

Oregon Agricultural College Bulletin

General Catalogue, 1923-24



CORVALLIS, OREGON

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General Catalogue

1923-24



CORVALLIS, OREGON

O. A. C. PRESS

1923

OREGON AGRICULTURAL COLLEGE

The work of the Oregon Agricultural College is organized into three main divisions: Resident Instruction, Experiment Station, and Extension Service.

I.—THE RESIDENT INSTRUCTION DIVISION includes

The School of Agriculture (B.Sc., M.S. Degrees)

With departments of Animal Husbandry, Dairy Husbandry, Farm Crops, Farm Management, Farm Mechanics, Horticulture (including Pomology, Vegetable Gardening, Landscape Gardening, Floriculture, and Horticultural Products), Poultry Husbandry, Soils, and Veterinary Medicine.

The School of Basic Arts and Sciences

With departments of Art and Rural Architecture, Bacteriology, Botany and Plant Pathology, Chemistry, English Language and Literature, Entomology, History, Mathematics, Modern Languages, Physics, Public Speaking and Dramatics, and Zoology and Physiology.

The School of Commerce (B.Sc. Degree)

With departments of Business Administration, Economics and Sociology, Office Training and Stenography, and Political Science.

The School of Engineering and Mechanic Arts (B.Sc., C.E., E.E., M.E. degrees)

With departments of Civil Engineering, Electrical Engineering, Highway Engineering, Industrial Arts, Mechanics and Materials, and Mechanical Engineering.

The School of Forestry (B.Sc., M.S. Degrees)

With departments of General Forestry and Logging Engineering.

The School of Home Economics (B.Sc., M.S. Degrees)

With departments of Home Economics Education, Household Administration, Household Art, Household Science, and Institutional Management.

The School of Mines (B.Sc. Degree)

With departments of Geology, Metallurgy, and Mining Engineering.

The School of Pharmacy (B.Sc., Ph.C. Degrees)

The School of Vocational Education (B.Sc. Degree)

With departments of Agricultural Education, Commercial Education, Education, Home Economics Education, Industrial Education, and Psychology.

The Department of Chemical Engineering (B.Sc. Degree)

The Department of Military Science and Tactics (B.Sc. Degree)

Including Reserve Officers Training Corps in Infantry, Field Artillery, Engineers, Motor Transport, and Cavalry.

The General Departments

Industrial Journalism, Library Practice, Physical Education for Men, and Physical Education for Women.

The School of Music (Music Diploma)

With departments of Harmony, Theory, Voice, Piano, Violin, Pipe-organ, and Orchestra.

The Short Sessions

Including the Summer Session and Winter Short Courses.

II.—THE EXPERIMENT STATION DIVISION includes

The Home Station, at Corvallis

The Eastern Oregon Branch Station, at Union

The Sherman County Dry-Farm Branch Station, at Moro

The Umatilla Branch Station, at Hermiston

The Southern Oregon Branch Station, at Talent

The Harney Valley Branch Station, at Burns

The John Jacob Astor Branch Station, at Astoria

The Hood River Branch Station, at Hood River

III.—THE EXTENSION SERVICE DIVISION includes

County Agricultural Work

Home Demonstration Work

Boys' and Girls' Club Work

Extension Specialist Work

In Animal Husbandry; Dairying; Drainage and Irrigation; Farm Crops; Farm Management; Field Entomology, Plant Pathology, and Bacteriology; Field Horticulture; Poultry Husbandry; Rodent Control; Rural Organization and Markets.

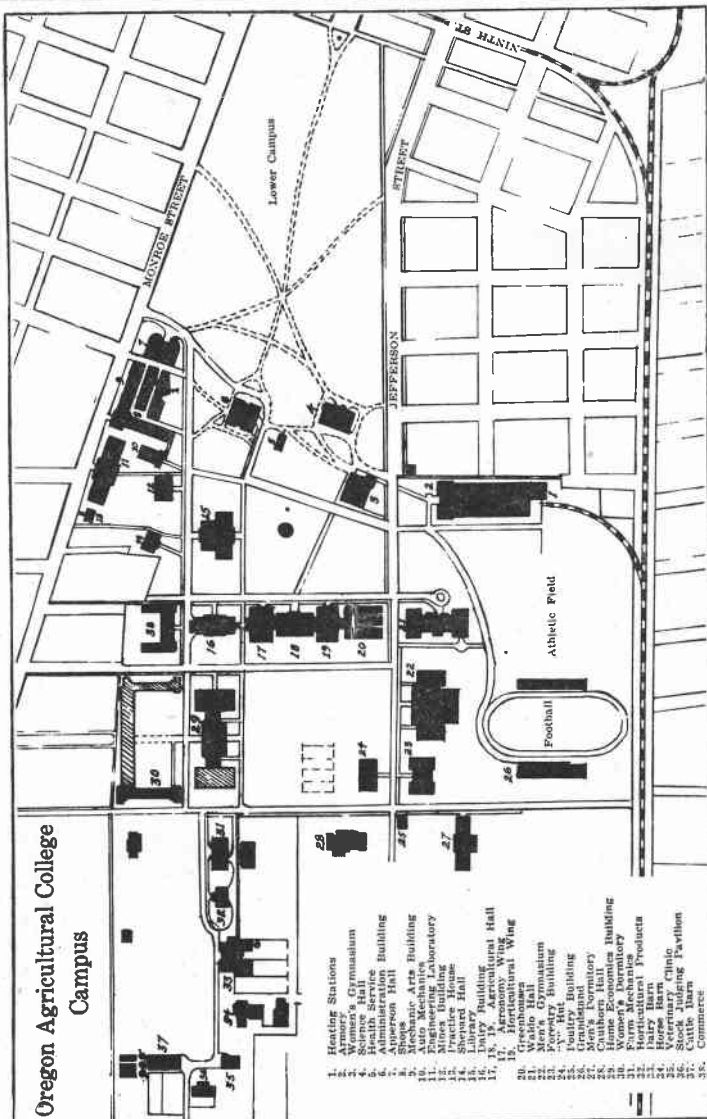
Extension Schools and Meetings

Extension Publications

Extension Lectures

Advisory Correspondence

Oregon Agricultural College Campus



1. Heating Stations
2. Women's Gymnasium
3. Science Hall
4. Administration Building
5. Apperson Hall
6. Mechanic Arts Building
7. Auto Mechanics Laboratory
8. Niles Building
9. Practice House
10. Shepard Hall
11. Dairy Building
12. Agricultural Hall
13. Horticultural Wing
14. Greenhouse
15. Men's Gymnasium
16. Forestry Building
17. Veterinary Building
18. Grains and Cereals Laboratory
19. Cuthbert Hall
20. Home Economics Building
21. Fruit and Vegetable Laboratory
22. Farm Mechanics
23. Dairy Barn
24. Horse Barn
25. Veterinary Clinic
26. Stock Building
27. Fowl Pavilion
28. Cattle Barn
29. Commerce

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COLLEGE CALENDAR

1923

SEPTEMBER 28, 29, Friday, Saturday	Registration
SEPTEMBER 29, Saturday	Required English examination
OCTOBER 1, Monday	Recitations begin
OCTOBER 5, Friday	Meeting of Board of Regents
NOVEMBER 12, Monday	Armistice Day; holiday
NOVEMBER 14, Wednesday	Close of mid-term examination
NOVEMBER 29, 30, DECEMBER 1, Thursday, Friday, Saturday	Thanksgiving recess
DECEMBER 19, 20, Wednesday, Thursday	Final examinations
DECEMBER 20, Thursday	Christmas recess begins

1924

JANUARY 2, Wednesday	Second term registration
JANUARY 3, Thursday	Recitations begin
JANUARY 9, Wednesday	Meeting of Board of Regents
FEBRUARY 13, Wednesday	Close of mid-term examination
FEBRUARY 22, Friday	Washington's birthday; holiday
MARCH 18, 19, Tuesday, Wednesday	Final examinations
MARCH 19, Wednesday	Second term ends; spring vacation begins
MARCH 25, Tuesday	Third term registration
MARCH 26, Wednesday	Recitations begin
APRIL 9, Wednesday	Meeting of Board of Regents
APRIL 30, Wednesday	Close of mid-term examination
MAY 30, Friday	Decoration Day; holiday
JUNE 5, Thursday	Senior examinations close
JUNE 7, Saturday	Senior Class Day, Alumni Reunion
JUNE 8, Sunday	Baccalaureate Sermon
JUNE 9, Monday .....	.....
.....	Fifty-fifth Annual Commencement; Meeting of Board of Regents
JUNE 10, 11, 12, Tuesday, Wednesday, Thursday	Final examinations
JUNE 12, Thursday	Third term ends
JUNE 23, Monday	Summer Session begins
JULY 4, Friday	Independence Day; holiday
AUGUST 2, Saturday	Summer Session ends

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 HON. N. R. MOORE, SecretaryCorvallis
 HON. B. F. IRVINE, TreasurerPortland

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HON. N. R. MOORE	Corvallis, 1924
HON. JEFFERSON MYERS	Portland, 1924
HON. J. K. WEATHERFORD	Albany, 1927
HON. C. L. HAWLEY	Portland, 1927
HON. M. S. WOODCOCK	Corvallis, 1927
HON. HARRY BAILEY	Lakeview, 1929
HON. GEO. M. CORNWALL	Portland, 1929
HON. T. H. CRAWFORD	La Grande, 1929

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* The arrangement is in order of seniority of appointment.

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* On leave of absence.

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- LILA MORRIS O'NEALEAssistant Professor of Household Art
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* On leave of absence.

COLLEGE COUNCIL

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Assistant Animal Husbandman, Experiment Station
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- CHARLES ELMER OWENSAssociate Professor of Plant Pathology
Terre Haute (Indiana) State Normal School; University of Indiana,
A.B., A.M.
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- ARTHUR LEE PECKProfessor of Landscape Gardening and
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FLORENCE ELDORA POOL	Jackson County Montana State College, B.Sc.
EDITH MAY HOFFMAN	Umatilla County Columbia University, B.Sc.; University of Paris.

COUNTY CLUB AGENTS

ETHEL IRENE CALKINS	Multnomah County Oregon Normal School.
HOMER MORTON CROSS	Douglas County Oregon Agricultural College, B.Sc.
DAVID HONORE KENNEDY	Tillamook County Oregon Agricultural College, B.Sc.
THOMAS DEFORREST KIRKPATRICK	City of Portland Drake University, B.Sc.; Simpson College; Iowa State College.
FRANK WILLIAM SEXTON	Klamath County Valparaiso (Indiana) Normal School.
WILLIAM DALE KINDER	Malheur County Oregon Agricultural College, B.Sc.
FRED NELSON WILLIAMSON	Linn County Oregon Agricultural College, B.Sc.

General Information

FOUNDATION AND ENDOWMENT

By an Act of Congress, approved by President Lincoln, July 2, 1862, a grant of land to the amount of thirty thousand acres, or its equivalent, was made to each state in the Union for each senator and representative in Congress to which the state was entitled by the apportionment of the census of 1860. The proceeds under this Act were to constitute a perpetual fund. The principal of this fund was to remain forever undiminished; but the interest arising from the fund was to be inviolably applied by each state that should avail itself of the benefits of the Act to the support and maintenance of a "college where the leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." Ninety thousand acres of land were apportioned to Oregon; and by an Act approved October 9, 1862, the Legislative Assembly of Oregon accepted the provisions of the Congressional law.

HISTORY

The legislature of 1868 provided for the location of the land received under the Act of 1862, and as there were no state colleges in Oregon at that time designated Corvallis College, a private institution in Benton county under the control of the Methodist Episcopal Church, South, as the recipient of the interest on funds to be derived from the sale of this Government land. For a number of years, however, none of the land was sold, and the legislature made small annual appropriations for the support of the institution.

In 1885, the church voluntarily relinquished its claim on the funds of the College, and the state assumed entire control of the institution. The legislature of that year provided for the "permanent location of the State Agricultural College at Corvallis, in Benton county," on the condition that the citizens of said county should, within four years, erect on the "farm containing thirty-five acres in the immediate vicinity of said city, known as the Agricultural College Farm, brick buildings for the accommodation of said State Agricultural College, at a cost of not less than \$20,000." During the summer of 1887, the cornerstone of the building erected by the citizens of

Benton county was laid by the Governor of Oregon amid impressive ceremonies.

This structure, now known as the Administration Building, was the nucleus around which other buildings soon began to cluster, as necessity and growing interest demanded. For a year or two there was ample room; but, as the institution grew, more land was needed and provided, and the institution now owns, as compared with the thirty-five acres originally comprising the campus and grounds, three hundred and forty-nine acres; and as compared with one structure, thirty-nine. There has also been a marked increase in the attendance, from ninety-seven to approximately five thousand students. Thirty years ago, most of the students came from Benton and neighboring counties. Today, every county in Oregon, forty-two other states, and eighteen foreign countries are represented. The increase in the number of students called for an increase in the number of the faculty. This body, from the number of five in 1884, has grown until it now numbers about three hundred. Other features usually found in connection with progressive educational institutions have grown in equal ratio. The curricula have been strengthened, the standards, both for entrance and graduation, have been advanced, organization has kept pace with development, and other improvements have been made from time to time, which have added to the thoroughness and efficiency of the work.

ORGANIZATION

The Oregon Agricultural College is organized into the three grand divisions that characterize the work of the land-grant colleges throughout the country; namely, Resident Instruction, Experiment Station, and Extension Service. Resident Instruction, which includes all work of teaching students at the institution, is the most distinctive feature of the College life. It has always been regarded as of first importance, and will doubtless continue to be so regarded, in spite of the increasing usefulness of other divisions of work. The Experiment Station, through systematic experiments, investigation, and research, is engaged in a search for fundamental truth. Its work is of great importance; for without it, the work of the other two grand divisions would soon become sterile and ineffective. The Extension Service, which is the newest of the three grand divisions of the College, includes all means of imparting the message of the College to the people in their own communities. It is virtually an effort to make practical and more or less immediate application throughout the state of the available truths worked out by the Experiment Station or used for resident instruction.

GOVERNMENT

Board of Regents. The general government of the College is vested in the Board of Regents, composed of thirteen members, of whom the Governor, Secretary of State, Superintendent of Public Instruction, and the Master of the State Grange are ex-officio members. The nine other members are appointed by the Governor, with the approval of the State Senate, and hold office for a term of nine years. Under a law of the State Legislature passed in 1885 the Board of Regents constitutes a body corporate under the name of "The Board of Regents of the State Agricultural College * * * * with power to sue and be sued and to make contracts," and to enact such regulations as may be necessary for the maintenance and development of the College.

The Administrative Council is composed of the President of the College, the deans of the several schools, the Director of the Experiment Station, the Director of the Extension Service, the Dean of Women, the Professor of Military Science and Tactics, and the Executive Secretary. It is the function of the Administrative Council to consider and determine the larger questions of institutional policy and administration, particularly those affecting more than one school or division, in so far as these are not reserved to the Regents or to the President. Meetings of the Administrative Council may be called by the President or the Executive Secretary.

The College Council is composed of the President of the College and all officers of administration and instruction with the rank of professor, associate professor, or assistant professor. It considers such matters of general policy and institutional interest, particularly those involving the welfare of the institution as a whole, as may be referred to it by the President or the Administrative Council.

The College Staff is composed of all members of the resident and field staffs of the Resident Instruction, Experiment Station, and Extension divisions of the College. Its function is concerned primarily with matters pertaining to the general welfare of the College. Meetings are held at the call of the President.

School Faculties. Each school of the College has its own faculty consisting of the dean, professors, associate professors, assistant professors, and instructors. Depending upon size of staff school faculties may be further organized into groups of ranking professors or committees for such definite administrative functions as may constitute a feature of school policy. The faculty of each school is organized for the purpose of administrative matters relating solely to its

own unit of administration. Meetings of school faculties are held at the call of the dean. The President is ex-officio a member of all school faculties.

Departmental Faculties. Each department has its own faculty, consisting of all members of its staff whether engaged in instructional, research, or extension activities. The departmental faculty considers matters which concern primarily its own internal policy and problems, and meets on call of the head of the department, who is its presiding officer. The school dean is ex-officio a member of all departmental faculties.

The Experiment Station Staff includes the President of the College, the Director of the Experiment Station; the Secretary of the Experiment Station, the superintendents of the branch experiment stations; the heads of the various departments of the School of Agriculture; the heads of departments of the School of Basic Arts and Sciences who are also heads of corresponding Experiment Station departments; and all assistants engaged in research and experimental work. The members of this staff are engaged in the investigation of problems encountered in the development of the agricultural interests of the state. They distribute, by correspondence, circulars, and station bulletins, information regarding their investigations.

Extension Staff. The Extension Service Staff includes the President of the College, the Director of Extension Service, the Secretary of Extension Service, the State Leaders and Assistant State Leaders of County Agents, Home Demonstration Agents, and Boys' and Girls' Club work, Extension Field Specialists in Dairying, Animal Husbandry, Home Economics, Farm Crops, Horticulture, Poultry, Farm Management Demonstration, Organization and Markets, and Rodent Control, County Agents, Home Demonstration Agents, and County Club Agents.

The Students. The College does not undertake to prescribe in detail either its requirements or prohibitions. Students are met on a plane of mutual regard and helpfulness. Since the advantages of the institution are provided at public expense, the students are under special obligation to perform faithfully all their duties, not only to the College, but also to the community and to the state. Whenever the deportment of any student is such that his influence is inimical to the interests of the institution, he will be relieved from further attendance.

PURPOSE AND SCOPE

The purpose of the College is to provide, in accordance with the acts of Congress under which it is maintained, a liberal, thorough, and practical education—an education that will afford

the training required for efficient service both in different branches of industry and in civic duties. The distinctive technical work covers the three great fields of production, manufacture, and commerce. Special attention is given to the application of science. All the practical work in the laboratories, in the shops, in the orchards, and on the farm, is based on scientific principles. While the industrial or technical work is emphasized, the importance of a thorough general training, of mind development, and of culture, is recognized in all the work of the institution. The object is to meet the demand for a broad and general education, supplemented by special technical training. State and Federal support impose upon the College the obligation of giving training for true citizenship.

The work, therefore, covers a broad field, including technical courses in the different phases of agriculture, forestry, home economics, engineering, mining, commerce, pharmacy, vocational education, military tactics, and industrial arts; with the necessary training in the basic subjects of mathematics and the natural and physical sciences; and also the general training in language, literature, history, economics, political science, civics, and physical education, which constitutes an essential part of a liberal education.

LOCATION

The seat of the Oregon Agricultural College is Corvallis, a city of 6,500 inhabitants, situated at the head of navigation on the Willamette River. As the name implies, it is in the heart of the Willamette Valley, famous for its varied and abundant resources. It is readily accessible by steam and electric railway from all parts of the state, the main-line Southern Pacific steam trains all connecting with Corvallis, and both the "West-side" Electric and the Oregon Electric trains running into the city. In addition to these north-and-south railways, an east-and-west railway running through the city connects the College with the Cascade Mountains on the east and the ocean, at Newport, on the west. Corvallis has free mail delivery, excellent paved streets, good schools, many churches, attractive residences, a modern sewer system, and a first-class gravity water system supplied from springs on the slopes of Mary's Peak, the tallest mountain in the Coast Range, sixteen miles to the west.

Situated on high, well-drained land, open to the invigorating sea breeze, Corvallis is one of the most healthful cities in Oregon. The climate is remarkably equable, and severe storms are almost unknown, summer or winter. The average annual temperature for 28 years (1890-1918) is 55.01 degrees Fahrenheit, and the average annual rainfall for the same period is 42.76 inches. The lowest

temperatures for the five years 1914 to 1918 were respectively 13, 21, 8, 14, and 19 degrees Fahrenheit in December and January; and the highest temperatures for the same years, in July and August, were respectively, 100, 97, 99, 103, and 99 degrees Fahrenheit.

The glens and gorges of the Coast Range, beginning only a few miles west of Corvallis, the distant splendor of the Cascades, sixty miles to the eastward, with their wealth of trees and the perennially snow-capped peaks—Hood, Jefferson, and the Three Sisters—present a constant panorama of picturesque mountain scenery. With such an environment, Corvallis is an ideal location for a college and a home.

GROUPS AND BUILDINGS

THE COLLEGE GROUNDS

The college grounds comprise three hundred and forty-nine acres. That part of the grounds, ninety-one acres in extent, lying immediately about the several buildings, east of Cauthorn Avenue, and usually designated as the lawns and campus, is tastefully planted with both native, exotic, and ornamental trees, shrubs, and herbs. The tract of one hundred and forty-three acres used for the farm, garden, and orchard operations is so plotted and planted as to meet the demands of the various lines of work and still conform to a general scheme of landscape embellishment. This portion occupies a slightly elevated and gently undulating site wholly within the western limits of the city of Corvallis. Drives and walks traverse the campus in all directions, thus rendering every objective point easily accessible.

In addition to the above plot, one hundred and fifteen acres, comprising the College south farm, including the horticultural and poultry tracts, lies just south of the city limits. Approximately eight hundred acres are also under lease for farm purposes.

COLLEGE BUILDINGS

The following brief descriptions will convey a general idea of the principal buildings and the purposes for which they are used. The location of the various buildings is shown on the map on page 4.

The **Administration Building** is a three-story brick structure, 90 by 120 feet, containing recitation rooms and the offices of the Registrar, the Business Manager, and the Director of the School of Music. Centrally located and on a slight eminence, it commands an unsurpassed view of the campus, the city of Corvallis, and the picturesque Cascades.

The Armory is situated about three hundred yards south of the Administration Building. It is one of the largest of its kind in the United States and is built of concrete and steel, 126 by 355 feet. The drill hall portion has an unobstructed area of 36,000 square feet. The arms room, offices, and drill hall afford facilities for the accommodation of 1,000 men.

The Women's Gymnasium is situated about two hundred yards south of the Administration Building, and is erected against a gently sloping bank on Jefferson Street. The structure, 70 by 120 feet, is built of stone and wood, and comprises a basement, or first floor, facing east, with the main floor above it, having a bank entrance on the west end. The first floor of the building is devoted to locker rooms, dressing rooms, bathrooms, and offices, together with a rest room and a special room for corrective gymnastics. The second floor consists chiefly of one large gymnasium room, which is also frequently used as a lecture hall, assembly room, and social center for moderate-sized gatherings. This room is surmounted by a balcony running-track, suspended from the trusses. The room affords facilities, in a court 79 by 54 feet in dimensions, for basketball, indoor baseball, tennis, and various winter and indoor games.

Science Hall, situated southeast of the Administration Building, and constructed of gray granite and sandstone, covers a ground space of 85 by 125 feet, has three stories and basement, and contains fifty-five rooms. It is one of the most serviceable buildings on the grounds, and within it are housed the departments of Chemistry and Pharmacy, with their various laboratories, recitation rooms, and lecture halls, together with the offices and laboratories of the Experiment Station chemists.

Apperson Hall, situated about one hundred and fifty yards northeast of the Administration Building, is 90 by 120 feet in size, three stories high, constructed of Oregon gray granite, sandstone, and terra cotta. With the addition of the third story during the summer of 1920 and complete remodeling of the interior the structure is virtually a new building. The first floor contains offices, laboratories, and classrooms for the departments of Electrical Engineering and Light and Power. The second floor contains offices of the departments of Physics, Highway Engineering, and Electrical Engineering, and various classrooms and laboratories. The Third floor contains offices for Irrigation Engineering, Civil Engineering, and Railroad Engineering, four drawing rooms, and five class and lecture rooms.

Mechanic Arts Building is a modern, well-lighted structure of brick, with cement foundations, 52 by 52 feet, two stories high,

flanked by a one-story wing on the east, 40 by 220 feet, and a similar wing on the south, 40 by 200 feet. The central portion contains the office of the Dean of the School of Engineering, a display room for student work, a tool-room for the machine shop, and a finishing room for the wood shop. On the second floor is a general drafting room, 30 by 50 feet, with a blue-print room and a dark room adjoining. The south wing contains the main woodworking shop; 40 by 97 feet, a stock room 30 by 40 feet, a carpenter shop 20 by 40 feet, and an additional woodworking shop, 40 by 50 feet. The east wing contains the machine shop, 40 by 80 feet, the blacksmith shop, 40 by 100 feet, store room for coal and iron, lockers, and toilet rooms.

The Foundry, which is located immediately south of the blacksmith shop, is built of brick. It contains one 22-inch Colliau cupola for melting iron, one brass furnace, one portable core oven, one stationary core oven for large work, one twelve-hundred-pound crane ladle, one eight-hundred-pound crane ladle, and several smaller ladles. It contains also one crucible brass furnace, one two-ton jib crane, one post crane, one No. 2 Delano pulley molding machine, one tumbling barrel for cleaning castings, and a liberal supply of smaller tools, flasks, etc.

Engineering Laboratory. The Engineering Laboratory, recently completed, is a brick and concrete building 220 by 63 feet, three stories high. It is located on Monroe Street, directly north of the Mines building and adjacent to the Mechanic Arts Building.

The main laboratory is 220 by 40 feet and includes three principal divisions: (a) a materials laboratory occupying about one-third of the building at the east end; (b) a hydraulics laboratory occupying the middle third; (c) a steam and gas engine laboratory occupying the west end of the building. Each of these divisions has floor space on the basement, main floor, and mezzanine or gallery floor. All are served by a five-ton electric traveling crane. The south part of the building contains offices, recitation rooms, drafting rooms, and special laboratories. The latter include high-way materials laboratory, fuel and oil testing laboratory, metallography laboratory, and automotive laboratory. A 100-horse-power water tube boiler is located in the basement to furnish heat for the building and steam for experimental use in the laboratory.

The Mines Building, 65 by 81 feet in dimensions, located northeast of the Library and about one hundred yards northwest of the Administration Building, is one of the newer structures. It is a fine four-story structure, constructed of brick, trimmed with stone, and similar in type to all the newer buildings on the campus. The

first floor of the building contains the main offices, assaying, metallurgical, and chemical engineering laboratories. The basement contains the crushing and sampling rooms, stock rooms, and ore-dressing laboratory. On the second floor are drafting, lecture, and class rooms. On the third floor are the geological museum, mineralogical and petrological laboratories. All the laboratories are provided with water, gas, and electric lights.

Shepard Hall, the student building now under the auspices of the Y. W. C. A., was erected as a tribute to the memory of Clay Shepard, who gave his life to the cause of cleaner and truer citizenship as exemplified in student life. The basement contains a swimming pool, shower-baths and locker rooms, kitchen, wood room, and accessories. The first floor contains a large lobby, which is used for social events and as a general gathering center, the offices of the General Secretary, a public office, and a combined cabinet and check room. The third floor is used for offices and committee rooms.

The Library Building, located south and west of the Mines Building, consists of two stories and basement in front and three stories and basement at the back. It is built of red brick and gray terra cotta, presenting a quiet and dignified appearance, in keeping with the use, fundamental to education, to which it is put. The most modern and effective system of lighting, heating, and ventilating is installed.

The first floor consists of an entrance hall, the technical periodical room, binding room, an auditorium for classes too large to be accommodated by the classroom of ordinary size, two other classrooms, and coatrooms. The second and third floors at the front are occupied by the main reading room, ample to seat over three hundred for reference work. Back of this room on the second floor are the offices, cataloguing, and other workrooms. The third floor consists of comparatively small rooms designed ultimately for seminar rooms for the use of such departments as will make the library their chief laboratory; however, under present crowded conditions on the campus, this story is used for offices of the department of Public Speaking and Dramatics, the Dean of the School of Basic Arts and Sciences, and the Dean of Women.

The northwest part of the Library contains the fireproof steel stack room, housing in safety the book collections and permitting their easy and effective use.

The building is ample to accommodate the growth of the library for many years, and its architecture permits stack expansion as time and growth demand it.

Dairy Building. Just north of Agricultural Hall is located the Dairy Building. The general scheme of both outside and inside

finish is similar to that of Agricultural Hall. The structure is 54 by 141 feet, three stories high. On the first floor are the offices of the Dairy department and laboratories for buttermaking, cheese-making, and market milk instruction, including a boiler and engine room and student lockers. On the second floor are the testing laboratory, advanced laboratory, veterinary laboratories, etc. The third floor is temporarily occupied by the department of Mathematics with the exception of a general lecture room, extending across the south end of this floor, and having a seating capacity of two hundred.

Agricultural Hall, standing southwest of the Administration Building, is the largest structure on the campus. It is an imposing edifice of brick and sandstone, consisting of the central or administrative section, the north or Agronomy wing, and the south or Horticultural wing.

The central section is 66 by 140 feet, four stories and basement, and contains conveniently arranged and well lighted classrooms, laboratories, and offices. On the first floor are the offices of the Director of the Experiment Station, the Dean of the School of Agriculture, the Director of the Extension Service, the State Leader of County Agricultural Agents, the State Leader of Home Demonstration Agents, the State Leader of Boys' and Girls' Clubs, with their several branches. The second floor is occupied by the department of Animal Husbandry; the third floor, by the departments of Zoology and Entomology with their respective museums; and the fourth floor, by the department of Bacteriology.

The north or Agronomy wing is 72 by 130 feet, three stories high. The first and second floors, occupied by the departments of Soils, Farm Management, Farm Crops, and Drainage and Irrigation, contain, in addition to the offices of these departments, rooms variously devoted to laboratory and class purposes. The third floor is occupied by the department of Art.

The south or Horticultural wing is 72 by 130 feet, three stories high. In the basement are located laboratories for plant propagation, spraying, vegetable preparation, and fruit packing. The basement also contains the general storage rooms for the department, and rooms which are especially adapted for the storage of fruits. The first floor contains the offices of the department of Horticulture, the research laboratory, systematic pomology laboratory, and three large lecture rooms. The second floor contains the offices and museums of the department of Botany and Plant Pathology, recitation rooms and student laboratories. The third floor contains the horticultural museum and horticultural herbarium, photograph

room, large student lecture room, drafting rooms, lecture rooms, and office of the Landscape Gardening section.

Greenhouses. A range of greenhouses aids the student in his studies in commercial greenhouse work. The range is made up of five even-span houses, three ninety feet long by twenty feet wide, and two thirty-three feet long by twenty feet wide, making the total area under glass 6,720 square feet. Each of the large houses has been divided into sections thirty feet long, so that the entire space in each may be devoted to a single crop. Of the two smaller houses, one is given up to research work, and one to general plant propagation. Such crops as carnations, chrysanthemums, violets, palms, ferns, general pot plants, and forced vegetables, like tomatoes, lettuce, and cucumbers, are grown in these houses.

Waldo Hall, one of the halls of residence for women, occupies a commanding site one hundred and fifty yards west of the Armory. It is a large building of pleasing appearance, with a concrete foundation and basement wall, and a cream-colored, pressed-brick superstructure, three stories high. The dimensions are 96 by 240 feet; and it contains one hundred and twenty-five rooms for students, besides a kitchen, dining-rooms, and parlors. It is modern in its appointments and finish throughout.

The Men's Gymnasium, situated on Jefferson Street and adjoining the main athletic field, is now practically complete. The central unit, 90 by 150 feet in size, provides a main hall with 13,500 square feet of floor space for three regulation basket-ball courts and space for general gymnasium and indoor athletic work. This hall is occasionally used as an auditorium for large assemblies and entertainments. The men's lockers, dressing-rooms, the showers, the departmental offices, and a large lobby for receptions, are also located in the central unit. The east wing, 52 by 96 feet in dimensions, provides an auxiliary gymnasium for apparatus work, three hand-ball courts, two wrestling and boxing rooms, and one large room for volley-ball. The new west wing, 52 by 96 feet, provides an additional boxing and wrestling room, bowling alleys, handball and squash courts. The fourth unit provides a natatorium 50 by 100 feet in size, of white tile construction, lighted at the bottom with special electric lights, and equipped with the most modern diving boards, and with a refiltration and violet-ray system which keeps the water sterile. The pool, which is one of the largest and finest in this part of the country, is surrounded by a gallery capable of seating fifteen hundred spectators.

