special students are eligible.

THE PAUL H. GULDIN MEMORIAL ENDOWMENT

The Paul H. Guldin Memorial Endowment, established by Mrs. Paul H. Guldin as a memorial to her husband, a graduate of the College in 1912, is to encourage undergraduate students in the Colleges of Agriculture and Home Economics to become interested, and to take

part, in the development of a more adequate rural leadership. The income supports a contest for the best original articles or stories, written by undergraduates in these Colleges and published in the *Cornell Countryman*, that contribute to the purpose of the endowment. The contest includes all issues of the magazine for the academic year. A first prize of \$100, a second prize of \$50, and two third prizes of \$25 each are available. Awards will be made not later than June 1 by a committee from the Faculty, appointed by the Dean.

THE CHARLES LATHROP PACK FOUNDATION FORESTRY PRIZE

The Charles Lathrop Pack Foundation Forestry Prize is in the amount of \$40 and is awarded annually in April for the best essay on forestry submitted by a resident student who has taken some course in forestry during the current college year. The purpose of the prize is to aid in training men and women to write articles that will arouse in the public an interest in forestry and an appreciation of what forestry means to the country. The award is made by a committee appointed by the President of the University. The detailed regulations are furnished by the Department of Conservation or by the Secretary of the College. The essay must be deposited at the office of the head of the Department of Conservation by noon on April 15.

RING MEMORIAL FUND PRIZE

The Ring Memorial Fund was established under the will of Charles A. Ring to advance horticultural science. The income is used for a prize of approximately \$50 to be awarded to an outstanding sophomore student specializing in plant or horticultural science.

Instructors and advisers of students in the plant sciences are requested to nominate, in writing, sophomores who show promise of advancing horticultural science. Consideration is to be given to grades in horticultural and supporting science courses; attitude toward education, horticulture, and scientific work; demonstrated ability for leadership; character and personality. Nominations must be received at the Office of Resident Instruction before May 1.

THE SAMUEL L. STEWART PRIZE

The Samuel L. Stewart Prize of \$100 is offered, annually, in an essay contest, to promote the production and distribution of high-quality milk, and to acquaint producers and handlers with the factors which may affect its palatability. The contest is open to undergraduate students in the College of Agriculture. Essays of 600 to 800 words must be filed at the Office of Resident Instruction by April 15.

ALUMNI PRIZE

The Alumni Association of the College of Agriculture contributes an annual prize of \$50 to be awarded at the close of the junior year to the student who has maintained the best scholastic record during his three years in the University, the award to be made by the College Faculty.

FRANK B. MORRISON MEMORIAL PRIZES

The Frank B. Morrison Memorial Prizes, totaling \$100 annually, are awarded to students winning top awards in the Students' Fitting and Showmanship Contest during Farm and Home Week.

ALPHA ZETA SCHOLARSHIP KEY

The Alpha Zeta Fraternity presents a scholarship key to the student who made the highest scholastic average in the first year of the four-year course. The name of the recipient is also inscribed on a plaque in the College office. The key is presented at the annual barbecue in the fall.

OTHER PRIZES

Information concerning other prizes open to students enrolled in the University is given in the *Announcement of Prize Competitions*. Copies may be obtained at the Visitor Information Center, Edmund Ezra Day Hall.

LOANS

A fund contributed by students of the College is available for small, short-time, emergency loans. Application may be made to the College Secretary.

A fund, the interest on which is available for loans to students specializing in floriculture, has been established by Mr. Max Schling of New York City. Another loan fund for students of floriculture, with principal and interest available, has been contributed by the New York Florists Club. Applications for loans from both these funds may be made to the College Secretary.

For other loan funds, available to students of all colleges at Cornell, application should be made at the Office of Financial Aids, 147 Edmund Ezra Day Hall.

HEALTH SERVICES AND MEDICAL CARE

These services are centered in the University's Gannett Clinic (out-patient department) and in the Cornell Infirmary (hospital). Students

are entitled to unlimited visits at the Clinic; laboratory and X-ray examinations indicated for diagnosis and treatment; hospitalization in the Infirmary with medical care for a maximum of fourteen days each term and emergency surgical care. On a voluntary basis, insurance is available to supplement the services provided by the General Fee. For further details of services, see the *Announcement of General Information*.

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