The Forestry Building. The three-story Forestry Building, 80 by 136 feet, constructed of brick, houses the work in forestry and

logging engineering. This building contains roomy laboratories for work in silviculture, dendrology, mensuration, forest protection, technology, drafting, and logging engineering. As rapidly as material can be assembled these laboratories are being supplied with the various instruments and equipment which the peculiar work of each requires. In addition to the laboratories, space is to be devoted to a collection of manufactured wood products, designed to show the various uses to which wood may be put and to a forest museum in which will be assembled large specimens of all commercial woods of the United States. All available publications dealing with forestry and logging subjects are provided for the use of students. Portions of the building are used temporarily by the School of Vocational Education, by the department of English, and the department of Poultry Husbandry.

The "Y" Hut. The "Y" Hut is 60 by 110 feet in size, consisting of one main floor with balconies. The auditorium has a stage, moving picture equipment, large fireplace, and writing and game tables. Smaller rooms adjoining are used for many purposes, such as committee meetings, billiards, the Secretary's office, and library. Opening from the balconies are offices of various student activities.

Men's Dormitory. This building, fitted up in the fall of 1919 as a campus residence for men students, is 204 by 57 feet in size, located near the Men's Gymnasium and the "Y" Hut. While the building was erected during the war for barracks, it was designed to be a permanent structure on the campus and was built with a view to being veneered with brick. It is built on a decided slope, with basement and three floors. The basement, with cement floor, accommodates a large cafeteria. The first floor contains a spacious living-room at the east end, and a number of student rooms at the west end. The two upper floors are given up entirely to student rooms. Lavatory, toilet and shower-bath facilities are provided on each floor, and laundry facilities in the basement. Student rooms are finished in wood, well lighted, and conveniently arranged. Steam heat and electric lights are provided throughout the building. Rooms are arranged to accommodate from two to four students; and furnishings, such as closet space, tables, chairs, iron bedsteads, etc., are provided on this basis.

Cauthorn Hall, another of the women's halls of residence, is a well-proportioned frame building, situated on a commanding spot in the western part of the campus. It is 160 by 50 feet, has three stories and basement, and contains sixty-two rooms, besides a large kitchen, dining-room, and reception rooms. Its furnishings and appointments are adequate, modern, and in harmony with its use.

Each floor is supplied with hot and cold water, baths, electric light, and steam heat.

Home Economics. The Home Economics Building now lacks only the west wing to complete the original plan of a central unit, two connecting links, and two wings. As it now stands the building measures about 215 feet in length and 120 feet in total width. It is located directly west of the Dairy Building and east of the Farm Mechanics Building, facing the Men's Gymnasium and the Forestry Building, across the West Quadrangle to the south. It consists of three stories above a high basement, and is built of brick and terra cotta. Heating, lighting, and ventilating systems of the most modern type are installed, and every provision—including an electric elevator, rest room, reading room, lockers, and dressing room—is made for the comfort and convenience of the young women pursuing work in Home Economics.

Large laboratories and lecture rooms for food preparation and for household arts are now amply provided in this building for the accommodation of all students. Adequate office room is also available for members of the Home Economics staff, and special laboratories are devoted to weaving and dyeing, laundry, etc. A feature of the building that affords opportunity for practical instruction in dietetics and institutional management is the large dining-room on the third floor of the central unit, capable of seating 300 people, and the kitchens, with modern equipment, where food is prepared for this dining-room. Another feature of practical value to all students is the group room arrangement showing two types of effective equipment for a home in accordance with a low or moderate family income, the object of each being to illustrate a kitchen, dining-room, and living-room proportioned, arranged, and equipped with the least outlay for the largest degree of genuine comfort, convenience, and charm.

Commerce Hall, completed during the summer of 1922, is located north of the Dairy Building with entrances from both the north and the south. It is of the "U" type, 186 feet long and 67 feet wide, with wings 28 by 107 feet. There are three floors above a well-lighted ground floor. The most approved methods of heating, lighting, and ventilation are employed. The new building houses the offices of the President and the Executive Secretary; the College Editor; the Clerical Exchange; the O. A. C. Press; offices of student publications; the department of Industrial Journalism; the Bureau of Organization and Markets; the executive office of the School of Commerce; the departments of Business Administration, Economics and Sociology, Political Science, and Office Training; and that part of the

department of Mathematics which deals with commercial Mathematics.

Margaret Snell Hall, another hall of residence for women, completed in 1921, is located north of the Home Economics Building. The building is 235 feet long by 96 feet wide, built of brick and terra cotta, three stories high above a basement. On the first floor are located the reception rooms and the dining-room and kitchens, together with a few student rooms. The laundry and freight room are located in the basement, which is connected by an elevator with a trunk-storage room on each floor. One hundred and twenty-eight rooms, most of them designed to accommodate two students, are equipped with individual closets, running water, steam heat, and electric lights. Compartment bathrooms, with showers in addition, a hair-dressing room, and a clothes-pressing room, are provided on each floor, all with thoroughly modern and sanitary equipment. The stairways are easy and convenient. On the third floor a hospital room, with three beds, is equipped with separate kitchen and bathroom, and connected with the main kitchens by a dumb waiter. Throughout the building every facility is provided in keeping with good management, health, and home comfort.

Farm Mechanics Building. A modern building is provided for the Farm Mechanics work. It is a well-lighted brick building, having a large operating floor, a classroom, a locker room, shop, and tool-room on the first floor. The operating floor is of cement and is roomy enough for demonstration and for the operation of the heavier farm machines. A gallery surrounding the operating floor provides space for the lighter farm implements such as tillage, haying, and harvesting machines. The building is equipped with shafting, belting, and power for operating and testing various machines, and a large well is provided for making pump tests. A machine shed 52 by 56 feet, with concrete floor, is located directly south of the Farm Mechanics Building.

The Dairy Barn is a frame building with cement foundation and brick pilasters. The main part is 50 by 100 feet, two stories high, with two wings extending to the south, each 46 by 80 feet, one story in height. There is also a milk-room, boiler room, and fuel room, as well as bins for the storage of grain and feed. The cow stables are floored with concrete and provided with modern stanchions, milking machines, and feeding facilities. Wide aisles afford convenience to students and visitors. Three silos of different types, erected adjoining the Dairy Barn, are regularly utilized in the feeding of the dairy animals. The second story has storage capacity for one hundred tons of loose hay.

Horticultural Products Building. The building is of brick 72 by 46 feet in dimensions with full basement and two additional floors. The inside walls are of brick with enamel coating, and the floors are of water-proof material. The building is equipped with a 40-horse-power boiler for high-pressure steam. Ample provisions are made for hot and cold water and electric power. In the basement are located boiler and storage rooms, also juice room for the manufacture of fruit juices and vinegars. This room is equipped with hydraulic press, centrifuge, multiple drum, silver-lined filter and settling vats. On the first floor is located dehydrating equipment, such as three-tunnel Oregon drier with recirculation, and a steam heated experimental dehydrator of one-ton capacity. This is automatically controlled by compressed air. Preparation machines, such as power peeler, slicers, washers, etc., are located in this room. This floor also contains equipment for the manufacture of jams and jellies on a large scale. Equipment such as steam-jacketed kettles (capacity 50 gallons), vacuum pans, and parboilers are among the installations. A large research laboratory for chemical investigation of by-products of the fruit industry is also located on the first floor. On the second floor are located the canning laboratories, equipped with two complete lines of canning machinery. Cooling facilities are also provided for the proper handling of the canned products.

The Veterinary Building, a frame structure 56 by 65½ feet, is used for both instructional and Experiment Station work. The front part of the building consists of two rooms, lighted by skylights and large windows. One of the rooms is a small amphitheater, with a seating capacity of about one hundred and twenty. The arena is sufficiently large for casting animals for surgical work. The opposite room is used for dissection and for holding autopsies. The back part of the building is divided into two stories. The first floor consists of a dressing room, toilet, and shower-bath room, drug and instrument room, and stalls. The second floor has space for storing feed, and for housing guinea pigs and rabbits.

The Stock Judging Pavilion. The Animal Husbandry work of the College is greatly facilitated by a judging pavilion, which provides comfortable and commodious quarters for all of the demonstration work with livestock. The main room is 40 by 90 feet, well lighted and heated. A movable partition is provided whereby this large room may be divided into two smaller ones, each large enough for all ordinary purposes.

The Cattle Barn. The department of Animal Husbandry has a modern beef-cattle and sheep barn. It is located just west of the old barns, and has a floor space of 52 by 120 feet for sheltering stock.

The hayloft has a large storage capacity for three hundred tons of hay and straw. Adjoining the barn are several concrete-floored exercise lots and a new stave silo. Especial conveniences are provided for the feeding, watering, weighing, and handling of livestock. The west half of the barn is at present devoted to beef cattle and the east half to sheep, although it is planned that the entire barn will eventually be used for beef cattle.

The Poultry Houses. On a five-acre tract of land, lying southwest of Cauthorn Hall, have been erected several buildings for the needs of the department of Poultry Husbandry. The main poultry building is a three-story structure and is used principally for class, laboratory, and demonstration purposes. Besides the main poultry building there is an incubator house, with a capacity of twenty-four incubators and complementary apparatus; and a feed-storage building and a brooding house. There are also colony houses for laying and breeding stock and growing chicks. Part of the colony houses are movable and constructed upon a plan that could be adopted by any farmer. The colony brooding coops are also portable and are used for investigations in both natural and artificial brooding.

Hog Barn and Feeding House. The barn is designed especially for farrowing, and contains twenty-nine pens, with a four-foot alley running the length of the building from east to west. Concrete is used for the entire floor, the feeding troughs, and the automatic watering equipment. The feeding house is 28 by 40 feet in dimensions, three stories high. The ground floor is occupied by a driveway and entrance alley, root bin, two large grain bins, which extend through the second story, and a hopper for dumping grain into the elevator, which leads to the third floor. The second story provides room for the storage of straw, six smaller grain bins with hopper bottoms, and quarters for the herdsman. The third floor contains the grinder, motor, chutes to grain bins, and storage room for movable equipment. The total capacity of the building is 15 tons of roots, 6,308 bushels of grain, and 40 tons of straw.

The Military Stables, located just beyond the Dairy Barn, accommodate the ninety horses and mules which are used in common by the Artillery and Cavalry units. The stalls are double, with earth and wooden floors. There are two through driveways of concrete, ample storage space for forage, and farrier's supply room. Box stalls are provided for sick horses and private mounts of officers. Adjacent to the stables are the gun sheds housing the big guns and other equipment of the Artillery unit. There are also a blacksmith's shop, saddler's shop, artillery repair shop, and cavalry saddle room.

The South Heating Plant, located at the south end of the Armory, is a one-story, reinforced concrete building, with a concrete tunnel

and conduits leading to the various buildings on the south side of the campus. It contains three boilers, one two-hundred-ninety, one two-hundred-fifty, and one one-hundred-fifty-five horse-power, with the necessary equipment for heating the buildings connected with it.

The North Heating Plant, a one-story brick building in the rear of Apperson Hall, contains the requisite equipment for supplying various buildings with heat, light, and power.

THE INCOME OF THE COLLEGE

Funds for the support of the College in its three grand divisions of work, Resident Instruction, Experiment Station, and Extension Service, are derived both from the National Government and the State of Oregon, as follows:

FOR RESIDENT INSTRUCTION

FROM THE NATIONAL GOVERNMENT

Land-Grant Interest Fund. Interest under the land-grant fund accruing under the act of Congress of 1862 approximates \$11,500 a year. No part of this fund may be used for the purchase, erection, or maintenance of any building.

The Morrill-Nelson Fund. An additional annual appropriation of \$50,000 a year is provided in the Morrill Act of 1890 and the Nelson amendment thereto of 1907, with the same limitation as to usage indicated for the land-grant interest fund.

FROM THE STATE OF OREGON

The Millage Tax. The Resident Instruction work of the College is chiefly dependent for maintenance, including buildings and betterments, upon the income from the millage tax, as provided by the State Legislature of 1913, and by vote of the people May 21, 1920. The income from this source for the calendar year of 1923 is \$1,096,027.

From the entrance fees and non-resident tuition for the year 1922-23, Resident Instruction work derived an income of \$57,000, of which \$18,500 was from non-resident tuition.

FOR EXPERIMENT STATION

Funds for the Agricultural Experiment Station, including the main station at Corvallis and seven branch stations, each in an important agricultural section of the state, are derived from the National Government, the State of Oregon, and Oregon counties, as follows:

FROM THE NATIONAL GOVERNMENT

The Hatch Fund. Under an act of Congress, approved March 2, 1887, the College receives \$15,000 a year for the maintenance of an Agricultural Experiment Station, "to aid in acquiring and diffusing among the people useful and practical information on subjects connected with agriculture."

The Adams Fund. An act of Congress, approved March 20, 1906, provides an annual appropriation of \$15,000.

This fund is "to be applied only to paying the necessary expenses of conducting original research or experiments bearing directly on the agricultural industry" of the state, and therefore supplements the Hatch Fund in the maintenance of the Experiment Station.

For the support of the branch station at Moro the National Government expends annually about \$5,000, and for the branch station at Hermiston about \$3,000.

FROM THE STATE OF OREGON

State Funds. The State Legislature of 1923 made the following appropriations for agricultural investigations during the biennium, 1923-1924. For the general work of the Experiment Station, \$50,000; for crop pest and horticultural investigations, \$30,000; for soil, drainage, and irrigation investigations, \$15,000; for dairy investigations, \$15,000, making a total of \$110,000, or \$55,000 annually.

The state also appropriates \$44,500 annually for the support of branch experiment stations at Astoria, Burns, Hermiston, Hood River, Moro, Talent, and Union.

County Fund. The Hood River Station receives an additional appropriation of \$4,000 annually from Hood River county.

FOR EXTENSION SERVICE

FROM THE NATIONAL GOVERNMENT

The Smith-Lever Fund. This fund was established by the Smith-Lever Agricultural Extension Act passed by Congress May 8, 1914. By its provisions the Oregon Agricultural College received \$10,000 from the Federal Government to apply towards the support of the Extension Service for the fiscal year ending June 30, 1915. This sum was to be increased annually for seven years, the maximum being reached in the fiscal year 1922-23. In order to maintain Extension work, which had expanded rapidly during the war, Congress appropriated for the fiscal year 1919-20 a Supplemental Federal Smith-Lever fund of \$1,500,000, making available for that year the maximum Smith-Lever fund. Supplemental appropriations

in the same amount were provided for the two following fiscal years. For the year 1922-23 the Supplementary appropriation was reduced to \$1,300,000. For the year ending June 30, 1923, Oregon receives \$41,300.38 Federal Smith-Lever fund. This is the maximum increase under the Smith-Lever Act of May 8, 1914, and continues as a permanent appropriation as long as a sum equal to the increase over the basic \$10,000 be "appropriated for that year by the legislature" of the state, "or provided by state, county, college, or local authorities, or individual contributions within the state for the maintenance of the cooperative agricultural extension work provided for in this Act." Oregon's share of the Supplemental fund of \$1,300,000 is \$9,924.51, making the total Smith-Lever funds for the fiscal year 1922-23 \$51,224.89.

Department of Agriculture Cooperative Funds. For the fiscal year ending June 30, 1923, the United States Department of Agriculture has given Oregon \$24,600 for Extension work in agriculture and home economics, the state duplicating this amount up to \$15,000, as shown under "Cooperative Work." In addition, the Bureau of Biological Survey of the United States Department of Agriculture has appropriated approximately \$10,000 for rodent control work during the fiscal year.

FROM THE STATE OF OREGON

For General Extension Work. The state appropriates \$25,000 a year for general extension work, including extension schools, lectures, demonstrations in agriculture and homemaking, publications, and Farmers' and Homemakers' Week. Towards meeting the Smith-Lever increase the state appropriated \$55,087.48 for the biennium 1923-1924.

For Cooperative Work. For cooperative work with the United States Department of Agriculture, as above mentioned, the state appropriates \$15,000 a year.

For Rodent Control Work. The state appropriated \$7,500 for use in rodent control for the biennium 1923-1924.

For County Extension Work. To meet the appropriations made by various counties for maintaining county extension work, including agricultural and home demonstration agent work, the state is now appropriating approximately \$70,336 a year.

OFFICIAL PUBLICATIONS

The College Bulletin. This publication includes the Reports of the Board of Regents, the general College Catalogue, catalogues

of the several schools, special announcements of College courses of study, illustrated booklets depicting College activities of special interest or timeliness, announcements of the Summer Session, announcements of the Winter Short Courses, and circulars to prospective students.

Extension Bulletins. These bulletins consist of monographs on the various phases of Agriculture, Household Science and Household Art, Engineering, Mining, and Commerce, together with bulletins and circulars issued in connection with the Club work for boys and girls in the public schools and the Home Cooperative Demonstration Projects. These bulletins are written in such style as to be easily understood, thus meeting the popular demand for scientific knowledge and giving it in such form that the people of the state may profit by its application to the problems of every-day life.

Experiment Station Publications. The Station Bulletins include reports upon research problems and upon experimental investigations in agronomy, horticulture, drainage and irrigation, dairying, animal husbandry, poultry husbandry, insect pests, plant diseases, home economics, and special subjects of interest to the husbandman, conducted at the home station or the several branch stations. The Experiment Station also issues a series of circulars briefer and less technical than the bulletin series.

STUDENT ORGANIZATIONS

One of the most important factors in rounding out the results and benefits of a college course is the society, club, or association work. As a result of the diverse interests of college life and the varied tastes of the students, the following organizations, besides many others, are maintained by students and faculty.

GENERAL ORGANIZATIONS

The Student Body Assembly. This is an organization of the entire student body working under a constitution and by-laws approved by the faculty and having general authority over all student body enterprises. Officers are elected annually, nominations and elections being conducted in a manner similar to that of the state electorate. The officers consist of a president and a secretary chosen from the senior class, and three vice-presidents, chosen one each from senior, junior, and sophomore classes. These five officers, as a whole, constitute the executive committee of the student body and have general supervision of all affairs of interest to the student body.

The Board of Control. The Board of Control consists of three faculty members appointed by the President of the College, one alumnus chosen by the Alumni Association, and five students who are the executive committee of the student body. The student body constitution vests in this Board of Control authority to supervise all student body interests entailing the expenditure of student body funds. They exercise functions in the main by the approval of budgets and schedules. The immediate supervision is exercised through a general manager appointed by the Board of Control.

Student Self-Government. Student self-government at the College places the general disciplinary powers of the institution in the hands of the students. The Student Council, an organization made up of ten students, five of whom are seniors, three juniors, and two sophomores, has been created and vested with such powers as are necessary to enforce the rules and regulations adopted by the students. Three members of the Student Council hold that position by virtue of their office as president of each of the classes. The remaining members are elected annually by the student body.

The Greater O. A. C. Association. This Association, which includes the whole student body of the College, was organized in 1918 to promote the welfare of the state and the College by fostering a finer college spirit and a keener interest in higher education throughout the state. The students from each county in the state constitute a separate sub-organization with a chairman and other officers who work directly under the leadership of the Greater O. A. C. Executive Committee, composed of three students chosen by the student body at the regular election in the spring. The Association cooperates with the Alumni Association in work for a greater and better O. A. C.

Women's League. The Women's League, organized in 1916, includes all the young women of the student body. In the fall of 1919 it became a member of the Oregon Federation of Women's Clubs. The purpose of the League is to develop unity among the women of the campus and to promote the spirit of democracy. With the approval of the Dean of Women, who is vitally interested in all phases of the activities of the League, the young women determine the general regulations governing women students.

The Cosmopolitan Club. This organization of foreign and American students, installed in 1911, is the local chapter of the Association of Cosmopolitan Clubs of the World. Its purpose is to provide social and educational advantages for its members and to promote international friendship. At present nineteen countries are represented in the local chapter.

CHRISTIAN ASSOCIATIONS

Both the Young Men's and the Young Women's Christian Associations occupy a vital place in the life of the College community. Each association has a full-time general secretary on the campus.

The Young Men's Christian Association was organized at the Oregon Agricultural College in 1890. The Association has grown steadily, enlarging the scope and effectiveness of its work. During the war the Association was reorganized on the basis under which the Army associations operated in the training camps, and during the S. A. T. C. at the College the "Y" Hut was the center of varied activities and services which built up a remarkable morale among the men in uniform. The College "Y" is now performing a similar service among the student body. The Employment Bureau for Men is conducted by the Y. M. C. A. The Association brings to the College each year a number of distinguished leaders whose addresses are stimulating and inspiring. The writing rooms, committee rooms, the auditorium, and stage have been at the service of the students for social, religious, and other student activities. The Hut continues to be used for College "sings," "movies," and other entertainment vital to the life of the institution. The "Y," in short, is firmly established as a strong inspirational influence in the life of the College.

The Young Women's Christian Association aims to cooperate with all forces of the College and of the community in promoting among the women students a well-developed life. The General Secretary is at the service of all of the women of the campus, at the Association headquarters in Shepard Hall. Those who wish to earn their way through College should apply to the General Secretary, who has charge of the Employment Bureau for Women. On registration days young women of the Y. W. C. A. meet the incoming students and assist them in adjusting their work. The meetings of the Association are held the first and third Thursday of every month. All women are cordially welcome to these meetings. Bible, mission, and industrial study classes, community service, parties, and teas form part of the year's program. Over half of the women in the College are members of the Y. W. C. A.

ATHLETIC ORGANIZATIONS

The Athletic Association. This organization, maintained by the students through the student body assembly, encourages wholesome competition in the various outdoor and indoor intercollegiate sports. It has charge of all details pertaining to the conduct of intercollegiate athletics in which the College may be interested. A committee of

the faculty has general supervision over the whole subject of athletics, thus assisting to insure a sound and conservative management.

The Varsity O Association. This association, which succeeds the Orange O club, includes all men of the College who have been officially awarded the Orange O in recognition of service on the intercollegiate athletic teams of the College. The function of the Varsity O Association is to promote the athletic ideals of the College and to serve in an advisory capacity to the Athletic Board of Control.

FORENSIC AND DRAMATIC ORGANIZATIONS

O. A. C. Forensic Association. This is a new organization with the purpose of bringing together for cooperative activity all campus organizations and individuals interested in any phase of forensics. This society through its members has charge of all business pertaining to competitive work in oratory and debate and cooperates in the promotion of forensics and dramatics at the College.

Intercollegiate Debate and Oratory. Each year the Oregon Agricultural College has three intercollegiate debates, putting into the field six teams, three supporting the negative and three the affirmative of the same question. The College sends one representative each year into the old-line State Oratorical Contest in which eight colleges take part, and a representative to an interstate contest in which seven colleges of the West participate (Stanford, Whitman, Washington State, Puget Sound, Pacific University, Montana, and Oregon Agricultural College). Monogrammed sweaters and medals are awarded to the men and women who represent the College in these events.

Local Debate and Oratory. There are interclass and interfraternity contests in debate, oratory, and extempore speaking, those in extempore speaking being carried on in connection with the classes in public speaking. A money prize is given for the best extempore speaking by a student in these contests. In the annual interclass forensic-athletic championship contest two representatives from each class participate. The winner represents the College in the state contest.

The Mask and Dagger. This club was organized for the purpose of offering special training in dramatic art. A try-out is held at the beginning of the college year in which all students except freshman men may participate. If elected by the club's judges they become eligible to try out for college plays. Successful participation in a college production entitles them to active membership in the club. No student, however, will be permitted to take

part in a public production who has not an average for all his College work, at the time the play is being prepared, of at least 75 percent. Platform exhibitions are given and standard plays presented during the college year.

Literary Societies. The Shakopean Literary Society, organized in 1918, is open to men and women of the student body, with a membership limit of thirty-five. The purpose of the organization is encouragement of public speaking. Features of the meetings are debating, oratorical contests, and discussion of current topics. The Lincolnian Literary Society, organized in 1921, fills a similar field.

The Lyceum Club, organized in 1922, prepares students to give musical programs, lectures, and full evenings of readings. Programs are presented in towns of the state. Election to membership depends upon recommendation of the School of Music and the department of Public Speaking and Dramatics.

MUSICAL ORGANIZATIONS

Musical organizations at the College are directed and coached by members of the faculty of the School of Music. Further details may be found by referring to the section of the Catalogue devoted to the School of Music.

The College Band. To become a member of the College Band a student must pass a satisfactory examination in the elements of music and ability to perform on his instrument. Attendance at rehearsals and individual practice are required. Members furnish their own instruments, except basses, baritones, altos and drums, which are furnished by the College. Instruments must be in low pitch.

The Orchestra. Membership in the College Orchestra is on a basis of standards of musical attainment determined by the conductor of the Orchestra. The training afforded by membership in the Orchestra is of great educational and cultural value to the student.

The Glee Club. Membership in the Glee Club is determined by the director after personal examination of the voices of candidates from all classes in the College. Regular rehearsals are required. The club participates in many public campus functions, and annually tours the state. The programs presented are composed of the best classical and popular music for men's voices, the preparation of which is a valuable experience in voice culture and interpretation.

The Madrigal Club. The Madrigal Club is a singing organization for young women open to talented singers throughout the

student body. The club is honored by membership in the National Federation of Music Clubs. Concerts by the Madrigal Club include the most beautiful classical arrangements for women's voices, as well as those termed "popular," and frequently this club presents an opera in conjunction with the Glee Club.

The Mandolin and Guitar Club. This organization fills a place in student life for those enjoying the "small strings" in combination. The club is open to all qualified students, and numbers among its members some of the most highly gifted student musicians on the campus.

TECHNICAL CLUBS

A number of clubs and associations in the various technical schools and departments have as their object the advancement of interest and information in the respective technical fields. Among these clubs are the Agricultural Club, Horticultural Club, Withycombe (Animal Husbandry) Club, Farm Management Club, Dairy Club, Soils Improvement Club, Oregon Agricultural College Chamber of Commerce, Civil Engineering Club, Electrical Engineers, American Association of Engineers (O. A. C. chapter), Forest Club, Chemical Engineering Society, Home Economics Club, Miners Club, Pharmaceutical Association, R. O. T. C. Association, and Society of Military Engineers.

HONOR SOCIETIES

Various societies having as their chief purpose the promotion and recognition of scholarship elect annually from among the student body limited numbers of those who have shown superior scholastic attainment, qualities of leadership, and personal character. The fact that most of these societies are national in scope, with chapters in the leading colleges and universities and with uniformly high standards for membership, makes election to one of the honor societies a distinction greatly prized. The following list includes the honor societies at present represented at the Oregon Agricultural College.

- Alpha Kappa Psi (Commerce, men, O. A. C. chapter established 1914).
- Alpha Zeta (Agriculture, men, O. A. C. chapter established 1918).
- Beta Alpha Psi (Accounting, men, O. A. C. chapter established 1922).
- Chi Epsilon (Chemical Engineering, established 1918).
- Delta Psi Kappa (Physical Education, women, O. A. C. chapter established 1920).
- Delta Sigma Rho (Forensic, men, O. A. C. chapter established 1922).
- Eta Kappa Nu (Electrical Engineering, O. A. C. chapter established 1921).
- Euterpe (Music, women, established 1920).
- Forum (General honorary, men and women, established 1914).
- Gamma Sigma Delta (Agricultural, O. A. C. chapter established 1909).
- Lambda Phi Lambda (Engineering, established 1920).

Omicron Nu (Home Economics, O. A. C. chapter established 1919).
Phi Theta Kappa (Commerce, women, O. A. C. chapter established 1920).
Rho Chi (Pharmacy, men and women, O. A. C. chapter established 1919).
Scabbard and Blade (Military, O. A. C. chapter established 1920).
Scribe (Local, journalistic, women, established 1921).
Sigma Delta Chi (Journalistic, men, O. A. C. chapter established 1920).
Sigma Tau (Engineering, O. A. C. chapter established 1913).
Tau Beta Pi (Engineering, O. A. C. chapter established January, 1922).
Xi Sigma Psi (Forestry, O. A. C. chapter established 1921).
Zeta Kappa Psi (Forensic, women, O. A. C. chapter established 1921).

STUDENT PUBLICATIONS

The Barometer. In March, 1896, the literary societies of the College began the publication of a monthly periodical, the "O. A. C. Barometer." The enterprise met with deserved success, and "the organ of the student body" is now issued as a four-page, six-column daily. It publishes the news of the College, and is of general public importance as representing the interests, character, and accomplishments of the student body at the College. By action of the Board of Regents, resulting from a unanimous recommendation of the student body, a portion of the regular term student fee of \$5.50 is devoted to the "Barometer," and every student regularly receives the paper.

The Beaver. The annual publication of the junior class made its initial appearance as "The Orange" in 1907. It is a high-class publication, substantially bound, and fully illustrated with photo-engravings, pen-and-ink sketches, and line and wash drawings. It is a full-dress carnival of the year's life, representing the dignity, the beauty, the versatility, the gaiety, the traditions, the sentiment, and the solidarity of the Oregon Agricultural College.

The Oregon Countryman. This is an illustrated monthly magazine, published by the students in Agriculture and Home Economics under the supervision of the faculties of these schools. It is designed to be of special service to the farm home. Besides dealing in a practical manner with the various College departments, it contains articles of scientific value contributed by the Experiment Station workers. Successful men and women of the state contribute articles for each issue.

The Student Engineer. This is a semi-annual magazine devoted to engineering and mechanic arts. Its purposes are to record engineering progress in the Northwest; to furnish news; to publish records of scientific work done by students in this institution; and to publish any matter of special technical and scientific interest to civil, mining, mechanical, and electrical engineers, and foresters and others engaged in technical pursuits.

The O. A. C. Directory, a magazine published twice a year by the students of the School of Commerce under the supervision of the faculty of the School, is devoted to the commercial interests of the College and the state. Articles of merit are contributed by students, faculty, and prominent business men of the state. A feature is the publication each year of a complete directory of all the members of the institution, students, faculty, and employees.

The O. A. C. Alumnus. This is a monthly periodical edited and issued for the Alumni Association by the Secretary of the General Alumni Association of the Oregon Agricultural College, whose office is at the College.

The Orange Owl. This publication, issued quarterly during the college year, is designed to promote creative talent among students in the expression of wit, humor, verse, prose fancy, whimsical essay, pen sketch, and cartoon. The initial publication appeared during Junior Week End in the spring of 1920.

The Annual Cruise is an illustrated magazine published by the Forest Club. Its objects are more closely to unite the forestry and lumbering interests of the Pacific Northwest, to advance scientific forestry and lumbering, and to promote forest interests in every feasible way. Articles of technical value are contributed by members of the faculty and by graduates, experts in their respective fields of effort.

STUDENT EXPENSES

GENERAL FEES

The regular College fees, except for special students in Music who take no other College work, are as follows:

Registration fee	\$10.00
Payable annually by each student at the time of registration. In no case will any part of this fee be refunded.	
Registration fee, Summer Session	\$10.00
All students attending the summer session pay this fee at the time of registration. In no case will any part of this fee be refunded.	
Late Registration fee	\$1.00 to \$5.00
Students registering after the scheduled registration dates of any term are charged a late registration fee of \$1.00 a day up to a maximum of \$5.00.	
Incidental fee	\$5.50
This fee, payable each term at the time of registration, is levied by the Student Assembly and gives every student of the College the benefits of the Health Service, admission to all athletic events on the campus, all concerts by student music organizations, all forensic contests, all Lyceum entertainments directed by the Student Assembly, and a subscription to the student newspaper, the Daily Barometer.	

OREGON AGRICULTURAL COLLEGE

Student Union Building fee	\$3.00
Payable each term at the time of registration. This fee is collected at the request of the Student Assembly as a result of a tax voted by the students to produce funds for the purpose of providing a Student Union Memorial Building.	
Physical Education fee	\$1.50, \$1.75
Charged each student to cover the cost of locker, towels, and supplies used by the student in the gymnasium. The fee for women is \$1.50 and for men \$1.75. Men are also required to make a towel deposit of seventy-five cents.	
Class Fees—	
Freshman	\$0.30
Sophomore	\$0.50
Junior	\$0.75
Senior	\$1.00
Collected at the request of the class of which the student is a member for the purpose of supporting the class organization.	
Non-Resident Tuition fee each term	\$35.00
Students not residents of Oregon pay non-resident tuition fees. Students who entered the institution prior to September, 1921, are not subject to non-resident fees. Those entering after September 1, 1921, but before September, 1922, pay a non-resident tuition fee of \$20.00 a term or \$60.00 a year. Non-resident students entering September 1, 1922, pay the fee indicated above. Non-resident students who served in the recent World War pay one-half the regular non-resident fee.	
Diploma fee	\$5.00
Charged each student at the time of graduation to cover costs of diploma.	
Binding fee for graduation thesis	\$1.00
If a thesis is prepared in meeting graduation requirements this fee is charged to cover cost of binding.	
Special Examination fee, each course	\$2.00
Any student upon the approval of the dean and the head of the department concerned and the payment of this fee is entitled to the privilege of taking a special examination for advanced credit. This fee is also charged if a final examination in a regular course is given in advance of the time on which it is officially scheduled.	
Change Slip fee	\$0.50
If the student makes any change in his official program after ten days from the registration date of any term this fee is charged for each change slip filed.	
Reinstatement fee	\$2.00
If for any reason a student's registration is canceled during a term for failure to comply with College regulations but is later allowed to continue his work the reinstatement fee is charged.	
Transcript fee	\$1.00
Each student upon request is entitled to an official copy of his record on file in the Registrar's office. If at a later date additional transcript is requested the fee will be charged.	
Military Uniform Deposit	\$10.00
Each year this deposit is required of all men registering for work in the Military department. This money is refunded at the close of the year or when the student withdraws from the course, returning to the Military department the clothing issued.	

Physical Education deposit\$.75
 Towel deposit required of all men. Refund is made when towel is turned in at the close of the course.

Laboratory fees and deposits—

Students are charged fees in certain laboratory courses to cover the cost of material used. These fees vary from twenty-five cents to \$7.50 per course.

Deposits are required in several of the courses to cover the cost of breakage when equipment is used where breakage is likely to occur. At the close of the term deductions are made to cover cost of breakage charged against the student, the balance being refunded. The deposits vary from fifty cents to \$15.00 per course.

Laboratory fees and deposits average approximately \$10.00 a term. The fees and deposits charged may be found in connection with the catalogue description of the individual courses.

COST OF A YEAR AT THE COLLEGE

The cost of a year at the College will vary slightly with the particular curriculum pursued by the student. In general it may be said that the necessary cost of a college year averages from \$400 to \$600. Such personal items as clothing, carfare and amusements vary according to the thrift, discriminations, and habits of the student. Some students spend more than the average indicated, while others keep their expenses at a lower figure.

Men in the R. O. T. C. receive their uniforms from the Government without cost to themselves. Men are required to supply themselves with a gymnasium suit and regulation gymnasium shoes at a cost of about \$4.00. Women are likewise required to provide themselves with the regulation gymnasium suit and shoes. The cost is about \$6.00.

An estimate of the average necessary cost of a college year is summarized below. The figure for board and room is estimated at a safe average price.

Annual registration fee	\$10.00
Incidental (Student) fee (\$5.50 a term)	\$16.50
Student Union Building fee (\$3.00 a term)	\$9.00
Laboratory fees and deposits (average)	\$30.00
Text-books and supplies	\$20.00 to \$60.00
Board (for nine months)	\$180.00 to \$250.00
Room rent (for nine months)	\$45.00 to \$100.00
*Tuition for students not residents of Oregon	\$105.00

The cost of gymnasium equipment should be added. Such uniforms, however, should serve for more than one year.

It is not recommended that any student come to the College without sufficient funds available to purchase his books and supplies for one entire term, pay his first month's board and room rent in

*Not paid by non-resident students registered at the College before September 1, 1922, except that non-resident students registered during 1921-22 continue to pay tuition of \$60 a year. Only one-half this tuition fee is charged non-resident students who served in the World War.

advance, and pay his first term fees. For the average student, this initial outlay will be approximately \$100, exclusive of non-resident tuition fees, the balance of the annual expenses being distributed about evenly throughout the remaining months of the college year.

BOARD AND ROOM

Halls of Residence for Women. Cauthorn, Margaret Snell, and Waldo halls, with their large airy parlors and rooms, are pleasant residences for the young women. The buildings are supplied throughout with pure mountain water, both hot and cold, electric lights, steam heat, and other modern conveniences. The rooms are furnished with single beds, mattresses, dressers, tables, and chairs. Such other materials as are needed to make the furnishings complete, including pillows, pillow-cases, sheets, blankets, bed spreads, curtains, rugs, and towels are furnished by the student. The bedrooms average about 12 feet by 15 feet, with one window 3 feet by 7 feet. Many of the rooms are larger, and a few of them have two or three windows. All rooms in Margaret Snell Hall have two or more windows. There are a limited number of single rooms in each hall. Preference for single rooms should be indicated early. The many advantages of having a roommate should not be overlooked by the student in making her plans for college life.

The conditions of living in the dormitories are such that the College considers it a distinct advantage to the women students to live in these halls of residence. A wholesome, busy student atmosphere is maintained. Reasonable freedom is allowed, but week nights are reserved for study. All girls entering the College are expected to live in one of the dormitories, unless their parents reside in the city, or they are given special permission from the Dean of Women to live elsewhere. This permission must be obtained from the Dean of Women previous to registration.

The expenses for living for each student in the dormitories are as follows:

Room deposit	\$ 3.00
Room rent for each term—	
Single room	30.00
Double room	15.00
Board per week, payable in advance	5.00
Incidentals, such as laundry fee, electric iron fee, etc., for each term	2.00

The College authorities reserve the right to increase the price of room and board should advancing prices make it necessary. A corresponding decrease will be made whenever decreased prices make it possible.

The room deposit of three dollars must be sent to the Director of Dormitories at time of application for a room. If the student withdraws from College, this deposit will be refunded, upon presentation of the receipt, if no damage has been done to the room or furnishings. In case a student who has applied for a room does not enter the College the deposit will be refunded provided notification is sent at least one week before opening date.

Women students are not expected to arrive in Corvallis until the day the halls are opened. The dormitories will open for students on the Saturday preceding opening date.

Men's Dormitory. The rooms in the Men's Dormitory accommodate from two to four students each. The rooms all have large windows, averaging in space 4 by 4 feet for each occupant. Comfortable cots, study tables, chairs, drawers, closets, and other conveniences are furnished. Each occupant furnishes the following articles: pillow, pillow-cases, mattress cover, sheets, blankets, bed spread, towels, soap, and individual toilet articles. Rugs, pictures, laundry bag, and similar accessories may be provided to suit the student's desires.

In the large, well-lighted basement, with cement floor, a cafeteria provides wholesome meals at cost. The cafeteria is open to students whether living in the Dormitory or not.

Rooms in the Men's Dormitory are assigned in the order that applications are received. Changes in the assignment may be arranged by communication with the designated authorities of the College. A deposit fee of three dollars is required, which will be refunded at the close of the year, less any deductions necessary to repair damage or abuse. During 1922-23 a uniform fee of \$12.00 a term (approximately twelve weeks) was charged each occupant of the Dormitory for room accommodations.

Private Board for Men Students. Board and room may be secured in private families in the city of Corvallis. Good accommodations for self-boarding, or for club-boarding, can also be secured in the city. By clubbing, or renting rooms and boarding themselves, students materially reduce the cost of living. Students, however, will not be permitted to live at places not approved by the Faculty. Lists of private boarding places can be secured from the Secretary of the Y. M. C. A. after the student arrives at the College.

Student Housing Committee. The Committee on Student Housing is chiefly concerned in seeing that all students are properly lodged. It endeavors to aid students in securing suitable rooms in private homes at reasonable rental; attempts to standardize such rooms in respect to equipment, sanitation, etc.; aids organized groups of students in locating suitable building lots, confers with them regarding their plans for building or buying houses, and aids them

in their arrangements for financing such projects. All leases of realty, all contracts for the purchase of lots or houses, all financial arrangements for the building of houses, are, before execution, subject to inspection, revision, and approval by the Committee on Student Housing.

SELF-SUPPORT

A considerable number of students manage, in one way or another, to earn the whole or part of their expenses while attending the College. Such opportunities occur in the line of office and laboratory assistance, personal services of numerous kinds, the management of various student enterprises, agencies for laundries, etc.

The Student Employment Bureaus, conducted by the campus Y. M. C. A. and Y. W. C. A., register without charge students who apply for employment. It is the purpose of the Bureaus to try to supply work, regular or occasional, to all who need it. In general, the demand for work on the part of students exceeds the supply that the Bureaus have available; therefore the attention of new students who intend to earn all or part of their living is called to the following results of past experience:

(1) The applications received during the summer will be given first attention; but no student should expect to be able to secure employment by correspondence.

(2) There is a constant over-supply of those wishing to do teaching and clerical work. None but those having superior qualifications and experience are likely to secure employment the first term.

(3) There is a considerable demand for efficient stenographers; also for men and especially women students who can do domestic labor of any kind; board and room rent may be earned by table service, dish washing, general housework, house cleaning, gardening, etc.

(4) Students who can do any kind of domestic or manual labor well, and who have thoroughly good health, can earn their board by three hours' work a day, or board and room by four hours' work a day. But no student should come to the College without resources sufficient for the expenses of one term. Work of any kind is much more readily secured after the student has had opportunity of becoming familiar with local conditions.

(5) No student should come expecting to earn money if he can do nothing well; skill is essential, as competition is quite as severe in the College community as elsewhere.

(6) Opportunities for earning money during the summer vacations can usually be counted on. The demand for forest rangers, for field workers in engineering and mining, for skilled workmen in engineering shops, factories, canneries, and hop-yards, and for horticultural, farm, and forestry laborers, is constant.

Women students desiring work in the Dormitories should apply early to the Director of the Women's Dormitories. The Dean of Women will be very glad to give any information to parents and prospective students concerning any matter of interest to women who are planning to enter the College.

HEALTH SERVICE

The College Health Service, inaugurated in 1916, is a department maintained with the aim of promoting the health of all the students. This aim is sought through medical examination, through consultation during office hours, through attendance of the College physician upon those in hospital and those ill at their residences, through sanitary inspection, and through supervision in case of epidemics. The services of the department, except insofar as the welfare of the College community may require, are not imposed upon any student or group of students. They are available, however, to all students who seek them voluntarily.

The department staff comprises two regular full-time physicians, whose headquarters are at the Health Service Building; two resident graduate nurses, who are in attendance at the same building, and two graduate nurses who are in attendance at the hospital, located at Ninth and Harrison Streets.

The Health Service is maintained by funds derived from the regular student fees, one-third of such fees being devoted to this purpose. The College physicians may be consulted during office hours by any student. They give medical examinations by appointment, and medical advice and attention to those who are ill. They authenticate excuses for absences from College work because of illness.

Patients who require hospital service for illness incurred while in College will be accommodated at the O. A. C. student hospital, where they receive free hospital service for a period not exceeding ten days. Hospital fees at the rate of \$2.50 a day will be charged for periods exceeding the ten days covered by the student fees.

LOAN FUNDS

Student Loan Fund. Through the liberality of friends of the Oregon Agricultural College and through the accumulation of interest on loans, an irreducible student loan fund aggregating \$22,041.01 (February 1923) has been established. The purpose, as expressed by one of the donors, is "not to induce students to attend school by providing money that can be easily obtained, but rather to aid those who have determined to secure an education and are paying the cost wholly or in part from their own earnings."

The fund consists of the following contributions:

(1) One thousand dollars (\$1,000) from Hon. R. A. Booth of Eugene, restricted to students studying:

(a) Agriculture in its various phases, with a view to becoming producers from the soil.

(b) Such branches of mechanics as properly relate to agriculture.

(c) Home Economics.

(2) Five hundred dollars (\$500) known as the Ashby Pierce Student Loan Fund.

(3) One thousand dollars (\$1,000) from the College Domestic Science Dining Room at the Panama-Pacific International Exposition, restricted to the use of women students.

(4) Four thousand six hundred dollars (\$4,600), without restriction, from accumulated interest and from various College organizations, such as Folk Club, Philadelphian and Feronian Literary societies, the Barometer, the Oregon Countryman, the Cosmopolitan Club, the Faculty, the Alumni, the Christian Associations, the Winter Short Course students of 1914, the Graduating Class of 1915, Chapter AL of P. E. O., Portland, and by various individuals, including Mrs. Clara H. Waldo, Portland; Hon. Thomas Kay, Salem; Hon. James Withycombe, and W. D. Wheelwright.

(5) Eight thousand seven hundred and seventy-six dollars and thirty-three cents (\$8,776.33) has been received to date from late registration and change slip fees.

L. J. Simpson Student Loan Fund. The College has received a gift of \$1,000 from Mr. L. J. Simpson of North Bend, Oregon, which sum is loaned to worthy students under the same conditions as apply to money in the Student Loan Fund.

The J. T. Apperson Agricultural College Educational Fund. By the will of the late Hon. J. T. Apperson, Regent of the College since its foundation, a fund amounting to between twenty-five and forty thousand dollars is to be a perpetual endowment, administered by the State Land Board of Oregon, for the assistance of worthy young men and women, "who are actual bona fide residents of the State of Oregon, and who would otherwise be unable to bear the expense of a college course at the Oregon Agricultural College." The income from this estate is to be loaned to students at a low rate of interest. Applicants for loans must be recommended to the State Land Board by the President of the College and the State Superintendent of Public Instruction.

The Masonic Educational Fund. The Grand Lodge of the State of Oregon has assigned two thousand dollars (\$2,000) to a fund which may be used by needy sons and daughters of Master Masons. Loans from this fund are made at the discretion of the Trustees of the Grand Lodge, upon the recommendation of the President of the College and the approval of the master and wardens of the Lodge at Corvallis. Loans to any one student may not exceed three hundred dollars (\$300) in a school year, subject to repayment in full or in installments at the borrowing student's earliest convenience.

The Harmon Foundation. This corporation of New York City, founded for the sake of assisting worthy self-supporting students in the last two years of their collegiate courses, assigned one thousand dollars (\$1,000) to the Oregon Agricultural College during the year 1922-23. This money is loaned under conditions novel

to this foundation, perfectly protecting the principal yet requiring no security from the student. Loans made under this fund must be repaid by regular payments begun not later than twelve months after graduation or the leaving of school. A five-year affiliation with the College by this Foundation is contemplated with the understanding that this amount will be increased in subsequent years.

The Simon Benson Fund. Mr. Simon Benson of Portland has placed the sum of two thousand dollars (\$2,000) on deposit with the Loan Committee for the assistance of needy and worthy students. These funds are administered in the same manner employed with the other moneys of the regular Student Loan Fund.

Bernard Daly Educational Fund. Under terms of the will of the late Dr. Bernard Daly of Lakeview, Oregon, worthy self-supporting young men and women of Lake county, Oregon, may receive a part or all of their necessary college expenses. The terms of the will provide that the income from this fund be used to pay the college expenses of at least fifteen students each year. The fund is administered by a board of trustees who select candidates annually from a list of applicants recommended by the county judge and county school superintendent.

PRIZES

The Clara H. Waldo Prize of one hundred and forty dollars is an award annually made in the proportions of fifty, forty, thirty, and twenty dollars respectively to the woman of highest standing registered as a regular student in one of the degree curricula in the senior, junior, sophomore, and freshman year.

The A. J. Johnson Prize of one hundred and forty dollars is an award annually made in the proportions of fifty, forty, thirty, and twenty dollars respectively to the man of highest standing registered as a regular student in one of the degree curricula in the senior, junior, sophomore, and freshman year.

In the distribution of the Waldo and Johnson prizes, the committees having charge of the awards are guided by the following points:

- (a) Proficiency in scholarship.
- (b) Success in student activities.
- (c) Qualities of manhood or womanhood.
- (d) Qualities of leadership.

The Joseph H. Albert Prize of twenty-five dollars is an award annually made to the senior student who is adjudged by a joint

committee of faculty and students to have made the greatest progress toward the ideal of character, service, and wholesome influence.

The J. M. Dickson Scholarship of one hundred dollars, established by the estate of the late J. M. Dickson to commemorate his service to the dairy industry of the state and his faith in education as a factor in the development of agriculture, is awarded annually at the end of the junior year to the student majoring in Dairy Husbandry who in the opinion of the departmental staff excels in scholarship and initiative, and gives promise of attaining leadership in some phase of the dairy industry.

The Mountain States Power Company Prize. This prize, offered by the Mountain States Power Company, is a silver loving cup presented to the senior man who during his entire college career has maintained a high standard of scholarship and manhood and has excelled in athletics.

The Jacob Reichart Prize. Through the generosity of Mr. Jacob Reichart, whose sons were prominent in debating while at the College, an award of twenty-five dollars is made annually to the student showing the greatest ability in forensics.

DEGREES AND CERTIFICATES

The Oregon Agricultural College confers the following degrees: B.Sc., M.S., C.E., E.E., M.E., Ph.C.

Graduates of major courses in Music receive the Music Diploma.

REQUIREMENTS FOR THE BACHELOR'S DEGREE

The degree of Bachelor of Science in Agriculture, in Forestry, in Logging Engineering, in Home Economics, in Electrical Engineering, in Civil Engineering, in Mechanical Engineering, in Mining Engineering, in Chemical Engineering, in Commerce, in Pharmacy, in Military Science and Tactics, in Vocational Education, and in Industrial Arts, is conferred upon those who have satisfactorily completed the respective four-year curricula, each of which in the aggregate comprises 192 credits of collegiate work in the case of women, and 207 in the case of men, of which latter 12 are taken in Military Science and Tactics. A graduate in any of the curricula receives the bachelor's degree in any other curriculum by completing the studies required in that curriculum.

REQUIREMENTS FOR THE HIGHER DEGREES

Graduate work is done in the several departments of the College under the general supervision of a standing committee of the Faculty known as the Committee on Graduate Students and Advanced Degrees. A complete outline of the work to be pursued by the student, meeting the College requirements for the particular degree sought, must be approved in advance by his major professor and the Committee on Graduate Students and Advanced Degrees. Candidates for any one of the higher degrees are required to complete a certain minimum of resident work, to prepare a suitable thesis, and to pass an oral examination.

The resident work may be completed in a single year by a student who devotes full time to his studies; it consists of a minimum of 48 credits, including the preparation of the thesis. Graduate credit from other institutions will not be accepted as reducing this minimum. From 24 to 36 of these credits must be devoted to the thesis and to allied subjects in the same department, and will constitute the candidate's major. Work towards the major of a student specializing in any of the technical departments of the College may be taken in allied pure-science departments. For example, it may be necessary for a student majoring in Dairy Husbandry to take work in dairy bacteriology with the department of Bacteriology or a problem in dairy chemistry with the department of Chemistry, etc. From 12 to 24 credits must be selected from other departments of the College and will constitute the minor. Undergraduate work of junior or senior rank may, at the discretion of the committee, be taken as a part of the minor, but when so taken the number of credits allowed for any course will be reduced to two-thirds of the number listed in the catalogue, the assumption being that the candidate can, in work of that grade, accomplish as much in two hours as the average undergraduate in three. No credit toward the major shall be allowed for any regular undergraduate course. At the time of registration, the student shall file with the chairman of the Committee on Graduate Students and Advanced Degrees an outline of each course to be taken for credit toward his major. A sample form of such outline may be obtained from the chairman of the committee.

Each candidate for the degree of Master of Science is expected to be familiar with the principles of the scientific method and with the general facts in the history of the development of science, especially within his particular field.

Each candidate for the Master's degree shall prepare a thesis upon some subject approved by the head of the department in which the student is doing his major work and by the Committee on

Graduate Students and Advanced Degrees. This thesis shall be of such character as to require not less than six nor more than twelve credits of work. The thesis subject, accompanied by the student's outline thereof, shall be filed with the chairman of the committee on or before the opening of the second term of the student's registration as a graduate student. The thesis must embody the results of investigation, though not necessarily original research, and a typewritten copy of the thesis, prepared according to the specifications of the committee, must be deposited with the chairman of the committee not later than two weeks prior to the date set for Commencement of the year in which the degree is desired.

After the thesis has been deposited, the chairman appoints a special examining committee and sets a date for the oral examination. This special committee consists of: (1) the one or more professors in charge of the major; (2) the one or more professors in charge of the minor; and (3) one or more members of the Committee on Graduate Students and Advanced Degrees. The report of this committee is presented to the College Council by the chairman of the Committee on Graduate Students and Advanced Degrees. The chairman will deposit the theses of successful students with the Librarian as soon as possible after the oral examination.

Higher degrees are conferred only at the regular commencement exercises, but the committee may under exceptional circumstances permit the candidate to be absent from such exercises.

Graduate students pay the same entrance, incidental, diploma, and binding fees as undergraduates. Laboratory fees are in each case determined by the head of the department concerned, and must be paid at the beginning of the term in which the laboratory work is done.

ADMISSION TO THE COLLEGE

A. ADMISSION AS REGULAR STUDENTS

In order to be admitted to the Oregon Agricultural College a student must be of good moral character and must present evidence of preparation sufficient to pursue profitably the curriculum for which he desires to register. When a student can not present such evidence he must take the regular entrance examinations of the College, held at the beginning of each term. These examinations are based in general upon the outlines in "Course of Study for the High Schools of Oregon" issued by the State Department of Education, Salem, Oregon.

The specific requirements for entrance to the different courses at the College are as follows:

Degree Curricula. Students sixteen years of age or over, who have completed 15 units of high school work in a high school recognized as standard, will be admitted to the degree curricula on presentation of a recommendation of the principal, showing work completed. It is requested that this statement be made on the "Certificate of Record" blank used by the higher institutions of Oregon. Copies of this blank will be sent by the Registrar upon application of either student or principal. The certificate, properly signed, should be filed with the Registrar of the College at least two weeks before the opening date. Applications received subsequent to this time will not be rejected, but it will be impossible to acknowledge receipt of certificates and students will likely be delayed in completing registration.

The 15 units of work presented for entrance must include the following:

(1) English 3 units; Elementary Algebra, 1 unit; Plane Geometry, 1 unit*.

(2) Six additional units† to be chosen without restriction from among the following subjects: English, Mathematics, Foreign Languages, Laboratory Sciences, and History (including Civics). In Forestry, Mines, and all branches of Engineering, including Chemical Engineering and Military Engineering, these latter units must include $\frac{1}{2}$ unit in Higher Algebra.

(3) Enough additional units selected from subjects credited towards graduation by standard high schools of Oregon must be presented to make a total of 15 units. No credit, however, is accepted in Drill, Spelling, Physical Training, Penmanship (except in Commerce), or for work which may be classed as largely a student activity. The College accepts one unit of entrance credit in case of students who have satisfactorily completed at least two years of work in the Junior division of the R. O. T. C.

One unit of Music is also acceptable and in cases where additional Music credits of a high grade are presented a maximum of two units may be allowed, provided other units in Groups 2 and 3 are properly balanced and do not represent a smattering of various subjects.

* Not required in Commerce.

† In the School of Commerce students will be accepted who present 2 instead of 6 additional units from subjects listed under (2), or 3 units under (2) if Geometry is not offered; provided they present at least 4 units in Commerce subjects. In case such students should subsequently desire to transfer to another school within the institution, however, they must meet the requirement of 6 additional units from subjects listed under (2). Such students must, of course, submit a total of fifteen units.

Fifteen Acceptable Entrance Units Required. A student offering 15 acceptable units, but deficient in certain of the required subjects may be admitted as a conditioned freshman, the condition to be removed at the earliest possible date.

Graduates of accredited high schools (offering 15 or more entrance units) who are deficient in any of the prescribed units listed under (2) may be permitted to make up the deficiency by substitution in the following way: If, for example, a student were to offer only five units prescribed under (2) above, but had a unit in some phase of field, shop, or laboratory work, equivalent to work in the college curriculum, he might, with the approval of the School concerned, receive credit in advanced standing (i. e., collegiate) for this work, and remove his condition by taking a subject from the group listed under (2) in its place.

A unit is defined as one high school subject carried for five 45-minute periods a week throughout the school year. A student is required to earn $7\frac{1}{2}$ college credits for each entrance unit that he lacks. Entrance credits other than those from accredited high schools are evaluated by the Entrance Committee.

While Physics is not prescribed as an entrance requirement, students who are preparing to enter the School of Engineering are urged to take a year's work in high-school Physics where the work is available. Students in the School of Agriculture who have not had a full year of high-school Physics are required to pursue the subject for two terms of their sophomore year.

The foregoing requirements for entrance are in conformity with the Minimum Entrance Requirements for Oregon Institutions of Higher Education. In March, 1921, certain uniform requirements for entrance from high school were recommended to the various higher educational institutions of Oregon by the Committee on Higher Educational Standards of the Oregon State Teachers' Association, representing approximately all the colleges, universities, and normal schools of the state. These standard entrance requirements were approved by the various institutions, and are as follows:

(a) Entrance without deficiency to the colleges, universities, and normal schools of Oregon shall be contingent upon presentation of at least ten (except schools of Commerce; see footnote (*), p. 71) units in English, mathematics, foreign languages (including Latin), laboratory science, and history (including civics). (It is left to the individual institutions to distribute these units according to their respective inclinations.)

(b) The number of units in English should be three, and in these emphasis should fall upon syntax and upon composition of original character.

(c) The remaining five units may be taken in any subject regularly offered in the high school course of study in this state (such as agriculture, drawing, art, manual training, music, teacher training, domestic science, and commerce subjects).

(d) It is recommended to high schools that students taking as much as five units outside the five departments mentioned in section (a) should take significant amounts of each subject to the end that the five units may not be merely a smattering of a number of these electives.

(e) In addition, each institution will make such specific requirements as it may find desirable.

Graduate Curricula. Graduates of four-year curricula in the Oregon Agricultural College or in other colleges of equal rank are eligible for registration as graduate students. Prospective graduate students are required to present credentials to the Registrar as specified under "Admission from Other Colleges."

B. ADMISSION AS SPECIAL AND OPTIONAL STUDENTS

Special Students. A person who has attained the age of 21 years and who has the necessary training or experience profitably to pursue courses of college grade may, with the approval of the dean of the school in which he desires to do special work, be registered as a special student. A special student is not a candidate for a degree.

Optional Students. An optional student is one who has met all entrance requirements but who, from the nature of the subjects elected, cannot be classified in any department or school. Optional students are under the supervision of the Dean of the School of Basic Arts and Sciences. They are not candidates for degrees.

C. ADMISSION TO ADVANCED STANDING

All questions of evaluating credits in advanced standing are determined by the Committee on Advanced Standing.

Advanced Standing. Students matriculating in the degree curricula with more than the number of credits required for entrance to the freshman class will be given advanced standing for such credits as represent work beyond the full four years of high school—that is, work taken in the graduate year—and are equivalent to the requirements of the curriculum in which the student matriculates.

Admission From Other Colleges. Full credit is given for regular collegiate work completed in other colleges or universities recognized as standard, insofar as such work is equivalent to the requirements of the curriculum in which the student wishes to matriculate. A student who has attended another college or university and desires to enter the Oregon Agricultural College should file with the Registrar an official certificate from the institution from which he wishes to transfer, giving evidence of: (1) his

honorable dismissal; (2) a detailed statement of the entrance credits presented at the time of his matriculation at the other college; and (3) an official transcript of the work pursued while in attendance at the other college.

ACCREDITED SCHOOLS

Graduates of the following Oregon high schools, standardized by the State Board of Education for 1922-23, will be admitted to the Oregon Agricultural College, provided their credentials include the minimum entrance requirements specified under Admission as Regular Students.

Adams	Corbett	Haines
Airlie	Corvallis	Halfway
Albany	Cottage Grove	Halsey
Alsea	Cove	Hardman
Amity	Crabtree	Harrisburg
Antelope	Crane	Helix
Applegate	Creswell	Heppner
Arago	Crow	Hermiston
Arlington	Culver	Hillsboro
Ashland	Dallas	Hood River
Astoria	Days Creek	Hubbard
Athena	Dayton	Hugo
Aumsville	Dayville	Huntington
Baker	Dorena	Imbler
Ballston	Drain	Independence
Bandon	Dufur	Ione
Banks	Dundee	Jacksonville
Bay City	Echo	Jefferson
Beaverton	Elgin	John Day
Bellfountain	Elkins	Joseph
Bend	Elkton	Junction City
Bethel	Elmira	Kent
Boardman	Enterprise	Kerby
Bonanza	Estacada	Kings Valley
Bridge	Eugene	Klamath Falls
Brownsville	Falls City	Knappa
Buena Vista	Flora	Lafayette
Burns	Florence	La Grande
Butte Falls	Forest Grove	Lakeside
Camas Valley	Fort Klamath	Lakeview
Canby	Fossil	Lapine
Canyon City	Gardiner	Leaburg
Canyonville	Gaston	Lebanon
Carlton	Gates	Lexington
Central Point	Glendale	Long Creek
Clatskanie	Glide	Looking Glass
Cloverdale	Gold Beach	Lorane
Coburg	Gold Hill	Lostine
Colton	Grande Ronde	McMinnville
Condon	Grants Pass	Madras
Coos River	Grass Valley	Malin
Coquille	Gresham	Mapleton

Marcola	Pilot Rock	Springfield
Marshfield	Pine City	Stanfield
Maupin	Plainview	Stayton
Mayville	Pleasant Hill	Sumpter
Medford	Portland	Sutherlin
Merrill	Powers	Sweet Home
Metolius	Prairie City	Talent
Mill City	Prineville	Tangent
Milton	Rainier	The Dalles
Milwaukie	Redmond	Tillamook
Molalla	Reedsport	Toledo
Monmouth	Richland	Tualatin
Monroe	Rickreall	Turner
Monument	Riddle	Tygh Valley
Moro	Rogue River	Umapine
Mosier	Roseburg	Umatilla
Mount Vernon	Rose Lodge	Union
Muddy Creek	St. Helens	Vale
Myrtle Creek	St. Paul	Vernonia
Myrtle Point	Salem	Waldport
Nehalem	Sams Valley	Walker
Newberg	Sandlake	Wallowa
Newport	Sandy	Waltersville
North Bend	Santa Clara	Wapinitia
North Powder	Scappoose	Warrenton
Nyssa	Scio	Wasco
Oakland	Scotts Mills	West Linn
Odell	Seaside	Westport
Ontario	Shaniko	Weston
Oregon City	Shedd	Wheeler
Paisley	Sheridan	Wilbur
Parkdale	Siletz	Willamina
Parkrose	Silver Lake	Woodburn
Pendleton	Silverton	Yachats
Perrydale	Sisters	Yamhill
Phoenix	Smith River	Yoncalla
Philomath	Spray	

RESIDENT REQUIREMENTS

Every student is expected to obtain from the Registrar's office a copy of Rules and Regulations for Students, giving the routine of registration, the marking system, academic standards, regulations governing student activities, organizations, fraternities and sororities, etc. Students are held responsible for familiarity with the regulations in this handbook.

The College year is divided into three terms of approximately twelve weeks each. The term dates for the current year may be found in the college calendar.

A Term Credit or credit hour represents three hours of the student's time each week for one term. This time may be assigned to work in classroom, laboratory, or outside preparation.

Normal Work for men consists of work leading to $17\frac{1}{2}$ credits a term during the freshman and sophomore years, 2 credits of which are for Military Science and Tactics, and 17 credits a term during the junior and senior years. Normal work for women consists of work leading to 16 credits a term. No regular student is permitted to register for work leading to more than $18\frac{1}{2}$ credits in any term without special permission from his dean, and not more than $20\frac{1}{2}$ credits a term may be recorded for any student. No student carrying work leading to fewer than 12 credits a term can qualify as a regular student, and only in special cases is a student permitted to register for less than 12 credits of work.

Military Science and Tactics is required of all men students, six credits each year being granted for the required work of the freshman and sophomore years.* Students over 30 years of age, those who are physically disqualified, and those who have served six months or over in the U. S. Army or Navy (except the S. A. T. C.) or who have received commissions in the Army or Navy, may be given credit in the required military work on recommendation of the faculty committee appointed to pass upon advanced credit in Military Science and Tactics. Students seeking advanced credit in Military Science and Tactics or excuse from drill must file a written petition, blanks for which may be secured at the office of the Commandant.

Physical Education is required of all students during the freshman and sophomore years and of women during the two following years also, unless they are excused on recommendation of the Professor of Physical Education for Women.

A physical examination is required of all students entering the College. In case examination of any student discloses physical defects, report is made to the Director of Physical Education, and the physical training of the student is adapted to suit, and if possible to correct, such defects.

Required Subjects. Every student before graduation from any four-year curriculum must have completed the following: English Composition, nine credits; Economics, three credits; Political Science, three credits; Business Administration, three credits; Natural or Physical Science, nine credits. No credit is allowed in General Chemistry unless a minimum of nine credits is completed. If a modern language is elected, the student will be expected to continue this through two years, though credit will be given for any work

* Nine credits each year are allowed for the elective work of the junior and senior years.

completed. Effective, beginning with the Class of 1925, all men students are required to become proficient in the art of swimming.

Required English Examination. All students registering as freshmen in the College are required to take an examination on the first Saturday of the fall term (from 3:00 to 5:00 p. m.) for the purpose of demonstrating their preparation for the work. The examination will cover the fundamental principles of grammar and require evidence of the student's ability to apply these principles in writing. Students failing to obtain a satisfactory grade in this course will be required to pass satisfactorily Eng 11K, a preparatory course offered for entrance credit only, before registering for Eng 101.

Maximum Number of Laboratory Hours. During the freshman and sophomore years the total number of laboratory hours for any student shall not exceed twenty-one hours a week for any term, on the basis of regular or normal course credits. These maxima do not include the time spent in military drill or physical education.

Credit Requirements for a Major or Minor. The term "major work" designates the field within any school in which a student is specializing to the extent of at least thirty-six credits, of which not less than eighteen shall be in one department. Students in Commerce and Home Economics may take a "minor" in some other school by carrying not less than eighteen credits of work in that school.

Note: Courses are designated by numbers of three digits in which the left-hand digit represents usually the year (as first, second, third, etc.) in which the course is normally pursued; the middle digit represents the group of related courses in the department to which the course belongs; and the right-hand digit represents the sequence of courses in cases where courses normally follow each other in succeeding terms.

School of Agriculture

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.
ARTHUR BURTON CORDLEY, D.Sc., Dean of the School of Agriculture.
ALBERT ABSHER, B.Sc., Secretary to the Dean.

Animal Husbandry

ERMINE LAWRENCE POTTER, M.S., Professor of Animal Husbandry.
ORAN MILTON NELSON, B.Sc., Professor of Animal Husbandry.
BENJAMIN WILLIAM RODENWOLD, B.Sc., Assistant Professor of Animal Husbandry.
ALFRED WEAVER OLIVER, B.Sc., Assistant Professor of Animal Husbandry.

Dairy Husbandry

PHILIP MARTIN BRANDT, B.Sc., A.M., Professor of Dairy Husbandry.
ROY CARROLL JONES, B.Sc., Associate Professor of Dairy Production.
VINCENT DICK CHAPPELL, M.S., Associate Professor of Dairy Manufactures.
HOWARD NOTSON COLMAN, A.B., B.Sc., Instructor in Dairy Husbandry.
ELMER EDWARD ANDERSON, B.Sc., Instructor in Dairy Husbandry.

Farm Crops

GEORGE ROBERT HYSLOP, B.Sc., Professor of Farm Crops.
CHARLES CURTIS RUTH, M.S., Assistant Professor of Farm Crops.
JOHN RICHARD NEVIUS, B.Sc., Instructor in Farm Crops.
RAYMOND GILBERT LARSON, B.Sc., Instructor in Farm Crops.
VERN OWEN, B.Sc., Teaching Fellow in Farm Crops.

Farm Management

HENRY DESBOROUGH SCUDDER, B.Sc., Professor of Farm Management.
CLAIR WILKES, B.Sc., Instructor in Farm Management.

Farm Mechanics

WILLIAM JAMES GILMORE, B.Sc., Professor of Farm Mechanics.
ALVA ESMOND BRANDT, B.Sc., Assistant Professor of Farm Mechanics.
ANTON EVERETT JENSEN, Instructor in Farm Mechanics.

Horticulture

WALTER SHELDON BROWN, A.B., M.S., Professor of Horticulture.

EDWARD MARIS HARVEY, Ph.D., Professor of Research in Horticulture.

ARTHUR LEE PECK, B.Sc., B.A., Professor of Landscape Gardening and Floriculture; Superintendent of Campus and Greenhouses.

ARTHUR GEORGE BOUQUET, B.Sc., Professor of Vegetable Gardening.

ERNEST HERMAN WIEGAND, B.Sc., Professor of Horticultural Products.

*ANDREW EDWARD MURNEEK, M.S., Assistant Professor of Horticultural Research.

HENRY HARTMAN, M.S., Assistant Professor of Pomology.

CARL EPHRIAM SCHUSTER, M.S., Assistant Professor of Pomology.

LYLE PORTER WILCOX, B.Sc., Instructor in Horticulture.

WALTER JOSEPH KOCKEN, MS., Instructor in Horticulture.

JAMES CARSCALLEN BELL, M.S., Assistant in Horticulture.

JOHN HOWE PAINTER, Teaching Fellow in Horticulture.

JAMES ROLAND PARKER, B.Sc., Teaching Fellow in Pomology.

OLIVER HAM, Assistant in Vegetable Gardening.

Poultry Husbandry

ALFRED GUNN LUNN, B.Sc., Professor of Poultry Husbandry.

FRANK ELMER FOX, B.Sc., Assistant Professor of Poultry Husbandry.

OLEN CLIFFORD KRUM, B.Sc., Instructor in Poultry Husbandry.

HERBERT VON LEHE, Assistant in Poultry Husbandry.

Soils

WILBUR LOUIS POWERS, M.S., Professor of Soils.

CHARLES VLADIS RUZEK, B.Sc., Professor of Soil Fertility.

EDWARD FRITCHOFF TORGERSON, B.Sc., Assistant Professor of Soils.

WILLIAM WATERS JOHNSTON, B.Sc., Assistant Professor of Soils.

Veterinary Medicine

BENNETT THOMAS SIMMS, D.V.M., Professor of Veterinary Medicine.

FRED MILLER, D.V.M., M.S., Assistant Professor of Veterinary Medicine.

CHARLES RUMPEL DONHAM, D.V.M., Instructor in Veterinary Medicine.

* On leave of absence.

Curricula. The School of Agriculture offers a four-year curriculum leading to the degree of Bachelor of Science; a special four-year baccalaureate curriculum in Landscape Gardening; and graduate curricula leading to the degree of Master of Science.

The Baccalaureate Degree. The aim of the work in Agriculture is to train young men to become successful farmers, dairymen, stockmen, poultrymen, and fruit growers; to equip them to become efficient managers of orchard and ranch properties and of agricultural cooperative organizations; to prepare them to become specialists in the service of the United States Department of Agriculture, or in some branch of technical work in agricultural colleges, experiment stations, or extension services; or to prepare them for service as teachers of Smith-Hughes agriculture in the public high schools.

Requirements for Graduation. The completion of 207 college credits by men and 192 by women is required for graduation. Work the first two years is prescribed, except that a three-credit option is allowed each term of the sophomore year. Students expecting to specialize in Landscape Gardening will pursue the curriculum outlined on pages 97-98; women will ordinarily pursue the one on pages 96-97; all others will pursue the one outlined on pages 81-96. During the junior and senior years, opportunity is offered for specialization in Animal Husbandry, Agricultural Chemistry, Agricultural Education, Farm Mechanics, Bacteriology, Botany and Plant Pathology, Dairy Husbandry, Entomology, Farm Crops, Farm Management, Horticulture, Poultry Husbandry, Rural Architecture, Rural Economics, Soils, Zoology, or General Agriculture. Of the 102 junior and senior credits necessary for graduation, 34 are prescribed and 68 are electives.

In addition to the prescribed work of the first two years each candidate for graduation must have completed:

(a) Eighteen or more credits in one of the above-named subjects, as selected at the beginning of the junior year. These courses, together with the correlated subjects in other departments, must be selected with the advice and consent of the head of the department and the approval of the Dean.

(b) At least fifty-four additional credits from any of the courses given in the School of Agriculture.

(c) Not less than twenty-four credits from among such subjects as English, Public Speaking, Economics, Sociology, Political Science, and Business Administration (of which 12 credits are prescribed, see pages 81ff) or in Industrial Journalism, Psychology, Education, Modern Languages, Mathematics, or Military Science and Tactics.*

*Twelve credits in Military Science and Tactics are required for graduation. Of these, six credits each year are taken in the freshman and sophomore years. The Advanced R. O. T. C. Course is elective and comprises eighteen additional credits (nine in the junior year and nine in the senior year) all of which may be applied as electives for graduation from any school in the College.

Graduate Work. Opportunities are provided in each of the departments of the School of Agriculture for graduates of this College, or of other institutions of equal rank, to do graduate work leading to the degree of Master of Science. The requirements for this degree are explained in full on pages 69-70. For information concerning the graduate curriculum in Agricultural Economics and Rural Sociology, see the School of Commerce section of the catalogue.

DEGREE CURRICULUM IN AGRICULTURE

(*B.Sc. Degree*)

Freshman Year

	Section I		
	1st	Term	
		2d	3d
English Composition (Eng 101, 102, 103).....	3	3	3
General Chemistry (Ch 101, 102, 103).....	3	3	3
General Botany (Bot 101, 102).....	4	4	....
Principles of Economic Zoology (ZP 130).....	....	....	5
Library Practice (Lib 100).....	....	....	1
Crop Production (FC 100).....	5	....	....
Elements of Horticulture (Hrt 100).....	....	5	....
Stock Judging I (AH 111).....	....	....	3
①Gymnasium (PEM 111, 112, 113).....	1½	1½	1½
②Military Science and Tactics.....	2	2	2
	17½	17½	17½
	Section II		
	1st	Term	
		2d	3d
English Composition (Eng 101, 102, 103).....	3	3	3
General Chemistry (Ch 101, 102, 103).....	3	3	3
General Botany (Bot 101, 102).....	....	4	4
Principles of Zoology (ZP 130).....	5	....	....
Library Practice (Lib 100).....	1	....	....
Crop Production (FC 100).....	....	5	....
Elements of Horticulture (Hrt 100).....	....	....	5
Stock Judging I (AH 111).....	3	....	....
①Gymnasium (PEM 111, 112, 113).....	1½	1½	1½
②Military Science and Tactics.....	2	2	2
	17½	17½	17½
	Section III		
	1st	Term	
		2d	3d
English Composition (Eng 101, 102, 103).....	3	3	3
General Chemistry (Ch 101, 102, 103).....	3	3	3
General Botany (Bot 101, 102).....	4	....	4
Principles of Economic Zoology (ZP 130).....	....	5	....
Library Practice (Lib 100).....	....	1	....
Crop Production (FC 100).....	....	....	5
Elements of Horticulture (Hrt 100).....	5	....	....
Stock Judging I (AH 111).....	....	3	....
①Gymnasium (PEM 111, 112, 113).....	1½	1½	1½
②Military Science and Tactics.....	2	2	2
	17½	17½	17½

①Women carry PEW 111, 112, 113, 121, 122, 123.

②Students have the option of entering the infantry unit or the cavalry unit.

①Sophomore Options

	Term		
	1st	2d	3d
Advanced Testing (DH 204).....			3
Judging Dairy Cattle (DH 351).....			3
Breeds of Livestock (AH 231, 232).....	3	3	
Farm Motors (FM 111) or other electives in Farm Mechanics	3	3	3
Landscape Gardening (Hrt 231).....	3		
Practical Poultry Keeping (PH 201).....			3
Plant Propagation and Greenhouse Practice (Hrt 241).....		3	
Vegetable Growing (Hrt 221).....			3
②General Physics (Ph 201, 202).....	3	3	
General Geology (G 301c).....		3	
Commercial Geography (ES 101 or ES 103).....	4 or	4 or	4
Economic History of the United States (ES 201).....	3		

Junior Year

Agricultural Economics (ES 362).....			3
Farm Accounting (BA 361).....	3		
Farm Management (FMg 302).....		4	
Genetics (ZP 351).....	3		
Animal Nutrition (AH 351).....			4
Comparative Anatomy (VM 301), or an elective.....	3		
Principles of Plant Pathology (Bot 311).....		4	
③or Comparative Anatomy (VM 302), 3 credits			
Plant Physiology (Bot 321).....			4
③or Comparative Physiology (VM 321), 3 credits			
Electives	8	9	6

Senior Year

	17	17	17
Practical Public Speaking I (PSp 254).....	3		
National Government (PS 301).....	3		
Electives	11	17	17
	17	17	17

While students may during the junior and senior years choose their electives from a wide range of courses, subject only to the restrictions imposed by paragraphs (a) (b) (c), page 80, they are strongly urged to elect one of the following curricula.

AGRICULTURAL BACTERIOLOGY

Junior Year

	Term		
	1st	2d	3d
Agricultural Economics (ES 362).....			3
Farm Management (FMg 302).....		4	
Genetics (ZP 351).....	3		
Farm Accounting (BA 361).....	3		
French or German	3	3	3
Physiological Chemistry (Ch 461).....			5
Bacteriology	5	5	5
Seminar (Bac 481, 482, 483).....	1	1	1
Electives	2	4	
	17	17	17

①No sophomore optional course will be given to fewer than five students.

②Required of students who do not present credit for at least one year's work in high school Physics.

③If this course is elected, one credit should be added to electives.

Recommended Elective

	1st	Term 2d	3d
Elementary Analysis (Mth 131, 132).....		4	4

Senior Year

Practical Public Speaking I (PSP 254).....		3	
National Government (PS 301).....	3		
French or German.....	3	3	3
Physical Chemistry (Ch 481, 482, 483).....	3	3	3
Bacteriology.....	5	5	5
Electives.....	3	3	6
	17	17	17

Recommended Electives

Seminar.....	1	1	1
Animal Parasites (ZP 361).....			3
Differential (Mth 251), and Integral Calculus (Mth 252, 253).....	4	4	4
General Physics (Ph 121, 122, 123).....	4	4	4

AGRICULTURAL CHEMISTRY**Junior Year**

Business Administration (Elective).....	3		
Political Science (Elective).....		3	
Economics and Sociology (Elective).....			3
Genetics (ZP 351).....	3		
Principles of Plant Pathology (Bot 311).....		4	
Plant Physiology (Bot 321).....			4
Electives.....	11	10	10
	17	17	17

Recommended Electives

Differential (Mth 251), and Integral Calculus (Mth 252, 253).....	4	4	4
Elementary German (ML 131, 132, 133).....	3	3	3
Comparative Anatomy (VM 301, 302).....	3	3	
Comparative Physiology (VM 321).....			3

Senior Year

Physical Chemistry (Ch 481, 482, 483).....	3	3	3
Dairy Chemistry (Ch 351).....	3		
Chemistry of Soil Fertility (Ch 355).....		3	
Physiological Chemistry (Ch 461).....			5
Animal Nutrition (AH 351).....	4		
Feeds and Feeding (AH 352).....		5	
Milk Production (DH 453).....			3
Intermediate German (ML 231, 232, 233).....	3	3	3
Public Speaking.....	3		
Advanced English Composition (Eng 201).....		3	
Electives.....	1		3
	17	17	17

AGRICULTURAL EDUCATION*

Junior Year

	1st	Term 2d	3d
Agricultural Economics (ES 362).....			3
Farm Accounting (BA 361).....	3		
Farm Management (FMg 302).....		4	
Genetics (ZP 351).....	3		
Animal Nutrition (AH 351).....	4		
Comparative Anatomy (VM 301) or an elective	3		
Principles of Plant Pathology (Bot 311), or Comparative Anatomy (VM 302), 3 credits①.....			4
Plant Physiology (Bot 321), or Comparative Physiology (VM 321), 3 credits①.....			4
Elementary Psychology (Psy 301).....	3		
Educational Psychology (Psy 322).....		3	
Principles of Teaching (Ed 313).....		2	
Vocational Education (Ed 323).....			2
Electives	1	8	4
	17	17	17

Recommended Electives

Dairy Herd Management (DH 352).....	3	
Forage Crops and Root Crops (FC 231).....		3
Small Fruit Culture (Hrt 415).....	3	
Practical Poultry Keeping (PH 201).....	3	
Farm Motors (FM 111).....		3
General Farm Repairs (FM 141).....		2

Senior Year

Practical Public Speaking (PSP 254).....	3	
National Government (PS 301).....	3	
Secondary Education in Agriculture (AE 401, 402).....	3	3
Supervised Teaching of Secondary Agriculture (AE 412).....		3
Electives	8	14
		14

Recommended Electives

Pruning and Spraying (Hrt 313).....	4	
Landscape Gardening (Hrt 231).....	3	
Soil Fertility (Sls 424).....	5	
Diseases of Livestock (VM 341).....	4	
Feeds and Feeding (AH 352).....	5	
Elementary Industrial Journalism (IJ 200).....		3
Practical Public Speaking II (PSP 255).....	3 or	3
Rural Sociology (ES 464).....		3
Cooperation (ES 323).....		4
Rural Education (AE 431).....	3	
→ Farm Conveniences (FM 351).....		2
↙ Poultry Breeding, Breeds, and Judging (PH 311).....	4	
↙ Carpentry (IA 222).....	3	

* Students may qualify for Smith-Hughes teaching by following this curriculum or by including 22 credits in Education with their major work in any other department.

①If this course is elected, one credit should be added to electives.

ANIMAL HUSBANDRY

Junior Year

	1st	Term 2d	3d
Agricultural Economics (ES 362).....	.....	.....	3
Farm Accounting (BA 361).....	.....	3	.....
Farm Management (FMg 302).....	.....	4	.....
Genetics (ZP 351).....	3	.....	.....
Comparative Anatomy (VM 301, 302).....	3	3	.....
Comparative Physiology (VM 321).....	.....	.....	3
Animal Nutrition (AH 351).....	4	.....	.....
Feeds and Feeding (AH 352).....	.....	5	.....
Electives	7	2	11
	17	17	17

Recommended Electives

Stock Judging IV (AH 411).....	4	.....	.....
Breeds of Livestock I (AH 231).....	3	.....	.....
Breeds of Livestock II (AH 232).....	.....	3	.....
Stock Judging III (AH 311).....	.....	.....	3

Senior Year

Practical Public Speaking I (PSp 254).....	3	.....	.....
National Government (PS 301).....	3	.....	.....
Diseases of Livestock (VM 441, 442, 443).....	3	3	3
Livestock Economics (AH 661).....	.....	.....	3
Electives	8	14	11
	17	17	17

Recommended Electives

Stock Judging IV (AH 411).....	4	.....	.....
Seminar (AH 481, 482).....	.....	1	1
Livestock Practice (AH 421, 422).....	1	.....	2
Meats (AH 471).....	.....	2	.....
Pedigree Study (AH 645).....	.....	2	.....
Business and Rural Law (PS 163).....	.....	.....	3
State and Local Government (PS 302).....	.....	3	.....
Soil Physics (Sls 421).....	5	.....	.....
Land Drainage (Sls 318).....	.....	.....	3
Advanced English Composition (Eng 201).....	.....	3	.....

BOTANY AND PLANT PATHOLOGY

Junior Year

Business Administration.....	3	.....	.....
Economics or Sociology.....	.....	3	.....
General Geology (G 301).....	3	.....	.....
Principles of Plant Pathology (Bot 311).....	.....	4	.....
Plant Physiology (Bot 321).....	.....	.....	4
Classification of Plants (Bot 204).....	.....	.....	3
Genetics (ZP 351).....	3	.....	.....
Comparative Morphology and Evolution of Plants (Bot 441).....	4	.....	.....
Electives	4	10	10
	17	17	17

Recommended Electives

	1st	Term 2d	3d
German or French	3	3	3
Plant Materials (Hrt 331, 332, 333).....	3	3	3
Plant Propagation and Greenhouse Practice (Hrt 241).....		3	....
Forest Pathology (Bot 314).....	2		....
Fruit Diseases (Bot 312).....			3
Diseases of Field Crops and Vegetables (Bot 313).....			3
General Physics (Ph 121, 122, 123).....	4	4	4

Senior Year

Economics or Sociology	3	....	....
Public Speaking (PSP 254).....	3	....	....
Elementary Industrial Journalism (IJ 200).....		3	....
Plant Histology (Bot 443).....	3	....	....
Mycology (Bot 414).....		4	....
Plant Ecology (Bot 442).....			3
Seminar (Bot 481, 482, 483).....	1	1	1
Electives	7	9	13
	<hr/> 17	<hr/> 17	<hr/> 17

Recommended Electives

German or French	3	3	3
Physiological Chemistry (Ch 461).....			5
Range and Pasture Botany (Bot 341).....		2	....
Plant Pathological Technique (Bot 415).....			3
Advanced Botany Studies (any term).....			....
Evolution and Eugenics (ZP 352).....		3	....
Application of Plant Science in Secondary School Teaching (Bot 471)	3	....	....
Introductory Photography (Ph 361).....	3	....	....
College Mathematics (Mth 201, 202, 203).....	3	3	3
Investigative Work for Seniors (Hrt 491, 492, 493).....	3	3	3

DAIRY HUSBANDRY**Junior Year**

Agricultural Economics (ES 362).....			3
Farm Accounting (BA 361).....	3		....
Farm Management (FMg 302).....		4	....
Genetics (ZP 351).....	3		....
Comparative Anatomy (VM 301, 302).....	3	3	....
Comparative Physiology (VM 321).....			3
Electives	8	10	11
	<hr/> 17	<hr/> 17	<hr/> 17

Recommended Electives

	1st	2d	3d
Commercial Buttermaking (DH 302, 303).....	3	3	....
Advanced Testing (if not previously taken) (DH 204).....	3	....	....
Dairy Chemistry (Ch 351).....	3	....	....
Vocational Psychology (Psy 312) or Elementary Psychology (Psy 301).....	3	....	....
Dairy Herd Management (DH 352).....	....	3	....
Principles of Teaching (Ed 313).....	....	2	....
Judging Dairy Cattle (DH 351).....	....	....	3
Market Milk (DH 301).....	....	....	3
Physiological Chemistry (Ch 461).....	....	....	5
Vocational Education (Ed 323).....	....	....	2

Senior Year

Practical Public Speaking I (PSp 254).....	3	....	....
National Government (PS 301).....	3	....	....
Electives	11	17	17
	17	17	17

Recommended Electives

Factory Organization and Management (DH 403).....	4	....	....
Secondary Education in Agriculture (AEEd 401).....	3	....	....
Diseases of Livestock (VM 441).....	3	....	....
Dairy Judging Team (DH 451), or Dairy Products Judg- ing Team (DH 454).....	2	....	....
Seminar (DH 480).....	1	....	....
Special Studies (DH 490, 491, 492).....	*	*	*
Cheesemaking (DH 401).....	4	....	....
Breeding Dairy Cattle (DH 452).....	3	....	....
Secondary Education in Agriculture (AEEd 402).....	3	....	....
Seminar (DH 480).....	1	....	....
Ice-cream and Condensed Milk (DH 402).....	....	....	3
Milk Production (DH 453).....	....	....	3
Forage Crops and Root Crops (FC 231).....	....	....	3
Supervised Teaching of Secondary Agriculture (AEEd 412).....	....	....	3
Elementary Industrial Journalism (IJ 200).....	....	....	3
Seminar (DH 480).....	....	....	1

ENTOMOLOGY†**Junior Year**

Business Administration (elective).....	3	....	....
Economics or Sociology (elective).....	....	3	....
Principles of Plant Pathology (Bot 311).....	....	4	....
Plant Physiology (Bot 321).....	....	....	4
Genetics (ZP 351).....	3	....	....
Advanced Economic Entomology (Ent 404).....	3	....	....
Insect Morphology (Ent 351).....	....	3	....
General Entomology (Ent 303).....	....	....	4
Electives	8	7	9
	17	17	17

* Credit to be arranged.

† Students in Entomology majoring in Bee Culture follow Entomology outline, except that they take Commercial Bee Culture in the junior year and Advanced Bee Culture in the senior year.

Recommended Electives

	1st	Term 2d	3d
Modern Language	3	3	3
Historical Geology (G 302) .....	.....	3	.....
Histology (ZP 300) .....	.....	.....	4
Chemistry of Spray Materials (Ch 352) .....	.....	3	.....
Introductory Photography (Ph 361)	3	.....	.....
Forest Entomology (Ent 321) .....	.....	4	.....

Senior Year

National Government (PS 301)	3	.....	.....
Public Speaking (PSP 254)	3	.....	.....
Elementary Industrial Journalism (IJ 200)	3	.....	.....
Insect Ecology (Ent 452), Insect Taxonomy (Ent 453) .....	.....	5	5
Seminar (Ent 481, 482, 483)	1	1	1
Electives	7	11	11
	17	17	17

Recommended Electives

Modern Language	3	3	3
Methods of Research (Hrt 694, 695)	2	2	.....
Embryology (ZP 310) .....	.....	.....	4
Commercial Bee Culture (Ent 131, 132, 133)	3	3	3
Breeds of Livestock II (AH 232) .....	.....	5	.....
Farm Motors (FM 111) .....	.....	.....	3

FARM CROPS**Junior Year**

Agricultural Economics (ES 362) .....	.....	.....	3
Farm Accounting (BA 361)	3	.....	.....
Farm Management (FMg 302) .....	.....	4	.....
Genetics (ZP 351)	3	.....	.....
Principles of Plant Pathology (Bot 311) .....	.....	4	.....
Plant Physiology (Bot 321) .....	.....	.....	4
Cereal Production (FC 311)	5	.....	.....
Crop Improvement (FC 341) .....	.....	.....	5
Crop Handling Equipment (FM 332) .....	.....	2	.....
Animal Nutrition (AH 351)	4	.....	.....
Climatology (Sls 331) .....	.....	.....	2
Electives	2	7	3
	17	17	17

Recommended Electives

Diseases of Field Crops and Vegetables (Bot 313) .....	.....	.....	3
Farm Conveniences (FM 351)	2	.....	.....
Farm Implements (FM 131) .....	.....	2	.....
Practical Pomology (Hrt 311)	4	.....	.....

Senior Year

	1st	Term 2d	3d
Practical Public Speaking I (PSp 254).....	3	.....	.....
Seed Production (FC 432).....	3	.....	.....
Potato Growing (FC 314).....	2	.....	.....
Crop Inspection (FC 421), Crop Efficiency (FC 411).....	.....	5	5
Soil Fertility Lectures (Sls 425).....	.....	3	.....
Forage Crops and Root Crops (FC 231).....	.....	.....	3
Business and Rural Law (PS 163).....	.....	.....	3
Markets and Marketing (ES 402).....	.....	4	.....
Elementary Industrial Journalism (IJ 200).....	3	.....	.....
Elementary Psychology (Psy 301).....	.....	.....	3
Electives	6	5	3
	17	17	17

Recommended Electives

Dairy Herd Management (DH 352).....	.....	3	.....
Concrete Construction (FM 341).....	.....	.....	3
Advanced Business Law (PS 201, 202).....	.....	4	4
Journalism Practice I (IJ 204).....	2	.....	.....
Advanced Crop Work (FC 414, 415, 416).....	5	5	5
Advanced Crop Breeding (FC 441)	3	.....	.....

FARM MANAGEMENT**Junior Year**

Farm Accounting (BA 361).....	3	.....	.....
Genetics (ZP 351).....	3	.....	.....
Farm Management (FMg 303).....	.....	3	.....
Animal Nutrition (AH 351).....	4	.....	.....
Principles of Plant Pathology (Bot 311).....	.....	4	.....
Farm Management (FM 303).....	.....	3	.....
Agricultural Economics (ES 362).....	.....	.....	3
Farm Organization (FMg 411).....	.....	.....	3
Farm Management Seminar (FMg 322, 323).....	.....	$\frac{1}{2}$	$\frac{1}{2}$
Electives	7	$6\frac{1}{2}$	$10\frac{1}{2}$
	17	17	17

Recommended Electives

Cereal Production (FC 311) (3 lectures).....	3	.....	.....
Soil Physics (Sls 421) (3 lectures and 1 laboratory period).....	4	.....	.....
Breeds of Livestock II (AH 232).....	.....	3	.....
Elementary Industrial Journalism (IJ 200).....	.....	3	.....
Elementary Typing (OT 111).....	.....	2	.....
Forage Crops and Root Crops (FC 231).....	.....	.....	3
Farm Motors (FM 111).....	.....	.....	3
Business and Rural Law (PS 163).....	.....	.....	3

Senior Year

Practical Public Speaking (PSp 254).....	3	.....	.....
National Government (PS 301).....	3	.....	.....
Advanced Farm Management (FMg 441, 442, 443).....	3	3	3
Farm Management Seminar (FMg 422, 423).....	.....	$\frac{1}{2}$	$\frac{1}{2}$
Enterprise Costs and Profits (FMg 433).....	.....	.....	3
Electives	8	$13\frac{1}{2}$	$10\frac{1}{2}$
	17	17	17

Recommended Electives

	1st	Term 2d	3d
Diseases of Livestock (VM 341).....	4	....	....
Practical Pomology (Hrt 311).....	4	....	....
Methods of Research (Hrt 694, 695).....	1	1	....
Soil Fertility Lectures (Sls 425).....	....	3	....
Dairy Herd Management (DH 352).....	....	3	....
Markets and Marketing (ES 402).....	....	4	....
Small Fruit Culture (Hrt 415).....	....	3	....
Farm Tractors and Farm Trucks (FM 112).....	....	....	3
Cooperation (ES 323) or Transportation (ES 403).....	....	....	4

HORTICULTURE—VEGETABLE GARDENING

Junior Year

Agricultural Economics (ES 362).....	....	....	3
Farm Accounting (BA 361).....	3	....	....
Farm Management (FMg 302).....	....	4	....
Genetics (ZP 351).....	3	....	....
Principles of Plant Pathology (Bot 311).....	....	4	....
Plant Physiology (Bot 321).....	....	....	4
Vegetable Seed Production (Hrt 321).....	3	....	....
Principles of Vegetable Gardening (Hrt 322).....	....	3	....
Practical Vegetable Gardening (Hrt 323).....	....	....	3
Electives	8	6	7
	17	17	17

Recommended Electives

Irrigation Farming (Sls 311).....	3	....	....
Greenhouse Construction (Hrt 341).....	....	4	....
Landscape Gardening (Hrt 231).....	3	....	....
Potato Growing (FC 314).....	....	2	....
Advanced Economic Entomology (Ent 404).....	3	....	....
History and Literature of Horticulture (Hrt 361).....	....	....	3
Diseases of Field Crops and Vegetables (Bot 313).....	....	....	3

Senior Year

Practical Public Speaking I (PSP 254).....	3	....	....
National Government (PS 301).....	3	....	....
Seminar (Hrt 481, 482, 483).....	1	1	1
Vegetable Forcing (Hrt 421, 422, 423).....	2	2	2
Systematic Olericulture (Hrt 424).....	1	....	....
Vegetable Marketing (Hrt 425, 426).....	3	3	....
Commercial Truck Gardening (Hrt 427).....	....	....	3
Electives	4	11	11
	17	17	17

Recommended Electives

Methods of Research (Hrt 694, 695).....	2	2	....
Investigative Work for Seniors (Hrt 491, 492, 493).....	3	3	3
Small Fruit Culture (Hrt 415).....	....	3	....
Dehydration of Fruits and Vegetables (Hrt 371).....	3	....	....
Markets and Marketing (ES 402, 603).....	....	4	4
Transportation (ES 403).....	....	....	4
Enterprise Costs and Profits (FM 433).....	....	....	3

HORTICULTURE—POMOLOGY

Junior Year

	1st	Term 2d	3d
Practical Pomology (Hrt 311).....	4	.....	.....
History and Literature of Horticulture (Hrt 361).....	.....	.....	3
Agricultural Economics (ES 362).....	.....	.....	3
Farm Accounting (BA 361).....	3	.....	.....
Farm Management (FMg 302).....	.....	4	.....
Genetics (ZF 351).....	3	.....	.....
Principles of Plant Pathology (Bot 311).....	.....	4	.....
Plant Physiology (Bot 321).....	.....	.....	4
Fruit Diseases (Bot 312).....	.....	.....	3
Pruning and Spraying (Hrt 313).....	.....	4	.....
Electives	7	5	4
	17	17	17

Recommended Electives

Sub-tropical Pomology (Hrt 312) Junior or Senior, offered alternate years	3	.....	.....
Viticulture (Hrt 414) Junior or Senior, offered alternate years	3	.....	.....
Small Fruit Culture (Hrt 415) (Junior or Senior).....	.....	3	.....
Nut Culture (Hrt 416) (Junior or Senior).....	.....	3	.....
Applied Plant Genetics (Hrt 418) (Junior or Senior).....	.....	.....	3
Cooperation (ES 323).....	.....	.....	4
General Sociology (ES 305).....	4 or	4 or	4
Elementary Psychology (Psy 301).....	3 or	3 or	3
Elementary Industrial Journalism (IJ 200).....	3 or	3 or	3
Elementary French (ML 111, 112, 113).....	3	3	3
Elementary German (ML 131, 132, 133).....	3	3	3

Senior Year

Commercial Pomology (Hrt 410).....	.....	5	.....
Systematic Pomology (Hrt 412).....	5	.....	.....
Seminar (Hrt 481 482, 483).....	1	1	1
Advanced Economic Entomology (Ent 404).....	3	.....	.....
Practical Public Speaking I (PSP 254).....	3	.....	.....
National Government (PS 301).....	3	.....	.....
Electives	2	11	16
	17	17	17

Recommended Electives

Orchard Practices and Management (Hrt 417).....	.....	.....	3
Methods of Research (Hrt 694, 695).....	2	2	.....
Investigative Work for Seniors (Hrt 491, 492, 493).....	3	3	3
Markets and Marketing (ES 402).....	.....	4	.....
Transportation (ES 403).....	.....	.....	4
Intermediate French (ML 211, 212, 213).....	3	3	3
Intermediate German (ML 231, 232, 233).....	3	3	3
American Literature (Eng 432).....	.....	3	.....

HORTICULTURE—HORTICULTURAL PRODUCTS

Junior Year

	1st	Term 2d	3d
Agricultural Economics (ES 362).....	.....	.....	3
Principles of Plant Pathology (Bot 311).....	.....	4	.....
Plant Physiology (Bot 321).....	.....	.....	4
Dehydration of Fruits and Vegetables (Hrt 371).....	3	.....	.....
Cost Accounting (BA 203).....	.....	.....	3
Principles of Canning Fruits (Hrt 351).....	3	.....	.....
Principles of Canning Vegetables (Hrt 352).....	.....	3	.....
The Canning Plant and Its Equipment (Hrt 353).....	.....	.....	3
General Physics (Ph 201, 202).....	3	3	.....
Machine Shop (IA 262).....	.....	.....	2
Practical Pomology (Hrt 311).....	4	.....	.....
Commercial Pomology (Hrt 410).....	.....	5	.....
Horticultural Products.....	3	.....	.....
Electives.....	1	2	2
	17	17	17

Senior Year

Practical Public Speaking I (PSP 254).....	.....	3	.....
National Government (PS 301).....	.....	.....	3
Principles of Economic Entomology (Ent 201).....	3	.....	.....
Fruit Juice and Vinegar Manufacture (Hrt 451).....	3	.....	.....
Commercial Jam and Jelly Manufacture (Hrt 462).....	.....	3	.....
Preserves, Glaced Fruits, and Candied Fruits (Hrt 472, 473).....	.....	3	3
Business Organization (BA 331).....	3	.....	.....
Business Management (BA 332).....	.....	3	.....
Electives.....	8	5	11
	17	17	17

MARKETING OF AGRICULTURAL PRODUCTS

Junior Year

Agricultural Economics (ES 362).....	.....	.....	3
Rural Finance (ES 367).....	3	.....	.....
Economic Organization of Agriculture (ES 364).....	.....	3	.....
Rural Sociology (ES 464).....	.....	.....	3
Business Organization (BA 331).....	3	.....	.....
Auditing (BA 302).....	.....	3	3
Science.....	3	3	3
Courses in Agriculture.....	5	5	5
Electives.....	3	3	.....
	17	17	17

Recommended Electives

Stock Judging III (AH 311).....	.....	.....	3
Breeds of Livestock I, II (AH 231, 232).....	3	3	.....
Elementary Industrial Journalism (IJ 200).....	3	.....	.....
Cereal Production (FC 311).....	5	.....	.....
Elements of Statistics (ES 313).....	.....	3	.....
Advanced Business Law (PS 201, 202).....	.....	4	4
Elementary Psychology (Psy 301).....	.....	.....	3

Senior Year

	1st	Term 2d	3d
Markets and Marketing (ES 402, 603).....	---	4	4
Transportation (ES 403).....	---	---	4
Public Finance (ES 401).....	4	---	---
National Government (PS 301).....	3	---	---
State and Local Government (PS 302).....	---	3	---
Municipal Government (PS 303).....	---	---	3
Principles of Advertising (BA 441).....	---	3	---
Courses in Agriculture.....	3	3	3
Electives.....	7	4	3
	17	17	17

Recommended Electives

Crop Inspection (FC 421).....	---	5	---
Crop Efficiency (FC 411).....	---	---	5
Enterprise Costs and Profits (FMg 433).....	---	---	3
Commercial Pomology (Hrt 410).....	---	5	---
Systematic Pomology (Hrt 412).....	5	---	---
Vegetable Marketing (Hrt 425, 426).....	3	3	---

POULTRY HUSBANDRY**Junior Year**

Agricultural Economics (ES 362).....	---	---	3
Farm Accounting (BA 361).....	3	---	---
Farm Management (FMg 302).....	---	4	---
Genetics (ZP 351).....	3	---	---
Anatomy of the Fowl (VM 309).....	---	3	---
Animal Nutrition (AH 351).....	4	---	---
Diseases of Poultry (VM 351).....	---	---	3
Poultry Breeding, Breeds and Judging (PH 311).....	4	---	---
Incubation and Brooding (PH 321).....	---	4	---
Poultry-house Design and Construction (PH 331).....	---	---	4
Electives.....	3	6	7
	17	17	17

Senior Year

Practical Public Speaking I (PSp 254).....	3	---	---
National Government (PS 301).....	3	---	---
Poultry Feeding (PH 441).....	4	---	---
Marketing Poultry Products (PH 451).....	---	4	---
Poultry Farm Management (PH 463).....	---	---	4
Seminar (PH 481, 482, 483).....	1	1	1
Departmental Management (PH 484, 485, 486).....	3	3	3
Electives.....	3	9	9
	17	17	17

SOILS

Junior Year

	1st	Term 2d	3d
Farm Accounting (BA 361).....	3	....	....
Farm Management (FMg 302).....	....	4	....
Genetics (ZP 351).....	3	....	....
Animal Nutrition (AH 351).....	4	....	....
Agricultural Economics, (ES 362).....	3	....	....
Principles of Plant Pathology (Bot 311).....	....	4	....
Plant Physiology (Bot 321).....	....	....	4
Irrigation Farming (Sls 311).....	3	....	....
Western Land and Water Laws (Sls 314).....	....	3	....
Land Drainage (Sls 318) or Climatology (Sls 331) alternate years, (2 or 3 credits).....	....	....	3
Soils Seminar (Sls 481).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives	$\frac{1}{2}$	$5\frac{1}{2}$	$9\frac{1}{2}$
	17	17	17

Recommended Electives

Practical Pomology (Hrt 311).....	4	....	....
Elementary Industrial Journalism (IJ 200).....	....	3	....
Forage Crops and Root Crops (FC 231).....	....	....	3
Soil Bacteriology (Bac 321).....	4	....	....
General Geology (G 301c).....	....	....	3
Business and Rural Law (PS 163) or Markets and Market- ing (ES 402).....	....	....	3
Option preparatory to teaching, 3 credits per term in Agricultural Education	3	3	3

Senior Year

Practical Public Speaking I (PSp 254).....	3	....	....
National Government (PS 301).....	....	3	....
Soil Physics (Sls 421).....	5	....	....
Soil Fertility (Sls 424).....	....	5	....
Soil Survey (Sls 427).....	....	....	3
Soil Management (Sls 428).....	....	....	2
Advanced Irrigation (Sls 414).....	3	....	....
Advanced Soil Work (Sls 441, 442).....	....	3	3
Soil Seminar (Sls 481).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives	$5\frac{1}{2}$	$5\frac{1}{2}$	$8\frac{1}{2}$
	17	17	17

Recommended Electives

Elementary Psychology (Psy 301).....	3	....	....
Engineering (For Irrigation students).....	3	3	3

ZOOLOGY

Junior Year

	1st	Term 2d	3d
Practical Public Speaking I (PSP 254).....	3	.....	.....
Business Administration, elective.....	3	.....	.....
Political Science, elective.....	.....	3	.....
Economics or Sociology, elective.....	.....	.....	3
Principles of Plant Pathology (Bot 311).....	.....	4	.....
Plant Physiology (Bot 321).....	.....	.....	4
Farm Management (FMg 302).....	.....	4	.....
Genetics (ZP 351).....	3	.....	.....
Evolution and Eugenics (ZP 352).....	.....	3	.....
Histology (ZP 300).....	.....	.....	4
Animal Parasites (ZP 361).....	.....	.....	3
Electives.....	8	3	3
	17	17	17

Recommended Electives

German or French.....	3	3	3
College Mathematics (Mth 201, 202, 203).....	3	3	3

Senior Year

Advanced Study and Thesis (ZP 691, 692, 693).....	3	3	3
Embryology (ZP 310).....	.....	.....	4
Electives.....	14	14	10
	17	17	17

Recommended Electives

German or French.....	3	3	3
General Physics (Ph 201, 202).....	3	3	.....
Elementary Industrial Journalism (IJ 200).....	3	.....	.....
Introductory Photography (Ph 361).....	.....	.....	3
Physiological Chemistry (Ch 461).....	.....	.....	5
Insect Morphology (Ent 351).....	.....	3	.....

CURRICULUM FOR WOMEN

The following outline is suggested as meeting the interests and needs of the majority of women students in Agriculture. Any desiring a more specialized course should consult with the Dean.

Freshman Year

	1st	Term 2d	3d
English Composition (Eng 101, 102, 103).....	3	3	3
General Chemistry (Ch 101, 102, 103).....	3	3	3
General Botany (Bot 101, 102).....	4	4	.....
Principles of Economic Zoology (ZP 130).....	.....	.....	5
Social Ethics (PEW 121), Hygiene (PEW 122).....	1	1	.....
Library Practice (Lib 100).....	.....	.....	1
Crop Production (FC 100).....	5	.....	.....
Elements of Horticulture (Hrt 100).....	.....	5	.....
Stock Judging I (AH 111).....	.....	.....	3
Gymnasium (PEW 111, 112, 113).....	1	1	1
	17	17	16

Sophomore Year

	1st	Term 2d	3d
Quantitative (Ch 247), Organic (Ch 224), Agricultural Chemistry (Ch 251).....	5	5	5
Soils (Sls 201, 202).....	3	3	4
Elements of Dairying (DH 200).....	3	3	3
Farm Accounting (BA 361).....	3	4	4
Practical Poultry Keeping (PH 201).....	3	4	1
Vegetable Growing (Hrt 221).....	4	1	
Clothing and Textiles (HA 108, 109, 110).....	1		
Gymnasium (PEW 111, 112, 113).....			

Junior Year

Agricultural Economics (ES 362).....	16	16	17
General Bacteriology (Bac 201).....	4	3	
Farm Management (FMg 302).....	3	4	
Genetics (ZP 351).....	3	4	4
Principles of Economic Entomology (Ent 201).....	3	4	4
Plant Pathology (Bot 311).....	4	4	4
Plant Physiology (Bot 321).....	4	4	4
Food Selection and Preparation (HS 203).....	2	3	4
Elementary Nutrition (HS 205).....	2	3	4
Agricultural electives.....			

Senior Year

Practical Public Speaking (PSP 254).....	16	15	15
National Government (PS 301).....	3	3	
Elementary Psychology (Psy 301).....	3	3	3
Landscape Gardening (Hrt 231).....	3	3	3
Home Nursing (HAD 430).....	5	5	5
Child Care (HAD 325).....	5	5	4
Agricultural options.....	5	5	4
Electives.....	5	5	4
	16	16	15

DEGREE CURRICULUM IN LANDSCAPE GARDENING*(B.Sc. Degree)***Freshman Year**

	1st	Term 2d	3d
English Composition (Eng 101, 102, 103).....	3	3	3
Business Correspondence (Eng 105).....	3	3	5
Plane Surveying (CE 121).....	3	3	3
Modern Language.....	4	4	4
General Botany (Bot 101, 102).....	3	3	3
Plant Propagation and Greenhouse Practice (Hrt 241).....	4	3	5
Elements of Horticulture (Hrt 100).....	4	4	4
Plane Trigonometry (Mth 111).....	1	1	1
Library Practice (Lib 100).....	1	1	1
①Gymnasium (PEm 111, 112, 113).....	1½	1½	1½
②Military Science and Tactics.....	2	2	2
	17½	18½	18½

①Women carry PEW 111, 112, 113, 121, 122, 123.

②Students have the option of entering the infantry unit or the cavalry unit.

Sophomore Year

	1st	Term 2d	3d
①English elective	3	3	
Modern Language	3	3	3
Plane Surveying (CE 122, 123)		4	5
General Geology (G 301c)		3	
Classification of Plants (Bot 204)			3
Drawing (A 213)	2		
Industrial Arts Drawing (A 211)	2		
Pencil and Pen Rendering (A 251)			3
Landscape Gardening (Hrt 231)	3		
Gymnasium (PEm 211, 212, 213)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
Electives	2	2	
	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$	<hr/> 16 $\frac{1}{2}$

Junior Year

Introduction to Economics (ES 391)	3	----	----
Practical Public Speaking (PSp 254, 255), Argumentation (PSp 257)	3	3	3
Water-color Rendering (A 351, 352)	----	3	3
Plant Materials (Hrt 331, 332, 333)	3	3	3
History and Literature of Landscape Gardening (Hrt 337)	3	----	----
Elementary Industrial Journalism (IJ 200)	3	----	----
Landscape Drawing (A 311, 312, 313)	3	3	3
Electives	----	5	5
	<hr/> 18	<hr/> 17	<hr/> 17

Senior Year

National Government (PS 301)	3	----	----
State and Local Government (PS 302)	----	3	----
Theory and Design (Hrt 431, 432)	4	4	----
Town Planning (Hrt 437)	----	----	4
Field Practice (Hrt 434, 435)	4	----	4
Business and Rural Law (PS 163)	----	----	3
Business Management (BA 332)	----	3	----
Electives	6	5	6
	<hr/> 17	<hr/> 15	<hr/> 17

ANIMAL HUSBANDRY

The courses in Animal Husbandry are planned to fit the student for the actual raising of livestock on the farm, so that he may produce the highest grade of stock in the most economical and business-like manner. The student is thoroughly grounded in the underlying principles in order that he may successfully continue his study after leaving college, but the practical details are also thoroughly treated and a special effort is made to keep the students in close touch with the financial phases of the industry. Students

①Eng 201 must be taken one term.

who take this work as their specialty are expected not to devote their entire time to livestock; but, on the contrary, to familiarize themselves with crop production, soil fertility, and other phases of agriculture as well as general education subjects.

Students electing to major in Animal Husbandry must have had considerable practical experience in farming and stock raising before they may be graduated. The nature and extent of the experience required is left to the judgment of the head of the department.

Students not majoring in Animal Husbandry but desiring to elect some work in the department will be given careful attention to see that they get just the work fitted to their individual needs.

Equipment. The equipment of the department of Animal Husbandry consists essentially of livestock, barns, and the College stock farms. During the past years the livestock available for illustration and demonstration purposes has been very much improved in numbers and quality. In addition to the livestock regularly kept on the College farm, much good stock is loaned from time to time by the leading breeders of the state. During the winter, car-load lots illustrating the market classes are brought in for demonstration purposes. The department possesses abundant equipment for the conduct of laboratory, lecture, and recitation work.

COURSES

AH 111. **Stock Judging I.** The various types of farm animals are studied by score cards and comparative methods, and the student is made familiar with the desirable and undesirable types of beef and dairy cattle, sheep, swine, and horses.

Required in Agriculture; freshman year; any term; 3 credits; 1 recitation; 3 two-hour laboratory periods. Fee \$0.25. Text: Vaughan, Types and Market Classes of Live Stock.

AH 221. **Livestock Management.** Practical details of the care and management of livestock, stabling, grooming, sanitation, practical feeding, and kindred details of livestock farming, all with special reference to Western conditions.

Required in Agriculture; sophomore year; any term; 4 credits; 3 recitations; 1 two-hour laboratory period. Fee \$0.50. Text: Potter, Western Live Stock Management.

AH 231. **Breeds of Livestock I.** A study of the breeds of sheep and beef cattle, their development, breeding, and type.

Prerequisite: AH 111. Required in Animal Husbandry; sophomore or junior year; first term; 3 credits; 3 recitations; 1 laboratory period. Fee \$0.25.

A. W. Oliver, B. W. Rodenwold

AH 232. Breeds of Livestock II. A study of the breeds of horses and swine, their development, breeding, and type.

Prerequisite: AH 111. Required in Animal Husbandry; sophomore or junior year; second term; 3 credits; 3 recitations; 1 two-hour laboratory period. Fee \$0.25.

AH 311. Stock Judging II. Course in judging of all kinds of stock.

Prerequisite: AH 111. Elective in Animal Husbandry; junior year; third term; 3 credits; 4 two-hour laboratory periods. Fee \$0.25. *B. W. Rodenwold*

AH 351. Animal Nutrition. The chemical and physiological principles of animal nutrition; function of the various classes of nutrients when taken into the animal body; nutritive ratios; feeding standards; compounding ratios; feeds with special reference to chemical composition, energy, values, and general adaptability to stock-feeding purposes.

Prerequisite: Ch 251. Required in Agriculture; junior year; first or third term; 4 credits; 4 recitations; 1 two-hour laboratory period. Text: Henry and Morrison, Feeds and Feeding. *O. M. Nelson*

AH 352. Feeds and Feeding. An advanced course in the feeding of horses, beef cattle, sheep, and swine. Special study is made of the practices of the best stockmen, and of investigations carried on by the various experiment stations. Students desiring to take only such parts of the course as relate to certain kinds of livestock will be permitted to do so by arrangement with the head of the department.

Prerequisite: AH 351. Required in Animal Husbandry; junior year; second term; 5 credits; 5 recitations; 1 two-hour laboratory period. Text: Henry and Morrison, Feeds and Feeding. *E. L. Potter*

AH 411. Stock Judging III. Practical judging of all kinds of livestock, with occasional trips to fairs and stock farms. Judging teams for the Pacific International Stock Show are chosen largely from among the members of this class.

Prerequisites: At least four credits in stock judging. Required in Animal Husbandry; senior year; first term; 4 credits; 5 two-hour laboratory periods. Fee \$0.25. *E. L. Potter*

AM 421. Livestock Practice. Laboratory practice in such work as dipping, dehorning, hoof trimming, shearing, horse training, and other common operations of the stock farm.

Required in Animal Husbandry; senior year; first term; 1 credit; 1 three-hour laboratory period. (Note: The department reserves the right to limit the number of students in this course.) Fee \$0.50. *B. W. Rodenwold*

AH 422. **Livestock Practice.** A continuation of AH 421.

Required in Animal Husbandry; senior year; third term; 2 credits; 2 three-hour laboratory periods. Fee \$1.00.

B. W. Rodenwold

AH 471. **Meats.** A study of meats of all classes of meat animals, covering butchering, location of and cutting of standard and retail cuts, judging meat raw and cooked, economics of meat production, sanitation and inspection, abbatoirs, packing houses, and retail markets.

Elective in Animal Husbandry; senior year; second term; 2 credits; 2 three-hour laboratory periods.

A. W. Oliver

AH 475. **Meats.** Same as AH 471 eliminating butchering.

Elective in Home Economics; senior year; second or third term; 1 credit; 1 three-hour laboratory period.

A. W. Oliver

AH 481. **Seminar.** Weekly meetings in which papers on animal husbandry subjects are read and discussed. These papers are prepared under the supervision of the department, although considerable latitude is allowed in selection of subjects and manner of presentation.

Required in Animal Husbandry; junior or senior year; second term; 1 credit; 1 recitation.

B. W. Rodenwold

AH 482. **Seminar.** A continuation of AH 481.

Required in Animal Husbandry; junior or senior year; third term; 1 credit; 1 recitation.

B. W. Rodenwold

AH 491. **Investigative Work.** The student selects some topic for individual investigation by library methods or otherwise. The object is: first, to allow the student to study some particular subject in which he is especially interested; and second, to give him training in working out problems for himself, such as he will have to undertake after leaving college.

Elective in Animal Husbandry; senior year; any term; credits and hours to be arranged.

E. L. Potter

AH 611. **Stock Judging IV.** Continuation of AH 411.

Prerequisite: AH 411. Elective in Animal Husbandry; senior or graduate year; first term; 4 credits; 5 two-hour laboratory periods. Fee \$0.25.

E. L. Potter

AH 645. **Pedigree Study.** A laboratory study of the blood lines of the various breeds of livestock. Each student is expected to select one or two breeds as the basis for special study rather than to attempt to cover all breeds.

Elective in Animal Husbandry; senior or graduate year; each term. Credits and hours to be arranged.

B. W. Rodenwold

AH 661. Livestock Economics. An advanced course in management, dealing particularly with economic and financial phases of livestock production.

Prerequisite: AH 352. Required in Animal Husbandry; senior or graduate year; third term; 3 credits; 3 recitations. *E. L. Potter*

AH 691. Graduate Research. Graduate students are given opportunity to carry on research work along any lines desired. The department is well equipped for graduate work along lines of experimental feeding of hogs, sheep, and beef cattle, livestock management, and all forms of library work with either experiment station or general livestock literature.

Elective in Animal Husbandry; graduate year; any term; credits and hours to be arranged. *E. L. Potter*

DAIRY HUSBANDRY

There are approximately 23,000,000 dairy cows in the United States at the present time. It is estimated that one-sixth of the food supply of the nation is derived from milk and its products. As the population of the country becomes more congested an increasing proportion of the animal food of the country will come from this source. Dairying is one of the most important agricultural industries of Oregon and the Pacific Northwest. Climatic conditions especially adapt this region to successful dairying.

The student who plans to specialize in dairying may elect either dairy production or dairy manufacturing. The courses in dairy production are designed primarily to fit the student for dairy farming, although he may enter upon extension, experiment station, or teaching work. The dairy manufacturing courses are designed to fit the student for creamery manager, buttermaker, cheesemaker, or other special phases of dairy manufacturing work or experiment station, teaching, inspection of dairy products, and commission work.

Equipment. The department has a herd of about 150 head of pure-bred dairy cattle representing the four major dairy breeds. These animals are available for both instructional and experimental purposes and each year are used in teaching judging alone to more than 300 students. The herd is being developed in such a way as to be of unusual value in illustrating the important points in breeding dairy cattle. The quality of the herd is indicated by the excellent record made by thirty-four animals taken on the Northwest Fair Circuit in 1921, where they won more than 150 premiums, including twelve championships and four grand championships.

The department has a well-equipped manufacturing laboratory. The manufacture of butter, ice-cream, and cottage cheese, and the handling of market milk, are carried on continuously on a commercial scale. The student thus has opportunity to see this work done under practical conditions, and he receives his systematic instruction under the same conditions. A modern cold-storage plant has been recently installed, including an 8-ton ammonia compressor, a 20,000-lb., zero-degree butter storage room, and a 150-gallon five-degree ice-cream hardening room, together with necessary brine tanks.

COURSES

DH 200. **Elements of Dairying.** Fundamental principles and correct practices of modern dairying; testing of milk and cream; principles of buttermaking; operation of farm separators.

Prerequisite: Ch 103. Required in Agriculture; sophomore year; any term; 4 credits; 3 lectures; 2 two-hour laboratory periods. Fee \$4.00. Deposit \$2.00. *H. N. Colman, E. E. Anderson*

DH 204. **Advanced Testing.** Theory and practice of the various tests used to determine the composition of milk, cream, butter, cheese, and condensed milk in factories; tests for adulterants and preservatives; methods of standardizing testing solutions. This course is prerequisite to the dairy manufacturing subjects.

Prerequisite: DH 200. Required in Dairy Husbandry; elective in Agriculture; junior or senior year; first term (or optional in sophomore year, third term); 3 credits; 1 lecture; 2 two-hour laboratory periods. Fee \$3.00. Deposit \$2.00. Text: Farrington and Woll, *Testing Milk and Cream.* *V. D. Chappell, E. E. Anderson*

DH 301. **Market Milk.** To train for the production of market milk and for work in city milk plants and as milk inspectors. Distribution problem of the small town and city; methods of buying, standardizing, and distributing milk from the point of view of the plant owner or manager.

Prerequisite: DH 204. Required in Dairy Husbandry; junior or senior year; third term; 3 credits; 2 lectures; 1 two-hour laboratory period. Fee \$2.00. Deposit \$1.00. *H. N. Colman*

DH 302, 303. **Commercial Buttermaking.** This subject is taught from the point of view of the inside operation of the creamery. The instruction includes the theory and practice of buttermaking and the operation of creamery equipment.

Prerequisite: DH 204. Required in Dairy Husbandry; junior year; first and second terms; 3 credits each term; 2 lectures; 1 four-hour laboratory period. Fee \$3.00. Deposit \$2.00. Text: Hunziker, *The Butter Industry.* *V. D. Chappell*

DH 304. **Dairy Products Judging.** Judging of butter, cheese, and milk with score cards; discussion of defects.

Elective; junior year; third term; 1 credit; 1 two-hour laboratory period. Fee \$2.00. *V. D. Chappell*

DH 351. **Judging Dairy Cattle.** The correlation of the form of dairy cattle with milk production; gross breed characteristics; comparative judging, terminology of the show ring, and fitting for show.

Prerequisite: AH 111. Required in Dairy Husbandry (junior or senior year; optional in sophomore year); third term; 3 credits; 3 two-hour laboratory periods. Fee \$0.50. *R. C. Jones*

DH 352. **Dairy Herd Management.** History and characteristics of the breeds of dairy cattle and their adaptability to various conditions; the selection of a breed; development of a herd; keeping of records; raising calves and heifers; the principles of feeding dairy cattle.

Prerequisite: AH 351. Required in Dairy Husbandry; elective in Agriculture; junior year; second term; 3 credits; 3 lectures. *P. M. Brandt*

DH 401. **Cheesemaking.** Theory and practice of cheesemaking; manufacture of Cheddar cheese; practice in the manufacture of the common soft types, including cottage, Neufchatel, and club; the fundamental scientific principles of chemistry and bacteriology involved; judging cheese.

Prerequisite: DH 204. Required in Dairy Husbandry; elective in Agriculture; senior year; second term; 4 credits; 2 lectures; 1 eight-hour laboratory period. Fee \$3.00. Deposit \$2.00. Text: Thom and Fiske, *The Book of Cheese*. *V. D. Chappell*

DH 402. **Ice-cream and Condensed Milk.** The manufacture and sale of ice-creams and ices; manufacture of condensed milk; emphasis on the relation of these industries to each other and to the dairy industry in general.

Prerequisite: DH 200. Elective; senior year; third term; 3 credits; 2 lectures; 1 three-hour laboratory period. Fee \$4.00. Text: Frandsen and Markham, *Manufacture of Ice-creams and Ices*. *V. D. Chappell*

DH 403. **Factory Organization and Management.** Taught from the standpoint of the factory owner or manager, correlating all the practices taught in factory methods with the problem of factory management. Leaks, efficiency, selling, etc.

Elective; senior year; first term; 4 credits; 3 lectures; 1 laboratory period. Fee \$1.00. *V. D. Chappell*

DH 451. **Dairy Judging Team.** To train students for participation in intercollegiate dairy cattle judging contests.

Prerequisite: DH 351. Elective; senior year; first term; 2 credits; several laboratory periods a week and short trips to farms. Fee \$0.50. *R. C. Jones*

DH 452. **Breeding Dairy Cattle.** The application of the principles of genetics to the breeding of dairy cattle; selecting breeding animals; planning the breeding policy of a herd; study of pedigrees.

Prerequisite: ZP 351. Required in Dairy Husbandry; elective in Agriculture; senior year; second term; 3 credits; 3 lectures. Fee \$0.50. *R. C. Jones*

DH 453. **Milk Production.** A further study of feeding for milk production; more detailed study of various feeding standards and recent feeding investigations; special problems.

Prerequisite: DH 352. Required in Dairy Husbandry; elective in Agriculture; senior year; third term; 3 credits; 3 lectures.

P. M. Brandt

DH 454. **Dairy Products Judging Team.** To train students for intercollegiate products judging contests.

Prerequisite: DH 304. Elective; senior year; first term; 2 credits; 3 two-hour laboratory periods. Fee \$2.00. *V. D. Chappell*

DH 480. **Seminar.** The object of this course is to train the student to do independent work and to develop the spirit of research. Each student prepares papers and discussions on recent scientific work.

For senior and graduate students; 1 credit; 1 recitation.

P. M. Brandt

DH 490, 491, 492. **Special Studies.** Students who have demonstrated their ability to do independent work may pursue special studies along various lines of investigation. This is to be under the supervision of various members of the staff. Credit to be arranged.

P. M. Brandt, V. D. Chappell, R. C. Jones

DH 691, 692, 693. **Research.** Graduate students who desire to pursue advanced work may take up problems which they are qualified to study. Credit to be arranged.

P. M. Brandt, V. D. Chappell, R. C. Jones

FARM CROPS

This department deals with the problems of production, improvement, marketing, manufacture, and uses of each of the field crops produced for food, forage, textile, and special purposes. The purpose

of the work is primarily to teach students scientific, practical, and economical methods of crop production and improvement that may be put into actual use on the farm. In addition the courses are so arranged that men may fit themselves for civil service positions in agronomy, forage crops, grain standardization, plant breeding, crop marketing, etc., or for experiment station, extension, or teaching work. The object is to turn out men with broad training along general lines and well finished in Farm Crops. Considerable flexibility in electives is allowed in order to meet special needs of individual students.

Farm Crops graduates occupy technical, commercial, and teaching positions involving considerable responsibility and are successful in farm operation. The field is a large one and deals principally with well-known and staple crops that are constantly in use and in demand. The work is closely associated with the daily food supply and is of importance to all students of Agriculture, whether seeking a salaried position or expecting to engage in the operation or management of a farm.

Equipment. The department has excellent recitation rooms and well-equipped laboratories. The Experiment Station plots and farm fields offer excellent opportunities for field study and make possible extensive collection of valuable material for class work. A large collection of the best books, periodicals, etc., dealing with the subject, is available. The Oregon Agricultural College is excellently equipped for grain grading and inspection work; the crop inspection and grading work is a marked improvement over anything heretofore offered.

COURSES

✓ **FC 100. Crop Production.** Fundamental principles of economic crop production; storage, marketing, and uses of leading cereal, forage, and special field crops; production costs; methods of improvement; crop rotations; and weed control methods. A course of foundation principles, prerequisite to all Farm Crops courses in the degree curriculum except FC 351 and 361.

Required in Agriculture; freshman year; any term; 5 credits; 5 lectures; 1 recitation; 1 two-hour laboratory period. Fee \$0.50. Text: Montgomery, *Productive Farm Crops*.

G. R. Hyslop, C. C. Ruth, J. R. Nevius

FC 231. Forage Crops and Root Crops. The production, handling, storage, marketing, and uses of forage; reseeding and care of range; development and maintenance of pasture; silage and hay making; soiling crop rotations; root-crop production; cost comparison of different crops.

Elective in Agriculture; sophomore or junior year; third term; 3 credits; 3 lectures; 1 recitation. Fee \$0.30. Text: Piper, *Forage Crops*.
G. R. Hyslop

✓ FC 311. **Cereal Production.** A thorough study of the production and uses of cereals and allied grains from seed to consumer; varieties; distribution; adaptability; best production methods; markets; manufacture and use of cereals; cereal judging; effects of seed treatment; studies of material in the field.

Elective in Agriculture; junior year; first term; 5 credits; 4 recitations; 2 two-hour laboratory periods. Fee \$0.60. Texts: Carleton, *Small Grains*. Montgomery, *The Corn Crop*. *C. C. Ruth*

FC 314. **Potato Growing.** Potato production; improvement; storage; cost; marketing; distribution; uses; experimental work; varietal studies and identification; judging and scoring.

Elective in Agriculture; junior or senior year; first or second term; 2 credits; 1 lecture; 1 recitation; 1 two-hour laboratory period. Fee \$0.50. *J. R. Nevius*

FC 341. **Crop Improvement.** Practical improvement of farm crops as to quality and yield; field selection; variety testing; head, hill, and ear-to-row methods; multiplication; pure-seed production; hybridization and fundamental plant-breeding laws applicable to practical crop improvement; laboratory and field work.

Elective in Agriculture; junior year; third term; 5 credits; 4 lectures; 1 three-hour laboratory period. Fee \$0.75. Text: Hayes and Garber, *Breeding Crop Plants*. *C. C. Ruth*

FC 351. **Seed Testing.** A study in seed identification and germination; seed legislation; standard methods of seed testing; seed grades and standards. A course for students preparing for private, state, or Federal seed-testing work. Men and women having a good knowledge of systematic Botany and some knowledge of seed production may take this course.

Elective in Agriculture, Home Economics, and Commerce; junior or senior year; second term; 2 credits; 2 three-hour laboratory periods. Fee \$0.75. *J. R. Nevius*

FC 361. **Weed Eradication.** Lectures and reference work on weed types and their habits of growth; weed legislation; practical methods of prevention, control, and eradication; special attention to noxious, persistent, perennial, and poisonous weeds of ranch and range.

Elective in Agriculture; junior or senior year; third term; 2 credits; 2 lectures. *J. R. Nevius*

FC 411. **Crop Efficiency.** The production, storage, and marketing of farm crops; comparison of methods leading to cheaper and more efficient production; analysis of net results; crop adaptability and its relation to substitutes and competing markets; relation of preparatory methods to returns; cropping systems and crop rotations; crop specialization; amendments affecting yield, quality, and profits of specific crops; crop storage and conditioning; grade and standard fixation; marketing of farm crops; export and import regulations; crop statistics, their value and use; disposal of crop by-products; other problems affecting successful production.

Required in Farm Crops; elective to others in Agriculture; senior year; third term; 5 credits; 5 lectures. Fee \$0.35. *G. R. Hyslop*

FC 414, 415, 416. **Advanced Crop Work.** Lectures or laboratory work, or both, to groups of students desiring additional work along special lines of crop production not treated fully in other courses, or for students desiring to carry on advanced work or investigation beyond that outlined in undergraduate courses. Individual students are assigned to some practical problem involving experimental or research work and the preparation of a thesis.

Elective in Agriculture; senior year; three terms; 3 to 5 credits each term. Fee to be arranged. *G. R. Hyslop*

FC 421. **Crop Inspection.** The inspection, grading, and valuation of cereals, forage, potatoes, beans, seeds, stock feeds, and miscellaneous agricultural commodities according to Federal, state, and other adopted standards; theory and practice of grade fixation and application. A course for people buying or selling agricultural commodities, grain supervisors, samplers, inspectors, warehousemen, millers, and others.

Elective in Agriculture; senior year; second term; 5 credits; 3 lectures; 3 two-hour laboratory periods. Fee \$0.75.

C. C. Ruth, J. R. Nevius

FC 432. **Seed Production.** Principles and special methods of production, distribution, and use of seed crops of grasses, alfalfa, clover, and other forage legumes; field beans, horse beans, soy-beans, peas, and other food legumes, and other special seed crops. Seed inspection, seed certification, and seed legislation.

Elective in Agriculture; senior year; first term; 3 credits; 2 lectures; 1 recitation; 1 two-hour laboratory period. Fee \$0.60.

G. R. Hyslop

FC 441. **Advanced Crop Breeding.** An advanced course dealing with the theory and technique of breeding field crops; transmission of characters; hybridization; variability and its measurement; behavior of characters of specific crops. This course is especially for stud-

ents expecting to make a business of seed production and improvement and for those wishing to enter Federal or experiment station work in crops.

Elective in Agriculture; senior year; first term; 3 credits; 3 recitations. Fee \$0.35. *C. C. Ruth*

FC 691, 692, 693. **Graduate Work.** Candidates for advanced degrees majoring in Farm Crops are expected to complete from 24 to 32 credits of work on some specific problem of a practical nature, requiring careful research work. Results of laboratory and field work, together with a study of the literature of the subject must be embodied in a suitable thesis.

Elective in Agriculture; graduate year; three terms; credits and fees to be arranged. *G. R. Hyslop*

FARM MANAGEMENT

Farm Management deals with the organization, equipment, and operation of the farm as a business enterprise. Its aim is to correlate and synchronize the operations in the various phases of production on the farm in such a way as to result in a smoothly-running, efficient plant from which maximum returns may be obtained. The courses in Farm Management are designed to give the student a broad, well-rounded training in all the phases of Agriculture that will prepare him for successful production, with emphasis laid upon those studies which will fit him best for successful management of the farm. They also prepare students for professional work as farm managers, county agriculturists, extension specialists, farm appraisers, instructional and investigational workers, etc.

Equipment. The Farm Management laboratory and seminar room are provided with drafting tables and instruments, surveying instruments, original data and record sheets, lantern slides and charts, and a complete periodical and bulletin reference library. Investigational work carried on in many different parts of the state offers the advanced student excellent opportunities for field work.

COURSES

FMg 302. **Farm Management.** Major factors affecting the labor income; types of farming; selection and purchase of the farm; capital investment and distribution; use of credit; quality and diversity of business; farm leases and rental methods; man and horse labor efficiency; farm equipment costs and duty; farm and farmstead layout; cropping systems and crop rotations; maintenance of soil fertility; cost of production; use of farm records and accounts; marketing in relation to farm management; typical successful and unsuccessful farms; getting started in the farming business. Short

field trips. Advanced Farm Management may be taken accompanying this course.

Required in Agriculture; junior year; first or second term; 4 credits; 3 lectures; 1 recitation; 1 two-hour laboratory period. Fee \$1.00. *H. D. Scudder*

FMg 303. Farm Management. A continuation of FMg 302 in which the minor factors in successful farm management are discussed.

Prerequisite: FMg 302. Elective; junior year; second term; 3 credits; 2 lectures; 1 two-hour laboratory period. Fee \$0.50.

H. D. Scudder, C. Wilkes

FMg 304. Farm Management Field Course. Practical application of farm management principles through direct field study and analysis of successful farms in the state; training in regular farm-management survey work. In the summer of the junior year students registered in this course, accompanied by the instructor, spend four or five weeks in the field in representative sections of the state, devoting about one week to each section. Camp equipment is provided and field camp maintained throughout the period, the student paying only his living and traveling expenses.

Prerequisite: FMg 302. Elective; junior year; summer term; 8 credits; field work.

H. D. Scudder, C. Wilkes

FMg 322, 323, 422, 423. Farm Management Seminar. Junior, senior, and graduate students majoring in Farm Management meet together in seminar work. The class is organized and conducted by the students, constituting their technical association in Farm Management. Discussion of investigational methods and results; inquiry into opportunity and requirements for professional and practical work in Farm Management; presentation of management methods by successful farmers in the state, etc. Each year a three-day field trip is taken to successful farms.

Required in Farm Management; junior year; second and third terms; $\frac{1}{2}$ credit each term; fortnightly meetings. *H. D. Scudder*

FMg 411. Farm Organization. Application of farm management principles to the organization of the individual farm; methods of measuring the efficiency of any given farm; organizing a farm business; standards for farm planning; efficiency practices in production and operation; planning production programs, cropping systems, and fertility balances; labor programs; livestock, machinery, and building equipment; methods of increasing productive business; methods of financing, etc. Field trips. This course gives preparation for the actual field problems undertaken in Advanced Farm Management.

Prerequisite: FMg 302. Elective; junior year; third term; 3 credits; 2 lectures; 1 three-hour laboratory period. Fee \$0.50.

H. D. Scudder, C. Wilkes

FMg 412. **Semi-arid Farm Management.** The farm-management problems of the dry farmer and irrigation farmer; preparation of management plans dealing with forms of production, profitable enterprises, fertility rotations, equipment, labor distribution, marketing, etc., as adapted to semi-arid conditions; when possible, a field excursion into the dry farming and irrigated sections of Oregon for farm survey work.

Prerequisite: FMg 302. Elective; senior year; second term; 2 credits; 2 lectures.

H. D. Scudder

FMg 422, 423. **Farm Management Seminar.** See FMg 322, 323, 422, 423.

FMg 433. **Enterprise Costs and Profits.** Production costs and enterprise profits; methods of securing agricultural costs; tabulation, analysis, and interpretation of cost data; discussion of forms of complete cost records and enterprise records adapted to different types of farming; study of actual production, operation, maintenance, and management costs under Oregon conditions and comparative costs and profits of the chief farm enterprises in this state; relations of price to cost and profits; analyses of new or questionable enterprises; field study of prominent and profitable farm enterprises.

Prerequisite: FMg 302. Elective; senior year; third term; 3 credits; 2 lectures; 1 three-hour laboratory period. Fee \$0.50.

H. D. Scudder, C. Wilkes

FMg 441, 442, 443. **Advanced Farm Management.** Field work on individual problems such as preparation of detailed organization and management plans for specific farms; efficiency testing of groups of farms; field studies and costs and profits of specific farm enterprises; field study of specific farm practices and their efficiency; studies in equipment and building improvement; farm management factor studies, etc., directed and reviewed through weekly round-table discussions.

Prerequisite: FMg 302. Elective; senior year; three terms; 3 to 5 credits each term; all laboratory and field work. Fee \$1.00 each term.

H. D. Scudder, C. Wilkes

FMg 452. **Land Economics.** Land resources of the state and of the United States and their utilization; methods of land clearing and costs; land values; types of farming adapted to different regions; the land settlement problem and settlement methods and opportunities in this and other countries; land tenure in the United States and in Oregon with comparisons of ownership and tenantry.

Prerequisite: FMg 302. Elective; senior year; second term; 2 credits; 2 lectures. *H. D. Scudder*

FMg 463. Accredited Farm Work. Senior or graduate students who have taken the regular four-year major in Farm Management or its equivalent and who have previous good records of practical experience in farming and the necessary personal qualifications as to character, industry, etc., have opportunity in this course as workmen on "accredited farms"—farms operated by progressive and successful farmers—both for actual experience and to study the management of these farms, making written reports, and where advisable, preparing reorganization plans. Work is inspected by the instructor and reported upon by the farm owner. College credit given the student depends upon extent and quality of practical work and written reports.

Prerequisite: FMg 302. Elective; senior or graduate year; 8 to 16 credits. *H. D. Scudder*

FMg 601, 602, 603. Graduate Work. Under this head all graduate work in Farm Management is registered. Graduate work in this field may be along either of two lines.

A. Research. For the student who wishes to prepare himself for investigational and instructional or extension work in Farm Management. With the development of Farm Management throughout the country as a distinct science or branch of Agriculture, many opportunities are opening up for men in instructional or investigational or extension work in both state and Federal service. Problems of wide diversity and great practical interest offer attractive thesis subjects. The minor courses required in connection with research problems are taken in residence one or more terms and the major work in residence or in the field.

B. Practical Management. For the student who wishes to prepare himself more thoroughly as a farm manager, a sufficient period registered in the course FMg 463, Accredited Farm Work, combined with several terms' work in residence, is suggested.

Elective; graduate year; first term; credits to be arranged.

H. D. Scudder

FARM MECHANICS

The purpose and scope of the work in Farm Mechanics are indicated fully in the description of courses given below.

Equipment. The most up-to-date farm machinery is loaned the institution by the leading implement dealers of the Northwest, so that the student has constantly before him and is working with and

studying the very best farm machines of all types. The large, well-lighted gas-engine laboratory contains many different makes of gas engines, trucks and tractors, and accessories, such as sectional carburetors, magnetos, and lubricators.

The laboratory is also equipped with two large brakes for the testing of tractors, dynamometers for determining the draft of the field machines and the draw-bar horse-power of tractors, a gas and steam indicator for determining the efficiency of farm engines and tractors, and an electric motor and watt meter, so that the student may become familiar with the power requirements of belt-driven farm machines. Many tractors of the latest design are available for use of the students in the laboratory and in the field.

Light and water systems, septic tanks, and other equipment for the farm home are installed in the Farm Conveniences Laboratory. The design of farm structures and graphic methods is taught in a room provided with filing cases, blueprinting equipment, and individual drafting tables equipped with T squares and triangles.

COURSES

FM 111. Farm Motors. The principle, construction, operation, and adjustment of farm motors and accessories, carburetors, magnetos, ignition, governing, cooling, and lubricating systems, fuels and oils, testing, timing, and trouble hunting of farm gas motors, such as are used in the tractor, truck, automobile, and stationary outfits; adaptation of electricity to farm uses.

Elective; sophomore year; any term; 3 credits; 3 two-hour laboratory and recitation periods. Fee \$2.00. *W. J. Gilmore*

FM 112. Farm Tractors and Farm Trucks. Detailed study and operation of the tractor, truck, and automobile; indicated, brake, and draw-bar horse-power tests of tractors; tractor operation in the field.

Prerequisite: FM 111. Freshman or sophomore year; any term; 3 credits; 1 recitation; 2 three-hour laboratory periods. Fee \$3.00.

A. E. Jensen

FM 121. Farm Motor and Farm Implement Repair. Repair of engines, tractors, trucks, and automobiles.

Prerequisite: FM 111. Elective; freshman or sophomore year; any term; 3 credits; 1 recitation; 2 three-hour laboratory periods. Fee \$3.00.

A. E. Jensen

FM 131. Farm Implements. Study of the latest horse- and tractor-drawn farm implements, plows and their adjustments and hitches, cultivating machinery, seeding and planting machines, hay and grain cutting machines, and manure spreaders; rope tying and splicing; fences and roads; setting up and adjustment of machines.

Elective; sophomore, junior, or senior year; any term; 2 credits; 2 two-hour laboratory and recitation periods. Fee \$1.00.

W. J. Gilmore

FM 141. General Farm Repairs. Babbitting and fitting bearings, soldering, belt lacing, key fitting, pipe fittings, and pipe cutting and fitting, welding and tempering, repairing, adjusting, and painting farm machines.

Elective; freshman or sophomore year; any term; 2 credits; 1 recitation; 1 three-hour laboratory period. Fee \$2.00. *A. E. Jensen*

FM 280. Graphic Methods. Plotting and charting of figures and statistics relating chiefly to agricultural subjects; analyzing such material, putting it into a form which is easily read and understood, and charting the material in an attractive manner; use of drawing instruments.

Elective; sophomore year; any term; 2 credits; 2 three-hour laboratory periods. Fee \$0.50. *A. E. Brandt*

FM 332. Crop Handling Equipment. A detail study of all machines used in handling of crops in field, on the farm, and in storage; fanning-mills; grain graders and crushers; grain separators and combines; farm elevators; racks; balers; silage cutters. This course is especially designed for students in Crop Production, and for students of the grain farms who desire a knowledge of adjusting and handling of the thresher and combine.

Elective; junior or senior year; second or third term; 2 credits; 1 lecture; 1 three-hour laboratory period. Fee \$1.50. *W. J. Gilmore*

FM 341. Concrete Construction. The selection, proportioning, mixing, and placing of concrete for floors, sidewalks, machine bases, and foundations. The building of forms is a part of the work.

Elective; junior or senior year; third term; 3 credits; 2 recitations; 1 three-hour laboratory period. Fee \$2.00. *A. E. Brandt*

FM 351. Farm Conveniences. Installation of farm water-supply systems, and farm electric-lighting plants; pipe fitting and plumbing; meter reading; wells, pumps, hydraulic rams, and storage systems. Open to either men or women who desire a knowledge of modern farm conveniences with a view to installation.

Elective; sophomore, junior, or senior year; any term; 2 credits; 1 recitation; 1 three-hour laboratory period. Fee \$2.00.

A. E. Brandt

FM 361. Land Clearing. The use of explosives, hand stump-pullers, horse pullers; tractor and donkey engine for removing stumps, char-pitting, stump burning, and chemical treatment; what

is being done in other states; clearing and leveling of sage brush and swamp lands.

Elective; junior or senior year; third term; 2 credits; 1 recitation; 1 three-hour laboratory period. Fee \$2.00. *A. E. Brandt*

FM 371. Dairy Mechanics. Proportioning and mixing of concrete for floors, sidewalks, and machine bases; study and operation of gas engines and accessories; pumps, steam boilers, and steam engines; firing and operating steam engines; flue repair; babbitting; soldering; pipe fitting; line shafts and belting. Especially adapted to the needs of the students in Dairying.

Elective; junior or senior year; first term; 3 credits; 2 recitations; 1 three-hour laboratory period. Fee \$2.00. *A. E. Jensen*

FM 372. Orchard Machinery. Construction, operation, and adjustment of orchard machinery, such as gas engine, pump, tillage and seeding implements; orchard plowing and cultivation; demonstration of tractors for orchard work. Intended for students in Horticulture.

Elective; junior or senior year; third term; 3 credits; 2 recitations; 1 three-hour laboratory period. Fee \$2.00.

W. J. Gilmore, A. E. Jensen

FM 373. Irrigation Farm Mechanics. This course is intended for students interested in farm irrigation, and is designed for junior and senior students in Soils. It deals with the farm gas and electric motor, pumps, concrete construction, and the study and installation of farm pumping plants.

Elective; junior or senior year; third term; 3 credits; 1 recitation; 2 laboratory periods. Fee \$2.00.

W. J. Gilmore

FM 380. Farm Structures. Planning of all farm buildings, fences, etc.; building materials; foundations; construction; lighting; ventilating; heating; costs; convenience of farm structures; plans and specifications; design and construction of farm racks, tanks, troughs, etc.

Elective; junior or senior year; any term; 1 recitation; 2 three-hour laboratory periods. Fee \$2.00.

A. E. Brandt

FM 381. Advanced Farm Mechanics. This course is designed primarily to fit students for positions with tractor and implement companies as demonstrators or as service men. It is also of much value to those who intend to operate farm power equipment. Recommended to students having had FM 111, 112, and 121 and who feel need of further study of farm power equipment. Detail study of design of farm power equipment; practical field work; tractor and truck service. (A continuation of FM 112 and 121.)

Prerequisite: FM 111, 112, 121. Elective; any year; any term: 3 credits; 1 recitation; 2 three-hour laboratory periods. Fee \$3.00.

A. E. Jensen

HORTICULTURE

The work in Horticulture includes instruction in Pomology, Vegetable Gardening, Floriculture, Landscape Gardening, and Horticultural Products. In these courses the student is first thoroughly grounded in the fundamentals, and is then allowed to specialize as he desires. He thus may fit himself for experiment station or government work or prepare for the many lines of horticultural business.

The courses consist of lectures, reference reading, field exercises, and laboratory work. Much stress is placed upon the practical phases of all the work. In all courses horticultural truths are illustrated by practice, whenever possible. Students are given field and laboratory exercises in all such operations as planting, seeding, budding, grafting, cultivating, thinning, pruning, harvesting, and spraying.

Equipment. The Horticultural wing of Agricultural Hall, Horticultural Products Building, the greenhouses, extensive orchards and gardens, the large campus containing good plant material, an ammonia-gas cold storage plant, and a very good library are at the service of the department. The laboratories are well equipped for giving instruction in spraying, plant propagation, and fruit packing, vegetable grading and crating, and systematic pomology. There are large lecture rooms, a drafting room, photography rooms, and a Horticultural Museum.

The equipment of the Horticultural Products Building is described under Grounds and Buildings.

In addition to the extensive orchards and gardens of the College, the region is well provided with orchards, canneries, etc., which can be used in the laboratory work.

The department of Horticulture is well equipped for research work. The laboratories, the greenhouses, the experimental plots, and an excellent research library of scientific books and periodicals, facilitate effective investigation in the field of Horticulture.

COURSES

Hrt 100. Elements of Horticulture. This course is designed to give a student enough training in horticulture to enable him to care for the home orchard and garden as well as to understand some of the fundamentals of commercial orcharding and trucking. The orchard; budding; grafting; purchasing of nursery stock; planting the orchard; tillage; spraying; intercropping; pruning; planting and care of the garden; methods of vegetable growing.

Required in Agriculture; freshman year; any term; 5 credits; 2 lectures; 2 recitations; 2 two-hour laboratory periods. Fee \$1.00. Text: Sears, Productive Orchardng.

W. S. Brown, L. P. Wilcox, and assistants

POMOLOGY*

Hrt 311. **Practical Pomology.** A continuation of Hrt 100. Principles and practices of fruit growing; frost fighting; thinning; fertilizers; pollination; economics of fruit-farm management, etc.

Required in Pomology; junior year; first term; 4 credits; 2 lectures; 2 recitations; 1 three-hour laboratory period.

C. E. Schuster, L. P. Wilcox

Hrt 312. **Sub-tropical Pomology.** This course takes up in detail the problems concerning the growing and marketing of such sub-tropical fruits as oranges, figs, olives, pineapples, etc.

Elective in Agriculture; junior or senior year; first term; 3 credits; 2 lectures; 1 recitation.

C. E. Schuster

Hrt 313. **Pruning and Spraying.** Thorough training in the fundamental principles underlying pruning, including bud studies, tree building, maintaining vigor of the tree, rejuvenation and the like. About one-third of the term is devoted to spraying machinery, spraying accessories, technique, and practical methods.

Required in Pomology; junior year; second term; 4 credits; 2 lectures; 2 recitations; 1 three-hour laboratory period. Text: Kains, Principles and Practices of Pruning. *W. S. Brown, L. P. Wilcox*

Hrt 361. **History and Literature of Horticulture.** Brief study of the history of horticulture; systematic survey of the literature of horticulture, acquainting the student with the various sources of horticultural knowledge.

Required in Pomology; junior year; third term; 3 credits; 2 lectures; 2 recitations.

H. Hartman

Hrt 410. **Commercial Pomology.** The problems of handling fruit, including the picking, grading, and packing of fruits; study of the problems of transportation, storage, distribution, and marketing; planning of buildings for packing and storing of fruits.

Required in Pomology; senior year; second term; 5 credits; 3 lectures; 2 recitations; 1 two-hour laboratory period. *H. Hartman*

Hrt 412. **Systematic Pomology.** Principles underlying pomological nomenclature, variety and species, description, classification and identification of the more important fruit groups and their inter-relationship.

* Bot 312, Fruit Diseases, is required (junior year) of students specializing in Pomology.

Required in Pomology; senior year; first term; 5 credits; 2 recitations; 4 two-hour laboratory periods. Fee \$3.00. Text: Hartman, Elements of Systematic Pomology. *H. Hartman*

Hrt 415. **Small Fruits and Grapes.** Problems connected with the soils and slopes, pruning, training, harvesting, packing, and marketing of such small fruits as the strawberry, currant, gooseberry, raspberry, blackberry, loganberry, and cranberry; together with American and European grapes.

Elective in Agriculture; junior and senior years; second term; 4 credits; 2 lectures; 2 recitations. Text: Card, Bush Fruits. *L. P. Wilcox*

Hrt 416. **Nut Culture.** Methods of growing, harvesting, curing, and marketing such nut crops as the walnut, filbert, almond, and pecan. Detailed laboratory study of the leading varieties of these nuts.

Elective in Agriculture; junior or senior year; second term; 2 credits; 1 lecture; 1 two-hour lecture-laboratory period. Fee \$1.00. *C. E. Schuster*

Hrt 417. **Orchard Practices and Management.** Trips are taken to fruit farms near Corvallis and other places in the state. Studies made of practices in pruning, spraying, cultivation, marketing, etc. The management of fruit farms is gone into carefully. Maps and plans for fruit farms are made. Students registered only by appointment with the head of the department. Schedule by arrangement in four-hour periods.

Prerequisites: Hrt 314, 315, 316. Elective in Agriculture; senior year; third term; 3 credits; 1 recitation; 1 four-hour laboratory period. Fee according to cost of trips. *W. S. Brown*

Hrt 418. **Applied Plant Genetics.** History and development of plant breeding with horticultural plants; methods used by breeders; clonal selection; varieties of plants; evolution and development of species and varieties of horticultural importance; selection; hybridization; graft hybrids; bud selection; disease resistance, etc.

Prerequisite: ZP 351. Elective in Agriculture; junior or senior year; third term; three credits; 2 lectures; 1 recitation; 1 two-hour laboratory period. Fee \$1.50. *H. Hartman*

Hrt 481, 482, 483. **Seminar.** Courses for senior and graduate students in Horticulture. Study is made of some of the advanced problems. Articles from the leading magazines on horticultural subjects, as well as experiment station and Government publications, are reviewed.

Required in Horticulture; elective in Agriculture; senior year; three terms; 1 credit each term; 1 one-hour recitation. *W. S. Brown*

Hrt 619. **Advanced Plant Genetics.** Special problems in plant breeding for graduate students.

Prerequisites: ZP 351 and Hrt 418 or full equivalents.

E. M. Harvey

VEGETABLE GARDENING

Hrt 221. **Vegetable Growing.** Fundamental study of methods of vegetable growing; planting and care of a vegetable garden as an integral part of every farm home; preparation for advanced courses in vegetable growing.

Required in Vegetable Gardening; elective in Agriculture; sophomore year; third term; 3 credits; 1 lecture; 1 recitation; 1 two-hour laboratory period. Fee \$0.50. Text: Green, Vegetable Gardening.

A. G. Bouquet

Hrt 321. **Vegetable Seed Production.** The business of seed production is becoming yearly more important. The work offered in this course is designed both to enable the student to understand and practice methods used in contract seed production, and to acquaint him with the manner of improving for himself seed strains of vegetables grown for market or home use. Laboratory work consists of field practice in selection of stocks, harvesting, threshing, and cleaning seed, seed testing, etc.

Required in Vegetable Gardening; junior year; first term; 3 credits; 1 lecture; 1 recitation; 1 two-hour laboratory period. Text: Brill, Farm Gardening and Seed Growing.

A. G. Bouquet

Hrt 322. **Principles of Vegetable Gardening.** A continuation of Hrt 221. Problems of growers in field management of a commercial vegetable garden, including such subjects as vegetable soils, production of plants, distribution of crops, succession of crops, manures and fertilizers, methods of irrigation, spraying, etc.

Required in Vegetable Gardening; elective in Agriculture; junior year; second term; 3 credits; 2 recitations; 1 two-hour laboratory period. Texts: Watts, Vegetable Gardening. Corbett, Garden Farming.

A. G. Bouquet

Hrt 323. **Practical Vegetable Gardening.** A continuation of Hrt 322. Study of methods used in the commercial production of vegetables for market; field and greenhouse work with lectures thoroughly to acquaint the student with proper methods and management; inspection of commercial testing grounds; trips to vegetable farms.

Required in Vegetable Gardening; junior year; third term; 3 credits; 2 recitations; 1 two-hour laboratory period. Text: Corbett, Garden Farming.

A. G. Bouquet

Hrt 421, 422, 423. Vegetable Forcing. This work extends through the three terms of the college year, thus giving the student opportunity to observe fall, winter, and spring conditions as they relate to crops under glass. Vegetable greenhouse types, soils, fertilizing materials, soil cropping, sterilization methods, frame practice and greenhouse irrigation are studied. Crop production and marketing studies include leaf lettuce, spinach, cauliflower, French endive, rhubarb, etc. Spring term instruction deals largely with the growing and marketing of tomatoes and cucumbers and the production of young vegetable plants.

Required in Vegetable Gardening; senior year; three terms; 2 credits each term; 1 recitation; 1 two-hour laboratory period. Text: Watts, Vegetable Forcing. *A. G. Bouquet*

Hrt 424. Systematic Olericulture. Descriptions, nomenclature, and classifications of vegetables; a sufficient number of varieties of each vegetable studied so that the student may become acquainted with the more important groups of horticultural varieties; exercises in displaying and judging vegetables; assigned readings.

Required in Vegetable Gardening; senior year; first term; 1 credit; 1 two-hour laboratory period. *A. G. Bouquet*

Hrt 425. Vegetable Marketing. Principles and commercial practices of field harvesting, grading, and packing of vegetables; methods of marketing. Lectures, field work, farm and market visits; assigned readings.

Required in Vegetable Gardening; senior year; first term; 3 credits; 2 recitations; 1 two-hour laboratory period.

Hrt 426. Vegetable Marketing. Continuation of Hrt 425. Car loading, transportation, and distribution of truck crops, such as onion sets, cabbage, cauliflower, broccoli, melons, tomatoes, etc. Lectures, field work in loading and observation of car loads; assigned readings.

Required in Vegetable Gardening; senior year; second term; 3 credits; 2 recitations; 1 two-hour laboratory period.

Hrt 427. Commercial Truck Gardening. Commercial vegetable gardening, principally as related to methods of production for the general market and for canneries and dehydrators. A general review of vegetable gardening. Assigned readings.

Required in Vegetable Gardening; senior year; third term; 3 credits; 2 recitations; 1 two-hour laboratory period.

LANDSCAPE GARDENING

Hrt 231. Landscape Gardening. This course is designed to fit the needs of all students. Definite principles controlling layout and organization of different classes of property are developed. Enough

drafting is required so that the student can express himself in a satisfactory manner. Study is made of problems in improvement work on home grounds, rural or urban, private estates, and small parks.

Required in Landscape Gardening; elective in Agriculture; sophomore year; first term; 3 credits; 2 two-hour drafting periods; 2 lectures; 1 recitation. *A. L. Peck*

Hrt 331, 332, 333. **Plant Materials.** This work is intended to familiarize the student with trees, shrubs, vines, and perennials; their peculiar habits of growth, requirements, and care. Special attention is given to foliage, color, form, adaptation, hardness, and effects when grouped. Students are advised to take Hrt 231 as a preliminary.

Elective in Agriculture; junior year; three terms; 3 credits each term; 3 two-hour laboratory periods. *A. L. Peck*

Hrt 337. **History and Literature of Landscape Gardening.** Designed to give the student a good idea of the development of the art, and to bring him in touch with the literature, past and current, that is related to the subject.

Required in Landscape Gardening; junior year; first term; 3 credits; 3 recitations. *A. L. Peck*

Hrt 431. **Theory and Design.** A study of the best works of prominent landscape architects, together with a wide range of collateral reading. Private estates, public parks, and playgrounds, boulevards, and cemeteries are carefully studied. Reports, such as those of park boards and landscape architects, are studied.

Prerequisites: Hrt 231, 331, 332, 333. Required in Landscape Gardening; elective in Agriculture; senior year; first term; 4 credits; 1 recitation; 3 three-hour laboratory periods. *A. L. Peck*

Hrt 432. **Theory and Design.** A continuation of Hrt 431, in which a large portion of the time is devoted to preparation of planting plans. Outside time is required for collateral reading.

Prerequisite: Hrt 431. Required in Landscape Gardening; senior year; second term; 4 credits; 12 hours laboratory work.

A. L. Peck

Hrt 434, 435. **Field Practice.** Courses in practical problems brought in from the field. The student makes surveys, does the engineering work incidental to the solving of the problem, makes general plans, planting plans, grading plans, details, etc.

Prerequisites: Hrt 231, 331, 332, 333. Required in Landscape Gardening; senior year; first and third terms; 4 credits each term; 12 hours laboratory work. *A. L. Peck*

Hrt 437. **Town Planning.** The underlying ideas of municipal, town, and village improvement, literature and reports studied; town problems discussed; methods of procedure in town improvement worked out.

Required in Landscape Gardening; senior year; third term; 4 credits; 1 recitation; 9 one-hour laboratory periods.

FLORICULTURE

Hrt 241. **Plant Propagation and Greenhouse Practice.** This course aims to meet the needs of students who expect to be engaged in agricultural research requiring an understanding of greenhouse practices in the handling of soils, water, sunlight, heat, and ventilation. Methods of propagating plant life are studied. Students are required to grow their own stock in the houses and to care for it throughout the term. Limited to twenty-five students.

Elective in Agriculture; sophomore year; second term; 3 credits; 1 lecture; 1 recitation; 2 two-hour practicums. Fee \$1.50.

A. L. Peck

Hrt 341. **Greenhouse Construction.** A course especially for students specializing in Floriculture and Vegetable Gardening. The problems connected with the building of greenhouses, hotbeds, and cold-frames; selection of materials; the various systems of heating and ventilating; value of the various types of buildings; lectures and laboratory exercises in greenhouses and drafting room.

Elective in Agriculture; junior year; second term; 4 credits; 1 lecture; 9 one-hour laboratory periods.

Hrt 441, 442, 443. **Greenhouse Crops.** Actual work in the greenhouse. Propagation; culture; soils; ventilation; watering; heating; as wide a range of experience as possible in growing of plants used in the florist trade.

Prerequisite: Hrt 241. Elective in Agriculture; senior year; three terms; 3 credits each term; 9 hours laboratory work.

A. L. Peck

HORTICULTURAL PRODUCTS

The work in Horticultural Products is designed to fit the student to enter fields of commercial canning, dehydration, jam, jelly, and juice manufacture and, in addition, to prepare him for research work along these lines. All laboratory work is conducted on a commercial scale, and the student is trained to operate and repair machinery used in all manufacturing work.

Instruction in canning embraces grading, blanching, siruping, exhausting, sealing, sterilizing (both in open bath and retort), labeling, and storage. Emphasis is given the making of sirups and brines.

In dehydration, instruction covers the drying of prunes, pears, apples, and other fruits and vegetables. Students have an opportunity to operate both the farm drier and the commercial dehydrating tunnel, where conditions are kept under constant control. Special opportunity is offered also to those wishing work on problems of by-products manufacture.

Students expecting to specialize in Horticultural Products are requested to take courses in Canning Bacteriology, Horticultural Products Chemistry, Pomology, Business Organization and Management, Cost Accounting, and Seminar.

Hrt 351. Principles of Canning Fruits. This course is designed to teach by lectures, recitations, and laboratory exercises the fundamental principles of canning fruits, method of preparation, grading, siruping, exhausting, sealing, cooking, cooling, and storing. It covers a working knowledge of methods used in commercial canning.

Required in Horticultural Products; junior year; first term; 3 credits; 1 lecture; 1 recitation; 1 four-hour laboratory period. Fee \$5.00. *J. C. Bell*

Hrt 352. Principles of Canning Vegetables. Continuation of Hrt 351. Principles of canning vegetables.

Required in Horticultural Products; junior year; second term; 3 credits; 1 lecture; 1 recitation; 1 four-hour laboratory period. Fee \$5.00. *J. C. Bell*

Hrt 353. The Canning Plant and Its Equipment. The purpose of this course is to study the canning plant, its location, general plan of construction, equipment, and operation. Students are given training in designing plants and estimating costs. Laboratory work covers the construction and adjustment of canning machinery. Field trips to canneries to study their construction.

Required in Horticultural Products; junior year; third term; 3 credits; 1 lecture; 1 recitation; 1 four-hour laboratory period. Fee \$5.00. *J. C. Bell*

Hrt 363. Food Products. Commercial methods followed in the manufacture of such food stuffs as fruit and vegetable by-products, spices, condiments, flavoring extracts, sirups, leavening agents, animal foods; the use of sugars, vegetable cooking oils, flours, and cereals.

Elective; junior or senior year; third term; 2 credits; 1 lecture; 1 recitation. *J. C. Bell*

Hrt 371. Dehydration of Fruits and Vegetables. This course is especially for students majoring in Horticulture. Actual drying of fruits and vegetables is done, along with the study of the common types of driers and principles of dehydration.

Required in Horticultural Products; junior or senior year; first term; 3 credits; 1 lecture; 1 recitation; 1 four-hour laboratory period. Fee \$5.00. *E. H. Wiegand*

Hrt 451. Fruit Juice and Vinegar Manufacture. Practical and scientific work in the handling of fruit juices; problems of filtration, sterilization, and bottling.

Required in Horticultural Products; elective in Agriculture; senior year; first term; 3 credits; 1 lecture; 1 recitation; 1 four-hour laboratory period. Fee \$5.00. *E. H. Wiegand, J. C. Bell*

Hrt 462. Commercial Jam and Jelly Manufacture. Practical and scientific manufacture of jams and jellies.

Required in Horticultural Products; elective in Agriculture; senior year; second term; 3 credits; 1 lecture; 1 recitation; 1 four-hour laboratory period. Fee \$5.00. *J. C. Bell*

Hrt 472, 473. Preserves, Glaced Fruits, and Candied Fruits. Continuation of Hrt 451. Manufacture of preserves, marmalades, conserves, maraschino cherries, glazed fruits, and candied fruits.

Required in Horticultural Products; senior year; second and third terms; 3 credits each term; 1 lecture; 1 recitation; 1 four-hour laboratory period. Fee \$5.00. *E. H. Wiegand, J. C. Bell*

Hrt 487, 488, 489. Special Problems. Special study of some phase of fruit and vegetable preservation, as selected by the student, such as dehydration, pickle manufacture, canning and preserving certain products, etc.

Elective; senior year; three terms; credits, hours, and fees to be arranged. *E. H. Wiegand*

RESEARCH

Hrt 491, 492, 493. Investigative Work for Seniors. This work is offered for those seniors who are contemplating following college, experiment station, or Government work as a life career, and for those who desire practice in research technique. Problems are assigned which give experience in the laboratory, greenhouse, field, and library.

Elective in Agriculture; senior year; three terms; 3 credits each term; 2 lectures. *E. M. Harvey*

Hrt 691, 692, 693. Advanced Thesis and Research Work. For graduate students only. Problems in Pomology. Vegetable Gardening, Landscape Gardening, Floriculture, Plant Breeding, as selected by student.

Elective in Agriculture; graduate year; three terms; 2 to 8 credits each term. *E. M. Harvey*

Hrt 694, 695. **Methods of Research.** Conducted as a research round table, these courses give drill in making of briefs and outlines of research problems, methods of procedure in conducting investigative work, processes of reasoning, weighing of evidence, and the preparation of bulletins and reports. Research problems being studied by the department of Horticulture are taken up. Close study is made of research work presented in bulletins from other institutions.

Elective in Agriculture; senior or graduate year; first and second terms; 1 or 2 credits each term; 2 lectures. *E. M. Harvey*

POULTRY HUSBANDRY

Poultry keeping is rapidly growing in importance as a definite part of every well-regulated system of diversified farming, and offers opportunity for profit-making as a specialized business. The climate of Oregon is particularly adapted to the successful breeding and raising of poultry.

Equipment. The equipment includes two poultry plants, one of twenty-five acres, the other a five-acre tract. The two-story Poultry Building has laboratories for incubation, judging, killing, egg handling, and carpentry, equipped with appliances necessary for practical poultry keeping. Twenty different makes of incubators, including a mammoth machine, are available for student practice in incubation. There are colony poultry houses, three different types of commercial houses, and hatching and brood coops of various styles. Large flocks of Barred Plymouth Rocks and White Leghorns used in experimental breeding work are available for study, and there are pens of several other of the more common breeds and varieties which are used for student study and practice. There are also sets of charts, lantern slides, motion pictures, and photographs, illustrating breeds of fowls, types of poultry houses, and equipment.

COURSES

PH 201. **Practical Poultry Keeping.** A brief course dealing with practical application of the principles of Poultry Husbandry to general farm conditions. An introductory course for those intending to specialize in this field, recommended also for those who plan to teach agriculture or wish a single, elementary course in Poultry Husbandry.

Optional in Agriculture; sophomore year; any term; 3 credits; 2 lectures; 1 recitation; 1 two-hour laboratory period. Fee \$2.50. Text: Lippincott, Poultry Production. *A. G. Lunn*

VM 309. **Anatomy of the Fowl.** Elective in Agriculture; required in Poultry Husbandry; 3 credits; 1 lecture or recitation; 1 laboratory period. (See courses in Veterinary Medicine.)

PH 311. Poultry Breeding, Breeds, and Judging. A study of breeds of poultry, their history and classification; principles and methods of breeding for different purposes; laboratory work in judging from fancy and utility standpoints.

Prerequisite: PH 201. Optional in Agriculture; required in Poultry Husbandry; junior year; first term; 4 credits; 2 recitations; 2 two-hour laboratory periods. Fee \$1.00. Deposit \$1.00.

F. E. Fox

PH 321. Incubation and Brooding. A study of the principles and practices involved in natural and artificial incubation and brooding; study of the egg and its development; laboratory work in actual running of incubators and brooders; opportunity given when possible for students to work out some definite problem.

Prerequisite: PH 201. Optional in Agriculture; required in Poultry Husbandry; junior year; second term; 4 credits; 2 recitations; 2 two-hour laboratory periods. Fee \$1.50. Deposit \$1.00.

F. E. Fox

PH 331. Poultry-house Design and Construction. A study of the principles of poultry-house designing; estimating the cost of buildings; studying building plans; practice in erecting, remodeling, and making appliances; excursions to neighboring farms.

Prerequisite: PH 201. Optional in Agriculture; required in Poultry Husbandry; junior year; third term; 4 credits; 2 recitations; 2 laboratory periods. Fee \$2.00. Deposit \$1.00.

F. E. Fox

VM 351. Poultry Diseases. Elective in Agriculture; required in Poultry Husbandry; third term; 3 credits; 1 lecture or recitation; 2 laboratory periods. (See courses in Veterinary Medicine.)

PH 441. Poultry Feeding. A study of feeds suitable for poultry; principles and practice of feeding breeding stock, feeding for egg production, and fattening for market; feeding young and growing chicks; feeding appliances; the compounding of rations; actual practice in feeding a flock of hens.

Prerequisite: PH 201. Optional in Agriculture; required in Poultry Husbandry; senior year; first term; 4 credits; 2 recitations; 2 two-hour laboratory periods. Fee \$1.00. Deposit \$1.00.

F. E. Fox

PH 451. Marketing Poultry Products. Preparation of poultry and eggs for market; methods of storage and preservation; methods of marketing; laboratory work in killing, picking, grading, packing, and shipping poultry; testing, grading, packing, and storing eggs.

Prerequisite: PH 201. Optional in Agriculture; required in Poultry Husbandry; senior year; second term; 4 credits; 2 recitations; 2 two-hour laboratory periods. Fee \$2.00. Deposit \$1.00.

F. E. Fox

PH 463. **Poultry Farm Management.** Selection of the location, layout, and arrangement of buildings; study of records. Each student works out complete plans for the layout and management of a commercial poultry enterprise.

Prerequisites: PH 321, 331, 441, 451. Optional in Agriculture; required in Poultry Husbandry; senior year; third term; 4 credits; 2 recitations; 2 two-hour laboratory periods. Fee \$1.00. Deposit \$1.00. *F. E. Fox*

PH 481, 482, 483. **Seminar.** Discussion of Poultry literature and current problems of interest to the advanced student, including critical examination of research methods relating to poultry work. Frequent written reports are required.

Required in Poultry Husbandry; senior year; three terms; 1 credit each term; 1 meeting a week. *A. G. Lunn*

PH 484, 485, 486. **Departmental Management:** For seniors majoring in Poultry Husbandry. Practical work in and about the poultry department, so arranged as to give the student practice and experience in college poultry plant management. Hours to be arranged with head of department.

Poultry Husbandry; senior year; three terms; 3 credits each term; 3 three-hour laboratory periods. *A. G. Lunn*

SOILS

The work in Soils includes soil physics, soil drainage, irrigation farming, dry farming, soil fertility, soil surveying, soil biology, and soil management. The purpose of the courses in Soils is to give the student thorough training in this important phase of agriculture, making him competent to manage a farm or preparing him for positions in state or Federal service. The wealth of Oregon rests in her soil and water resources, and their intelligent development, management, and preservation. With the further extension of state and Federal aid to reclamation, there will be a greater demand for men who have a knowledge of how most successfully and economically to use water which the engineer's canals and reservoirs provide. These men must know the best time, amount, and method of irrigation, and the effects of irrigation upon soils and crops. They should also know the relations between soils, soil waters, and drainage, and understand how to locate and construct drains and to treat or fertilize the soil so as to secure the highest possible efficiency for each unit of tiling employed.

Equipment. The Soils laboratories are equipped with apparatus for complete study of physical and chemical properties of soils and problems of soil management. Ample desk room, supplied with running water, gas, compressed air, and electricity, is available. Electric

centrifuges and shakers, electric bridge for alkali testing, electric air baths, analytic and torsion balances, microscopes, blast lamps, aspirators, percolators, capillary tubes, mulch cylinders, soil sieves, scales, solution balance, compression filters, soil sampling tubes, moisture equivalent centrifuge, furnaces, hoods, etc., form a part of the equipment for the work in Soils. Soil surveying and mapping outfits, soil survey charts of the United States, and a collection of samples of the chief soil types of Oregon and the United States, are available. The soil preparation room is equipped with benches, soil-grinding and sifting machinery, and ample space for drying, preparation, and storage of large quantities of the different soil types used in the laboratories. For field work in Drainage and Irrigation, surveying instruments, tiles, and ditching tools, weirs, flumes, hook gauges, water-stage register, electric pumping plant, etc., are available. Weather-recording instruments of different kinds supply equipment for the course in Climatology. Laboratories fitted with desks, ovens, etc., afford opportunities for studies of the movement and retention of irrigation water in soil, the effects of irrigation upon soils and crops, the effect of tile drainage upon soils of different types, their rate of drainage, etc. On the College farm the students build weirs, measure water, lay out distribution systems, make cement pipes for laterals, and test pumping machinery. On the drainage plots, the rate of discharge is measured and the effects of drains and soil conditions on water table are studied. The Exhibit Room is equipped with cases and racks for displays of soil sample collections, subsoils, hard-pans, soil analyses, soil colors, soil drainage and irrigation exhibits, etc. A well-stocked reference library is available. The Experiment Station farms at Corvallis and in other parts of the state, together with the cooperative trials in different counties, offer opportunity for field study of soil problems.

Research. The department of Soils is well equipped for offering research work. The experiment fields, soil tanks, laboratories, and library, and the plans and methods used in soil, irrigation, and drainage investigations offer valuable opportunities to graduate students. See courses SIs 601, 602, 603.

COURSES

SIs 201, 202. Soils. Origin, formation, and classification of soils; study of the physical properties of soil moisture, heat, and air; effects of tillage, drainage, and irrigation; plant foods and soil fertility; fertilizers; crop rotations; manures; acid and alkali soils.

Prerequisites: Ch 101, 102, 103. Required in Agriculture; sophomore year; first and second terms; 3 credits each term; 2 lectures;

1 recitation; 1 three-hour laboratory period. Fee \$2.00 each term. Deposit \$2.00 each term. Text: Lyon, Fippin, and Buckman, Soils. *C. V. Ruzek, E. F. Torgerson, W. W. Johnston*

Sls 203. Soil Drainage and Irrigation. Principles of drainage and of irrigation; use of chain and level as applied to location and installation of tile drains or irrigation laterals; design of tile systems; their effect upon soils and crops; costs and benefits.

Required in Agriculture; sophomore year; third term; 3 credits; 2 lectures; 2 recitations; 1 three-hour laboratory period. Fee \$2.00. Deposit \$1.00. *W. L. Powers*

Sls 311. Irrigation Farming. Methods of obtaining, distributing, and conserving irrigation waters; handling of different crops under irrigation; costs and profits; duty of water in various districts of Oregon; water rights and irrigation codes; field and laboratory studies of irrigation qualities of different soils; laying out of irrigation systems.

Elective; junior year; first term; 3 credits; 2 lectures; 1 three-hour laboratory period. Fee \$1.00. Deposit \$1.00. Text: Widtsoe. *W. L. Powers, W. W. Johnston*

Sls 312. Irrigation Farming Elective. Special course for Irrigation Engineering students or other students who cannot take the laboratory course in Irrigation Farming.

Elective; junior or senior year; first term; 2 credits; 2 recitations. *W. L. Powers*

Sls 314. Western Land and Water Laws. A brief history of the development of water laws. Homestead laws, water rights, and irrigation codes in the different states, particularly in the Northwest and Oregon; appropriation, adjudication, and administration of water; reclamation and other Government and state land acts affecting reclamation development; organization and administration of irrigation districts and projects; water users' associations, etc.; discussion of public questions relating to reclamation.

Elective; junior year; second term; 3 credits; 3 recitations. Text: Chandler, Elements of Western Water Law. *W. W. Johnston*

Sls 317. Dry Farming. Advanced study of the subject of moisture conservation, special tillage methods and machinery, soil and climatic conditions, etc., in dry-farming regions, with particular reference to Oregon and northwestern states. Offered in alternate years. Offered in 1923-24.

Prerequisite: Sls 211 or 215. Elective; junior or senior year; second term; 2 credits; 2 recitations. *W. L. Powers*

Sls 318. **Land Drainage.** Field study of road, soil, and sanitary drainage; actual surveying, laying out, drafting of plans, estimation of cost, and installation of drainage systems; preparation of a complete report of the organization of a drainage district.

Prerequisite: Sls 201. Elective; junior year; third term; 3 credits; 1 recitation; 2 three-hour laboratory periods (week end). Fee \$1.00. Deposit \$1.00.

W. L. Powers

Sls 331. **Climatology.** Practical meteorology; observing and recording local weather and forecasting; a study of the climate of Oregon and the effect of climate upon agriculture. Given alternate years. Not given 1923-24.

Elective; junior or senior year; third term; 2 credits; 1 recitation; 1 two-hour laboratory period. Fee \$1.00. Deposit \$1.00.

E. F. Torgerson

Sls 411. **Irrigation Field Practice.** This course aims to give practical knowledge of irrigation farming conditions. Careful records are kept of water used on different soils and crops and of the yield obtained from definite areas. This work may be done during the summer months in connection with duties as ditch rider or other field agent. A report is required and work is to be outlined with the instructor in advance.

Prerequisite: Sls 311. Elective; junior or senior year; any term; 2 to 4 credits.

Sls 414. **Advanced Irrigation.** Irrigation literature and methods of irrigation investigation; field and laboratory studies of irrigation experiments; calculation of depth of water applied and of the most economical production thereby secured; costs and profits connected with irrigation; analysis of data and preparation of a thesis. Field examinations are made, where possible, of some of the largest projects in the state.

Elective; senior year; first term; 3 credits.

W. L. Powers, W. W. Johnston

Sls 417. **Irrigation Management.** A study of the operation and maintenance of irrigation systems; methods and records for water masters; control of agencies destructive to ditches; cost and durability of materials used in distribution of water on the farm; water rotations for different types of farming.

Elective; senior or graduate year; second term; 2 credits.

W. L. Powers

Sls 421. **Soil Physics.** Origin, formation, physical composition, and classification of soils; soil moisture, surface, tension, osmosis, capillarity, diffusion, aeration, temperature, and the resulting alteration in crop-producing power; influence of washing, drainage, and

irrigation upon soils; laboratory determination and comparison of physical properties of various soil types; physical effect of mulches, rotations, and cropping; soil sampling and judging; mechanical analysis of soils.

Elective; senior year; first term; 5 credits; 3 recitations; 2 three-hour laboratory periods. Fee \$2.00. Deposit \$1.00. Texts: Mosier and Gustafson. O. A. C. Laboratory Manual.

W. L. Powers, E. F. Torgerson

SlS 422. Soil Physics Elective. Similar to SlS 421, but without laboratory work, for Agricultural students unable to take the regular course in Soil Physics and for students in Irrigation Engineering.

Elective; senior year; first term; 3 credits; 3 recitations. Text: Mosier and Gustafson.

W. L. Powers

SlS 424. Soil Fertility. Advanced work in composition and values of fertilizers and barnyard and green manures; maintenance and improvement of fertility; effect of the various crops and different systems of farming upon the fertility of the soil; crop rotations and fertility in different sections of the state and the United States; field-plot and pot-culture investigations.

Prerequisite: SlS 421. Elective; senior year; second term; 5 credits; 3 recitations; 2 three-hour laboratory periods. Fee \$2.00. Deposit \$2.00.

C. V. Ruzek

SlS 425. Soil Fertility Lectures. Same as SlS 424, except no laboratory work.

Elective; senior year; second term; 3 credits; 3 recitations. Fee \$0.50.

C. V. Ruzek

SlS 427. Soil Surveying. For the advanced student who desires preparation for service at state experiment stations or in the Government Bureau of Soils. Study of the classification of soils and soil areas of the United States, of Oregon, and of the Northwest; much field work in making regular and completed soil surveys of assigned areas, with a report thereon.

Prerequisite: SlS 421 or 424. Elective; senior year; third term; 3 credits; 1 recitation; 2 three-hour laboratory periods. Fee \$1.00.

E. F. Torgerson

SlS 428. Soil Management. Occurrence, composition, characteristics, productivity, plant-food requirements, comparative values, and management of different soil types of Oregon.

Prerequisite: SlS 424. Elective; senior or graduate year; third term; 2 credits; 2 recitations.

W. L. Powers

SlS 441, 442. Advanced Soil Work. The advanced student may study the various soil types of Oregon through mechanical analysis,

and other physical tests; may undertake field work in soil surveying and mapping; or, through wire-basket, pot-culture, and field-plot tests, may determine the effects of various systems of cropping, or fertilizing, or of soil bacteria, upon soil fertility.

Prerequisites: Sls 411, 421. Elective; senior or graduate year; any term; 2 to 5 credits each term. Fee \$1.00 each term. Deposit \$2.00.

W. L. Powers, C. V. Ruzek

Sls 451, 452. **Advanced Drainage or Irrigation Work.** Special problems in either subject, such as the drainage of alkali lands, drainage against seepage, study of water-table fluctuations, run-off etc.; or field studies of the duty of water for a certain district, conservation of irrigation waters, effect of irrigation on soil moisture conditions, etc., as selected by the student.

Elective; senior year; any term; 2 to 5 credits each term. Fee \$0.50 each term. Deposit \$1.00.

W. L. Powers

Sls 481. **Seminar.** Semi-weekly meetings, alternating with those of the Soils Improvement Club, at which papers on soils subjects are read and discussed. Papers are prepared under supervision of the department.

Required in Soils; junior or senior year; three terms; one-half credit each term.

W. L. Powers, C. V. Ruzek

Sls 601, 602, 603. **Advanced Thesis and Research Work.** Courses for graduate students either as major or minor. Students may select problems in soil physics, analysis, surveying, fertility, irrigation, drainage, soil management, dry farming, or related subjects.

Elective to graduate students; three terms; 5 to 15 credits each term.

W. L. Powers, C. V. Ruzek

VETERINARY MEDICINE

The object of the courses in Veterinary Medicine is to help fit the student for the successful handling of livestock. Comparative Anatomy and Comparative Physiology familiarize the student with the normal structures and functions of the animal body, thus laying a foundation for courses in judging, breeding, feeds and feeding, nutrition, and diseases of animals.

The work in diseases is taken up from the standpoint of the livestock owner. The students learn to recognize diseases, to care for sick animals, and to prevent disease through proper methods of sanitation and management. The importance of quarantine, the different methods of control and eradication of disease, and the role of the stock owners in maintaining this work are considered.

Equipment. This department has its office, physiological laboratory, and lecture room on the second floor of the Dairy Building. Dissections, autopsies, and clinics are conducted in a suitably equipped Veterinary Clinic Building.

COURSES

VM 301. Comparative Anatomy. A laboratory course in the anatomy of domesticated animals. Special attention is given to the digestive systems of the horse and the cow; to the foot, the teeth, and the muscles of locomotion of the horse. The work includes complete dissection of the digestive, urinary, genital, and respiratory systems, and partial dissection of the circulatory, muscular, and nervous systems.

Prerequisite: ZP 130 or equivalent. Required in Animal Husbandry and in Dairy Husbandry; junior year; first term; 3 credits; 1 lecture; 3 two-hour laboratory periods. Fee \$1.00.

B. T. Simms, F. W. Miller, C. R. Donham

VM 302. Comparative Anatomy. Continuation of VM 301.

Prerequisite: VM 301. Required in Animal Husbandry and in Dairy Husbandry; junior year; second term; 3 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$1.00.

B. T. Simms, F. W. Miller, C. R. Donham

VM 309. Anatomy of the Fowl. A study of the structure of the body of the fowl.

Required in Poultry Husbandry; junior or senior year; second term; 3 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$1.00. Text: Kaupp, *Anatomy of the Domestic Fowl*.

VM 321. Comparative Physiology. Study of the functions of the body; the physiological processes of all domestic animals, with emphasis on the horse and the cow.

Prerequisites: VM 302, Ch 224 or equivalent. Required in Animal Husbandry and Dairy Husbandry; junior year; third term; 3 credits; 3 lectures; 1 two-hour laboratory period. Fee \$1.00.

B. T. Simms, C. R. Donham

VM 341. Diseases of Livestock. A one-term course for students specializing in the Plant Group. The more common diseases, with methods of prevention and control, are considered. The laboratory work consists of a free clinic.

Elective; junior or senior year; first term; 4 credits; 2 lectures; 2 recitations; 1 two-hour laboratory period. Fee \$0.50. Text: Craig, *Common Diseases of Domesticated Animals*.

C. R. Donham

VM 351. **Diseases of Poultry.** The parasitic, infectious, and non-infectious diseases of poultry; emphasis upon methods of prevention and control of the parasitic and infectious diseases; observations of autopsies, methods of diagnosis, and treatment of fowls.

Required in Poultry Husbandry; junior or senior year; third term; 3 credits; 3 recitations; 1 two-hour laboratory period. Fee \$0.50. Text: Ward and Gallagher, *Diseases of Domesticated Birds*.

VM 441, 442, 443. **Diseases of Livestock.** The parasitic, infectious, and non-infectious diseases of domesticated animals. The laboratory work consists of a free clinic. Students assist in handling the medical cases, operating on the surgical cases, and caring for animals in the hospital.

Prerequisites: VM 302, 321, or equivalent. Required in Animal Husbandry and Dairy Husbandry; senior year; three terms; 3 credits each term; 2 recitations; 1 two-hour laboratory period. Fee \$0.50 each term. Text: U. S. D. A. *Diseases of Horses*.

B. T. Simms, F. W. Miller

School of Basic Arts and Sciences

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.

M. ELLWOOD SMITH, Ph.D., Dean of the School of Basic Arts and Sciences; Director of the Summer Session.

VERA FUNK, B.Sc., Secretary to the Dean.

Art and Rural Architecture

FARLEY DOTY McLOUTH, B.Sc., Professor of Art.

FREDERICK HENRY BERNs, Instructor in Art.

MARJORIE BALTZELL, Instructor in Art.

MARIANNE WINTER, Instructor in Art.

Bacteriology

GODFREY VERNON COPSON, M.S., Professor of Bacteriology.

WILLIAM VERNAL HALVERSEN, M.S., Assistant Professor of Bacteriology.

JOSEPH ELLSWORTH SIMMONS, M.S., Assistant Professor of Bacteriology.

JAMES ALEXANDER BERRY, M.S., Instructor in Bacteriology.

Botany and Plant Pathology

HOWARD PHILLIPS BARSS, A.B., S.M., Professor of Botany and Plant Pathology.

WINFRED MCKENZIE ATWOOD, Ph.D. Associate Professor of Plant Physiology.

WILLIAM EVANS LAWRENCE, B.Sc., Associate Professor of Plant Ecology.

CHARLES ELMER OWENS, A.M., Associate Professor of Plant Pathology.

HELEN MARGARET GILKEY, Ph.D., Assistant Professor of Botany; Curator of the Herbarium.

MARGARET STASON, M.S., Instructor in Botany.

BERTHA EMOGENE THOMPSON, M.A., Instructor in Botany.

Chemistry

JOHN FULTON, M.S., Professor of Chemistry; Director of Chemical Laboratories.

SHIRLEY JONES, M.S., Professor of Agricultural Chemistry.

WALTER SCOTT, Ph.D., Associate Professor of Chemistry.

FRANCIS HENRY THURBER, M.A., Assistant Professor of Organic Chemistry.

HAROLD RUSSELL KELLY, B.Sc., Assistant Professor of Agricultural Chemistry.

EARL GILBERT, Ph.D., Assistant Professor of Physical Chemistry.

JOSEPH PARK MEHLIG, M.S., Instructor in Chemistry.

OSMAN HORACE CADY, M.S., Instructor in Chemistry.

ABRAHAM SCHWARTZ, B.Sc., Instructor in Chemistry.

REX LOTHROP, B.E., Instructor in Chemistry.

ALBERT WASHINGTON LAUBENGAYER, B.Chem., Instructor in Chemistry.

CYRIL EVAN FARRAND, B.Sc., Instructor in Chemistry.

JOHN PAUL QUIGLEY, M.S., Instructor in Chemistry.

HENRY PRICE HOWELLS, M.S., Instructor in Chemistry.

HELEN MARJORIE CRAWFORD, A.B., M.S., Instructor in Chemistry.

EDISON HERBERT SMITH, M.S., Instructor in Chemistry.

HELEN LOUISE FULTON, M.S., Teaching Fellow in Chemistry.

English Language and Literature

FREDERICK BERCHTOLD, A.M., Professor of English Language and Literature.

IDA BURNETT CALLAHAN, B.Sc., Associate Professor of English Language and Literature.

SIGURD HARLAN PETERSON, A.B., Associate Professor of English.

LORIN BURTON BALDWIN, A.M., Assistant Professor of English.

GERTRUDE EWING McELFRESH, A.B., B.Sc., Assistant Professor of English.

HARRY HOWARD TUCKER, A.B., Instructor in English.

SHARON OSBORNE BROWN, A.B., Instructor in English.

FREDERICK DEAN MOORE, B.A., Instructor in English.

JAMES COLEMAN SCOTT, A.B., Instructor in English.

CLARENCE DAVID GREENHOOD, A.B., Instructor in English.

AVERETT HOWARD, A.B., Instructor in English.

Entomology

LESTER LÖVETT, B.Sc., Professor of Entomology.

*FRANK HEIDTMAN LATHROP, A.B., M.S., Associate Professor of Entomology.

* On leave of absence.

WILLARD JOSEPH CHAMBERLIN, M.S., Assistant Professor of Entomology.

HERMAN AUSTIN SCULLEN, A.B., Assistant Professor of Entomology.

THERESE BECKWITH, A.B., Entomological Technician.

DUDLEY BUCK BROWN, A.B., Teaching Fellow in Entomology.

History

JOHN B. HORNER, A.M., Litt.D., Professor of History; Director of Oregon Historical Research.

WILLIAM HENRY ELLISON, Ph.D., Associate Professor of History.

Mathematics

CHARLES LESLIE JOHNSON, B.Sc., Professor of Mathematics.

EDWARD BENJAMIN BEATY, B.Sc., A.M., Associate Professor of Mathematics.

FREDERICK CHARLES KENT, A.B., Associate Professor of Mathematics.

NICHOLAS TARTAR, B.Sc., Assistant Professor of Mathematics.

HARRY LINDEN BEARD, B.Sc., Assistant Professor of Mathematics.

JOHN ALBERT VAN GROOS, M.S., Assistant Professor of Mathematics.

GEORGE ALFRED WILLIAMS, A.B., Instructor in Mathematics.

FLOYD EUGENE YOUNG, A.B., Instructor in Mathematics.

JOHN CLARENCE GRAY, B.Sc., Instructor in Mathematics.

BELVA DIXON, B.Sc., Instructor in Mathematics.

Modern Languages

LOUIS BACH, A.M., Professor of Modern Languages.

MELISSA MARGARET MARTIN, B.Sc., A.M., Instructor in Modern Languages.

ETHEL TAYLOR, A.B., Instructor in Modern Languages.

Physics

WILLIBALD WENIGER, Ph.D., Professor of Physics.

WILLIAM BALLANTYNE ANDERSON, Ph.D., Professor of Physics.

ROBERT UPHOFF, A.B., Assistant Professor of Physics.

ALBERT WASHINGTON MARKER, A.M., Instructor in Physics.

JACOB JORDAN, A.M., Instructor in Physics.

FRED BUCHNER MORGAN, A.B., B.Sc., Instructor in Physics.

HARRY DRILL, A.B., Instructor in Physics.

MAUDE TURLAY PARR, Instructor in Physics.

Public Speaking and Dramatics

CHARLES BUREN MITCHELL, A.M., Professor of Public Speaking.

EARL WILLIAM WELLS, B.A., Instructor in Public Speaking.

PERCY LORAIN EDWARDS, B.A., Instructor in Public Speaking.

ELIZABETH MARIA BARNES, Instructor in Dramatics.

Zoology and Physiology

NATHAN FASTEN, Ph.D., Professor of Zoology and Physiology.

HOWARD MARSHALL WIGHT, M.S., Assistant Professor of Zoology and Physiology.

FLORENCE HAGUE, Ph.D., Instructor in Zoology and Physiology.

WILBUR DOANE COURTNEY, B.Sc., Instructor in Zoology and Physiology.

WALTER PAGE COVELL, B.Sc., Teaching Fellow in Zoology and Physiology.

The School of Basic Arts and Sciences comprises various departments furnishing instruction in the basic sciences and other fundamental subjects underlying the various industries represented in the distinctive courses of the Oregon Agricultural College. It is an administrative organization of the twelve departments, Art and Rural Architecture, Bacteriology, Botany and Plant Pathology, Chemistry, English Language and Literature, Entomology, History, Mathematics, Modern Languages, Physics, Public Speaking and Dramatics, and Zoology and Physiology, the scope and facilities of which are discussed under their respective departmental headings.

ART AND RURAL ARCHITECTURE

Art. The department of Art and Rural Architecture offers no regular courses in Art with the idea of instruction in the fine arts alone, but rather as art education relates to the highest ideals in every-day life, and meets the requirements of the industries, dress, and the home. Courses in drawing, composition, design, and color are offered for the purpose of facilitating instruction in the applied arts courses in design, metal work, clay modeling, and the ceramic arts, and in the work of such other departments as Landscape Gardening, Household Art, and Industrial Arts. The courses offered not only develop utilitarian ideas, but they also cultivate an appreciation of the beautiful in nature and art.

Rural Architecture. The courses in Architecture are offered primarily to students in Agriculture, Home Economics, and Engineering. All students, however, who are interested in domestic or rural

architecture, may elect courses which they are prepared to take. The work is especially adapted to meet the utilitarian requirements of the various departments and to serve these departments in an able manner. The courses consist of problems in the design and construction of buildings and a consideration of building materials.

Equipment. The department occupies commodious, well-lighted studios on the third floor of Agricultural Hall and the first floor of the Library Building, a metal-working laboratory, and a clay-modeling and pottery studio in the Mines Building. The studios have north light, are well heated and ventilated, and are equipped with studio and laboratory accessories, such as casts, still life, prints, and tools. The department is also well supplied with wall drawings, pictures, and portfolios illustrating the different phases of the work.

The College Library has a carefully selected and growing reserve in art and architecture, covering all branches of these subjects.

COURSES

ART

A 110. Drawing and Composition. Free-hand drawing of still life, decorative textiles and costumes, developing the principles of representation in line and light and shade, by use of pencil, charcoal, and brush and ink.

Required in Home Economics; freshman year; first term; 3 credits; 1 lecture; 1 recitation; 3 two-hour studio periods. Fee \$0.50.

F. H. Berns, Marjorie Baltzell, Marianne Winter

A 120. Design. The elements of design construction and their application to problems of dress and home decoration are made the basis of this course. A note-book is required of each student. Two hours outside reading required.

Prerequisite: A 110 or equivalent. Required in Home Economics; freshman year; second term; 3 credits; 1 lecture; 1 recitation; 3 two-hour studio periods. Fee \$0.50.

F. H. Berns, Marjorie Baltzell, Marianne Winter

A 130. Color Harmony. This course covers the study of the so-called primary colors, the development of the prismatic colors with their complements, color quality, color values, and the various harmonies. Problems are rendered in original color harmonies, and in the use of nature color and color prints. These problems are an application of appropriate color schemes as applied to articles of household use, dress, and home interiors. Two hours outside reading required.

Prerequisites: A 110, 120, or equivalent. Required in Home Economics; freshman year; third term; 3 credits; 1 lecture; 1 recitation; 3 two-hour studio periods. Fee \$0.50.

F. H. Berns, Marjorie Baltzell, Marianne Winter

A 211. Industrial Arts Drawing. Free-hand perspective and free-hand drawing of furniture and other articles, machine parts, and drawing from written descriptions.

Required in Industrial Arts and Landscape Gardening; sophomore year; first term; 2 credits; 3 two-hour studio periods. Fee \$0.50.

F. D. McLouth

A 213. Drawing. Study and graphic representation of trees, hedges, shrubbery; in general the materials used in landscape gardening.

Prerequisite: A 211. Required in Landscape Gardening; sophomore year; first term; 2 credits; 3 two-hour studio periods. Fee \$0.50.

F. D. McLouth

A 221. Industrial Arts Design. A course in the principles of design suited to the Industrial Arts Curriculum. Original design plates for door and cabinet paneling, metal parts, hinges, escutcheons, draw pulls, etc., and furniture.

Prerequisite: A 211. Required in Industrial Arts; sophomore year; second term; 2 credits; 3 two-hour studio periods. Fee \$0.50.

F. D. McLouth

A 241. Applied Design and Color. An elective offered to give broader working knowledge of design principles which may serve as a guide to selection and adaptation for practical application in the home. Problems in design and execution are required.

Prerequisites: A 110, 120, and 130. Elective; second term; 2 credits; 3 two-hour studio periods. Fee \$0.50.

F. D. McLouth

A 242. Applied Design and Color. A continuation of A 241.

Prerequisite: A 241. Elective; second or third term; 2 credits; 3 two-hour studio periods. Fee \$0.50.

F. D. McLouth

A 251. Pencil and Pen Rendering. Pencil and pen technique; use of the pencil and pen in the expression of landscape gardening subjects; sketching; pencil drawing as used under washes; studio and out-of-doors work.

Required in Landscape Gardening; sophomore year; third term; 2 credits; 3 two-hour periods. Fee \$0.50.

F. D. McLouth

A 311, 312, 313. Landscape Drawing. Study of the presentation of drawings used by landscape architects and gardeners.

Required in Landscape Gardening; junior year; three terms; 3 credits each term; 9 periods. Fee \$1.00 each term.

F. D. McLouth

A 331. **Water-color.** The courses in water-color are offered as electives and are open to any students who have completed courses A 110, 120, and 130, or their equivalent. The work of the first term includes simple flat washes of geometric casts and flat color washes of still-life subjects.

Elective; sophomore, junior, or senior year; any term; 2 credits; 3 two-hour studio periods. Fee \$0.50. *F. D. McLouth*

A 332. **Water-color.** A continuation of A 331, taking up more complex still-life subjects, posters, flowers, and landscape.

Prerequisite: A 331. Elective; sophomore, junior, or senior year; any term; 2 credits; 3 two-hour studio periods. Fee \$0.50.

F. D. McLouth

A 333. **Design and Color Use.** The purpose of the course is to combine the use of design and color in more advanced problems of every-day application. Six problems are required and a note-book covering lectures and assigned reading. Two hours outside reading required.

Prerequisites: A 110, 120, 130, or equivalent. Required in Home Economics; junior year; any term; 3 credits; 1 lecture; 3 two-hour studio periods. Fee \$0.50.

F. D. McLouth, F. H. Berns

A 341. **Clay Modeling and Pottery.** Preparation of clay; designing and modeling of vases and bowls; application of original designs in incising and piercing; glazing and firing of kiln.

Prerequisites: A 110, 120, 130, or equivalent. Elective; sophomore, junior, or senior year; 2 credits; 3 two-hour studio periods. Fee \$1.00.

Marjorie Baltzell

A 342. **Clay Modeling and Pottery.** Introduction of handles, feet, and modeled decoration.

Prerequisites: A 110, 120, 130 (or equivalent), 341. Elective; sophomore, junior, or senior year; 2 credits; 3 two-hour studio periods. Fee \$1.00.

Marjorie Baltzell

A 343. **Clay Modeling and Pottery.** Application of principles previously studied to advanced problems; introduction of Japanese methods.

Prerequisites: A 110, 120, 130 (or equivalent), 341, 342. Elective; sophomore, junior, or senior year; 2 credits; 3 two-hour studio periods. Fee \$1.00.

Marjorie Baltzell

A 351. **Water-color Rendering.** Color theory; brush technique; flat washes over pencil; use of water-color washes in the expression of landscape gardening subjects.

Prerequisite: A 251. Required in Landscape Gardening; junior year; second term; 3 credits; 4 two-hour periods and 1 one-hour period. Fee \$0.50.

F. D. McLouth

A 352. **Water-color Rendering.** Continuation of A 351. Application of color theory; rendering color washes of more complex landscape gardening subjects. Later in the term opportunity is given for out-of-doors sketching in water-color.

Prerequisite: A 351. Required in Landscape Gardening; junior year; third term; 3 credits; 4 two-hour periods and 1 one-hour period. Fee \$0.50.

F. D. McLouth

A 441. **Jewelry Making.** Elementary processes involving sawing, soldering, and stone setting. Materials used are copper and silver.

Prerequisite: A 120 or equivalent. Elective; any term; 2 credits; 6 periods. Fee \$1.00. Deposit \$2.00.

Marjorie Baltzell

A 442. **Jewelry Making.** A continuation of A 441, introducing advanced problems in wire work and carving.

Prerequisites: A 120, A 441, or equivalents. Elective; any term; 2 credits; 6 periods. Fee \$1.00. Deposit \$2.00.

Marjorie Baltzell

A 443. **Jewelry Making.** A continuation of A 442. Problems to be carried out in gold.

Prerequisites: A 120, A 141, A 142, or equivalents. Elective; any term; 2 credits; 6 periods. Fee \$1.00. Deposit \$2.00.

Marjorie Baltzell

* RURAL ARCHITECTURE

Note: All hours are laboratory or drafting-room periods.

Ar 212. **Perspective Drawing.** Study of the representation of buildings and ground by means of mechanical perspective.

Elective; second term; 1 credit; 3 periods. Fee \$0.50.

Ar 213. **Dairy Buildings.** Study of dairy barns, silos, etc., by drawing plans.

Elective; third term; 2 credits; 6 periods. Fee \$0.50.

Ar 317, 318, 319. **Horticultural Products Buildings.** Study of evaporators, store houses, and other structures by drawing plans and inspecting buildings.

Required in Horticultural Products; senior year; three terms; 1 credit each term; 3 periods. Fee \$0.50.

Ar 320. **Domestic Architecture.** Study of house arrangement (for women students).

Elective; junior year; any term; 2 credits; 6 periods. Fee \$0.75. Text: Robinson, Domestic Architecture.

* Except by special arrangement courses in Rural Architecture will not be offered during 1923-24.

Ar 331, 332, 333. **House Planning.** Study of architecture by working drawings of houses.

Elective; junior year; three terms; 3 credits each term; 9 periods. Fee \$1.00 first term; \$0.50 second and third terms. Text: Robinson, Domestic Architecture.

BACTERIOLOGY

Bacteriology has become fundamental to such sciences as Agriculture, Pharmacy, and Home Economics and is a necessary part of the training of every man or woman who is seeking a true education. The courses in Bacteriology are adapted to meet both technical and cultural needs of the students. In the sophomore year the work is general and fundamental in nature, and practically the same for all students; but in the later courses it becomes more specialized, following some definite branch of the science. So complex has the study of Bacteriology become that the attempt is no longer made to master the whole field but only one or two of the main branches of the subject, such as Soil Bacteriology, Dairy Bacteriology, Pathogenic Bacteriology, and others.

During the junior and senior years, opportunity for advanced work is given to students who have had proper preliminary training and who show a natural aptitude towards the work. Students in Agriculture may elect Bacteriology as a minor, and receive the necessary fundamental training for positions in Agricultural Bacteriology in colleges, experiment stations, civil service, dairy and food inspection, etc.; while students in the Pharmacy and pre-medical curricula may elect advanced work in Medical Bacteriology, Sanitation, and Public Health work. Graduate students in Dairy Husbandry, Soils, Horticultural Products, Pharmacy, or Home Economics, may elect Bacteriology as a minor with the approval of their major professor and the head of the department of Bacteriology.

Proper understanding of Bacteriology necessitates a fair knowledge of General Chemistry, which is therefore made prerequisite to the courses in Bacteriology. Before a student can progress very far in the work, a knowledge of Qualitative, Organic, and Agricultural Chemistry is necessary, but these subjects will have been taken by students in the degree curricula by the time they are required for their bacteriological work.

Equipment. The department of Bacteriology occupies the fourth floor of Agricultural Hall. The department has well equipped laboratories for resident study and Experiment Station work, with dark room, storeroom, large incubator room for student use, and a departmental library containing the latest authentic texts on bacteriology. The general library has all the available American and

foreign bacteriological periodicals of recognized merit. The department is well supplied with the highest grade microscopes, glassware and other equipment for general and advanced work.

COURSES

Bac 201. **General Bacteriology (Agricultural).** A series of lectures, recitations, and laboratory experiments to familiarize students with the fundamental principles of Bacteriology as applied to Agriculture.

Prerequisite: One year of Chemistry. Required in Agriculture; sophomore year; any term; 4 credits; 2 lectures; 3 two-hour laboratory periods. Fee \$5.00. Text: Russell and Hastings, *Agricultural Bacteriology*.

Bac 204. **General Bacteriology.** A series of lectures, recitations, and laboratory experiments to familiarize students with the fundamental principles of Bacteriology.

Prerequisite: One year of Chemistry. Required in Home Economics (sophomore year), and in Pharmacy (junior year); first or second term; 3 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$4.00. Text: Buchanan, *Bacteriology*.

Bac 205. **General Bacteriology.** A continuation of Bac 204. A course adapted primarily to students in Home Economics. Bacteriology of food preservation, principles of sanitation, bacteriological studies of water, milk, and foods of all kinds; common infectious diseases; disinfection; germicides; and preservatives.

Prerequisite: Bac 204 or 201. Required in Home Economics; sophomore year; second or third term; 3 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$4.00. Text: Buchanan, *Bacteriology*.

Bac 212. **Zymology and Fermentations.** An elective for students in Horticultural Products. This course is planned to train the student to meet the bacteriological problems in food preservation such as the isolation, identification, and control of micro-organisms causing spoilage of fruits, vegetables, and other foodstuffs; the bacteriology of curing, ripening, and preserving food products.

Prerequisite: Bac 201 or 204. Required in Horticultural Products; elective in Agriculture; any year; second term; 3 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$4.00.

Bac 301, 302, 303. **Advanced Bacteriology.** Beginning with the first term of the junior year, students in Agriculture and Pharmacy may elect Bacteriology as a minor and continue throughout the rest of their college course.

Prerequisite: Bac 201 or 204. Elective; junior year; three terms; 4 credits each term; 2 lectures; 3 two-hour laboratory periods. Fee \$5.00 each term.

Bac 311. Dairy Bacteriology. Application of Bacteriology to dairy practices; physiological activities of bacteria underlying bacterial analysis of dairy products; dairy sanitation; bacteriology of diseases of dairy cattle.

Prerequisite: Bac 201 or 204. Required in Dairy Husbandry; junior or senior year; first term; 4 credits; 2 lectures; 3 two-hour laboratory periods. Fee \$5.00.

Bac 312. Dairy Bacteriology. A continuation of Bac 311. A more thorough study of specific problems in Dairy Bacteriology and practice in special technique, adapted to particular needs of individual students as far as possible, and planned to train students as bacteriologists for creameries and market milk plants.

Prerequisites: Bac 201, 311. Elective in Agriculture; junior or senior year; second term; 3 credits; 1 lecture; 3 two-hour laboratory periods. Fee \$5.00.

Bac 321. Soil Bacteriology. A study of micro-organisms of the soil and their relation to soil fertility; biochemistry of the decomposition of humus; nitrogen-fixation; ammonification, etc.; relation of bacteria to soil fertility and study of the soil as a medium for bacteriological growth.

Prerequisite: Bac 201; Ch 251. Elective in Agriculture; junior or senior year; first term; 4 credits; 2 lectures; 3 two-hour laboratory periods. Fee \$5.00.

Bac 322. Soil Bacteriology. A continuation of Bac 321. A more thorough study in soil of different farm practices. Review of literature on Soil Bacteriology.

Prerequisite: Bac 321. Elective in Agriculture; senior year; second term; 3 credits; 1 lecture; 3 two-hour laboratory periods. Fee \$4.00.

Bac 332. Pharmacy Bacteriology. Continuation of Bac 204. Lectures and laboratory work devoted to principles of Bacteriology and study of Pathogenic Bacteriology.

Prerequisite: Bac 201 or 204. Required in Pharmacy; junior year; second term; 3 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$4.00. Text: Park and Williams, Pathogenic Micro-organisms.

Bac 333. Immunity and Serum Therapy. A study of the theory of immunity and its application to serum therapy; preparation of toxins, antitoxins, vaccines, etc.; study of normal and pathological blood.

Prerequisites: Bac 205 or 332. Required in Pharmacy; junior year; third term; 3 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$4.00. Text: Park and Williams, Pathogenic Micro-organisms.

Bac 401, 402, 403. **Advanced Bacteriology.** A continuation of Bac 303 comprising further training in the principles and technique of Bacteriology besides directing the study along one of the main lines of Bacteriology.

Prerequisite: Bac 303. Elective; senior year; three terms; 4 credits each term; 3 two-hour laboratory periods; 2 lectures. Fee \$5.00 each term.

Bac 413. **Agricultural Bacteriology (Advanced).** A final course in Bacteriology for students in Agriculture. Application of bacterial activities to farm practices and to the farm home; rural sanitation, hygiene, control of infectious diseases, fermentations, food preservation, etc.

Prerequisites: Ch 251, Bac 201. Elective; senior year; third term; 3 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$4.00.

Bac 481, 482, 483. **Seminar.** A discussion of the current literature on bacteriological topics.

Elective in Agriculture; senior year; three terms; 1 credit each term; 1 period.

Bac 691, 692, 693. **Research in Bacteriology.** Work for the master's degree, as either a minor or a major in the department, may be selected and continued with the assistance and cooperation of the instructional staff of the department.

Prerequisite: Two years in Bacteriology. Credits and hours to be arranged. Fee \$2.00 a credit.

BOTANY AND PLANT PATHOLOGY

The courses offered in the department aim not only to give the student a knowledge of plants, their external and internal structure, their vital activities, their relations to their environment, and their natural classification; but also to impart such fundamental and practical information in regard to plants as will form a strong foundation for the technical work in Agriculture, Forestry, Pharmacy, and Home Economics.

Exceptional opportunities are afforded students who desire to specialize in Botany and Plant Pathology to prepare for the teaching of Botany and Agriculture in secondary schools and to secure a general foundation for advanced study and research in Horticulture, Agronomy, General Agriculture, Forestry, Grazing and other fields. Special attention is given to those who wish to take up investigational work in agricultural experiment stations or in the United

States Department of Agriculture under the civil service. Training in Botany and Plant Pathology is a most valuable asset to agricultural extension workers, horticultural inspectors, district agriculturists, grazing experts, seed analysts, and pure-food experts.

Equipment. The department of Botany and Plant Pathology is quartered on the second floor of Agricultural Hall. The three general student laboratories are equipped with compound microscopes for each student and with special artificial illumination for microscopic work. The laboratories for special studies in Plant Pathology, Plant Physiology, Plant Ecology, and Plant Histology are provided with all the equipment required for ordinary courses and in addition special instruments and technical apparatus are available for advanced work. The herbarium contains several thousand specimens of native and introduced plants including cultivated forms, weeds, poisonous plants, drug plants, grazing plants, forest trees, and other plants of economic importance. A battery of electrical driers is provided for collected material. Several thousand specimens of fungi, mostly parasitic forms, are comprised in the mycological collection. Physiologic dark rooms, photographic dark rooms, greenhouse space, and culture and sterilizing rooms for work with parasitic organisms are available. The departmental library contains excellent sets of reference works and bulletins, and receives the current issues of practically all of the more important botanical periodicals published in America and foreign countries.

Courses for Students Majoring in Botany and Plant Pathology. Students desiring to pursue special training in Botany and Plant Pathology are expected to take the usual work required in the freshman and sophomore years of the curricula in Agriculture, Forestry, Pharmacy, or Home Economics with but slight modifications. In the junior and senior years, besides the courses or options required of all students in these schools, special courses in Botany and Plant Pathology and related subjects are prescribed by the department of Botany and Plant Pathology. Students may obtain information from the head of the department regarding these requirements.

Graduate Courses. Advanced work in Plant Pathology, Physiology, Ecology, Morphology, Taxonomy, etc., or in technical methods employed in plant science research may be taken by graduate students as major or minor subjects and registered for under Bot 691, 692, 693. Graduate work looking toward the master's degree with major in Botany and Plant Pathology may be registered for under the School of Agriculture. Such work will be outlined by the head of the department with approval of the graduate committee

and carried forward under the immediate direction of an instructor specializing in the field in which the major is chosen.

Grazing Assistant Positions. The United States Forest Service offers abundant opportunity for properly prepared college students to enter grazing assistant positions in the national forests. Students desiring to prepare for these positions should consult this department for complete information as to requirements. The following Botany courses should be taken: Bot 101, 102, 321, 204, 341, 442. In addition, work should be taken in Animal Husbandry, Chemistry, Forestry (F 111, 112, 212, 311), and English (Eng 201).

COURSES

Bot 101, 102. General Botany. A two-term sequence taking up a study of higher plants as living things faced with problems of existence; their fundamental structure; life-histories; physiology; relation to soil, air moisture, temperature, etc.; extent and constitution of the vegetable kingdom as a whole; forms causing plant diseases or producing decay; main characteristics of the principal families of agricultural plants.

Required in Agriculture; freshman year; first and second terms; (Bot 101 required in Forestry, freshman year, first term, and Bot 102 modified by elimination of one laboratory period and reduction to 3 credits required of Forestry freshmen, second term); 4 credits each term; 1 lecture; 1 recitation; 3 two-hour laboratory periods. Fee \$2.00 each term. Deposit \$1.00 each term. Text: Martin, Botany, with Agricultural Applications.

Bot 107, 108, 109. Pharmaceutic Botany. A three-term sequence preparatory to Pharmacognosy and Materia Medica and concentrated upon the study of various plant tissues, identification of drug plants, study of crude and powdered drugs and their identification.

Required in Pharmacy; freshman year; three terms; 3 credits each term; 1 lecture; 1 recitation; 2 two-hour laboratory periods. Fee \$1.50 each term. Deposit \$1.00. Text: Martin, Botany.

Helen M. Gilkey

Bot 202. Principles of Botany, Part I: The Plant Kingdom. A study of representative members of the different groups of plants from lowest to highest, comparing their structure and reproductive methods and their position in the scale of plant evolution.

Elective; first term; 3 credits; 1 lecture, 1 recitation; 2 two-hour laboratory periods. Fee \$1.50. Deposit \$1.00. Text: Martin, Botany.

Helen M. Gilkey

Bot 203. Principles of Botany, Part II: The Seed Plants. A study of the structure and vital activities of higher plants and their relation to their environment.

Required in Home Economics; elective for others; sophomore year; any term; 3 credits; 1 lecture; 1 recitation; 2 two-hour laboratory periods. Fee \$1.50. Deposit \$1.00. Text: Martin, Botany.

Margaret Stason

Bot 204. Classification of Plants. A study of the families of higher plants and the identification of weeds, ornamentals, crop plants, etc., as students may elect; field trips for collecting specimens and recording data, and laboratory analysis of material thus collected; practice in drying and mounting plant specimens.

Prerequisite: An elementary course on seed plants. Elective; third term; 3 or more credits; 1 recitation; 2 three-hour laboratory periods or field trips. (Additional periods for additional credit.) Fee \$0.50 each credit. Text: Piper and Beattie, Flora of the Northwest Coast.

Helen M. Gilkey

Bot 311. Principles of Plant Pathology. Causes, symptoms, effects, and means of dissemination of disease in plants; principles of plant disease control; laboratory work with various types of plant diseases and the different groups of plant parasites.

Prerequisites: Bot 101 and 102, or their equivalent. Required in Agriculture (plant group); junior year; second term; 4 credits; 2 recitations; 3 two-hour laboratory periods. Fee \$2.00. Deposit \$1.00. Text: Duggar, Fungous Diseases of Plants.

C. E. Owens

Bot 312. Fruit Diseases. Causes, symptoms, progress, and control of the important fungous, bacterial, and physiological diseases of orchard trees and small fruits, with emphasis on those of importance in the Pacific Northwest. Studies in the laboratory are supplemented by field excursions.

Prerequisite: Bot 311. Required in Pomology; junior year; third term; 3 credits; 2 recitations; 2 two-hour laboratory periods. Fee \$1.50. Deposit \$1.00. Text: Hestler and Whetzel, Manual of Fruit Diseases.

C. E. Owens

Bot 313. Diseases of Field Crops and Vegetables. Similar to Bot 411, but dealing with diseases of field crops and truck and garden vegetables. References: Stevens, Diseases of Economic Plants; Taubenhaus, Diseases of Truck Crops.

Prerequisite: Bot 311. Required in Plant Pathology; junior year; third term; 3 credits; 2 recitations; 2 two-hour laboratory periods. Fee \$1.50. Deposit \$1.00.

C. E. Owens

Bot 314. Forest Pathology. The parasitic and saprophytic fungi which attack forest trees and destroy structural timber; their effects upon the wood; preventive measures.

Prerequisites: Bot 101 and 102, or their equivalent. Elective; first term; 2 credits; 1 recitation; 1 two-hour laboratory period. Fee \$1.00. Deposit \$1.00. Text: Rankin, Manual of Tree Diseases.

C. E. Owens

Bot 321. Plant Physiology. A study of the life processes and vital requirements of the plant as a basis for intelligent agricultural and horticultural practice; physiology of the living plant; response made by the plant to the influences surrounding it; laboratory experiments.

Prerequisites: Bot 101 and 102, or their equivalent, and Qualitative, Quantitative, and Organic Chemistry. Required in Agriculture (plant group); junior year; third term; 4 credits; 1 lecture; 1 recitation; 3 two-hour laboratory periods. Fee \$4.00. Deposit \$2.00. Text: Palladin, Plant Physiology.

W. M. Atwood

Bot 341. Range and Pasture Botany. A study of the edible, non-edible, and poisonous plants of the range and pasture, their characteristics, life-histories, methods of reproduction, conditions for growth, their distribution and ecological factors affecting them; relation of grazing to the maintenance of ranges and pastures; methods of preventing stock poisoning or of eradicating poisonous plants. Of interest to students in Animal Husbandry and Dairy Production, and to students in Forestry. Students may register for one additional credit, taking one additional two-hour laboratory period.

Prerequisites: Bot 101 and 102, or equivalent. Elective; second term; 2 credits; 1 recitation; 1 two-hour laboratory period. Fee \$0.50 each credit. Text: Frye and Rigg, Elementary Flora of the Northwest.

W. E. Lawrence

Bot 414. Mycology. A study of the different groups of fungi with special attention to parasitic forms, dealing with structure, life-history and classification. An advanced course.

Prerequisites: Bot 101 and 102, or their equivalent. Elective for advanced or graduate students; second term; 4 credits; 2 recitations; 3 two-hour laboratory periods. Fee \$2.00. Deposit \$1.00. Text: Stevens, Fungi.

H. P. Barss

Bot 415. Plant Pathological Technique. A training course in the technical methods employed in plant pathological investigations; isolation, cultivation, and inoculation of parasitic organisms; record keeping; care of collections; photographic methods, etc. For advanced students.

Prerequisite: Bot 311. Elective for advanced or graduate students; third term; 3 credits; 1 recitation; 2 three-hour laboratory periods. Fee \$2.50. Deposit \$2.00. *H. P. Barss*

Bot 441. **Comparative Morphology and Evolution of Plants.** An advanced course aiming to show the tendencies and causes which impel or control evolution within the plant kingdom and designed to broaden the student's knowledge of the different groups of plants by comparison of the organic structure, life-histories, cytological development, and reproductive processes of representative forms. Basic to work in Genetics, Plant Breeding, and advanced biologic study. Offered in alternate years. Offered in 1923-24.

Prerequisites: Bot 101 and 102, or their equivalent. Elective for advanced or graduate students; first term; 4 credits; 1 lecture; 1 recitation; 3 two-hour laboratory periods. Fee \$2.00. Deposit \$2.00. Text: Coulter et al., *A Text-Book of Botany*, Vol. I, Part 1. Coulter *Evolution of Sex in Plants.* *W. E. Lawrence*

Bot 442. **Plant Ecology.** A study of the effects on living plants of external influences such as climate, soil, physiography, etc., under natural conditions or under conditions modified by agriculture; native vegetation as an indicator of agricultural possibilities. Of special value to students of Agriculture, Forestry, Grazing, Agricultural Economics, Irrigation and Drainage, Plant Introduction, Geology, and Botany, and any expecting to enter state or Federal field service.

Prerequisites: Bot 101 and 102, or their equivalent. Elective for advanced or graduate students; third term; 3 credits; 1 lecture; 1 recitation; 1 three-hour laboratory period. Fee \$1.50.

W. E. Lawrence

Bot 443. **Plant Histology.** An advanced course dealing with the structure, inclusions, activities, and methods of division of the plant cell; development, structure, and relation to function of various types of plant tissues; training on the technique of making temporary and permanent microscopic mounts, including sectioning, staining, etc. Offered in alternate years. Not offered in 1923-24.

Prerequisites: Bot 101 and 102, or their equivalent. Elective for advanced or graduate students; first term; 3 credits; 1 recitation; 2 three-hour laboratory periods. Fee \$3.00. Deposit \$2.00. Text: Stevens, *Plant Anatomy.* *C. E. Owens*

Bot 451, 452, 453. **Advanced Study and Thesis.** For students specializing in Botany and Plant Pathology. Investigation of special problems or advanced studies not included in regular courses.

Elective; junior or senior year; any term; credit, hours of work, etc., to be arranged with major professor.

Bot 471. Application of Plant Science in Secondary School Teaching. For prospective teachers of agriculture or natural science in secondary schools. Deals with point of view, methods, materials, texts and equipment in teaching plant science subjects and considers the manner in which the work should be adapted to the interests, needs, and possibilities of any particular community.

Prerequisite: An elementary course in Botany. Elective; first term; 3 credits; 1 lecture; 1 recitation; 2 two-hour laboratory periods or field trips. Fee \$1.50. Deposit \$1.00. *C. E. Owens*

Bot 481, 482, 483. Seminar. The seminar is attended and contributed to by advanced students and instructional staff in the department of Botany and Plant Pathology and consists of reports on advanced botanical studies, extracts of articles along botanical lines appearing in scientific journals and other publications. Students are required to prepare and present papers on assigned topics.

Required in Botany; senior or graduate year; three terms; 1 credit each term; 1 period.

Bot 691, 692, 693. Graduate Study and Thesis. Graduate students may register under these numbers for special studies and investigations of graduate grade in any line of work included within the scope of the department of Botany and Plant Pathology such as plant pathology, physiology, morphology, ecology, taxonomy, mycology, histology, range botany, poisonous plants, technique, etc. Thesis work for the master's degree is taken up under these numbers.

Elective for graduate students; any term; credits, hours, prerequisites, etc., are arranged by the instructor in charge of the major line of work pursued, subject to the approval of the head of the department.

CHEMISTRY

The foundation courses in General Chemistry consist in familiarizing the student with the more important underlying principles of the science and the fundamentals of laboratory technique. These principles are devolved and illustrated largely through a study of the descriptive chemistry of the non-metallic and metallic elements, including appropriate means for identifying each.

The courses in Analytical Chemistry consist of (a) Qualitative Analysis, by means of which the student is enabled to classify, separate, and identify the components of mixtures and constituents of compounds; (b) Quantitative Analysis, in which he determines the actual quantity of those components and constituents which he has previously learned to separate and identify.

A study of the principles of Organic Chemistry and their applications in the laboratory follows the foregoing courses.

Having completed these, the student is now fairly well prepared to begin specialization in the field of chemistry. The following lines of specialization are suggested:

(1) **Agricultural Chemistry.** Study and analysis of soils, feeds, fertilizers, dairy and horticultural products; animal nutrition and general experiment station work.

(2) **Inorganic Chemistry and Analysis.** Study and analysis of minerals, ores, alloys, and the products of metallurgical and other inorganic chemical industries, including advanced inorganic chemistry and a study of the rarer elements and their technical application.

(3) **Pharmaceutical and Physiological Chemistry.** Study of the chemical processes more intimately associated with foods, drugs, pharmaceutical products, and the products of the human economy, including comprehensive analytical methods, and advanced organic synthesis.

(4) **Chemical Engineering.** Preparation for the field of industrial chemical technology.

Equipment. The department of Chemistry occupies nearly the whole of Science Hall, excepting the fourth floor which is occupied at present by the School of Pharmacy, and four rooms used by the Experiment Station department of Agricultural Chemistry.

The first floor contains the main general laboratory, the stock room, and the organic laboratory. The general laboratory, designed for practical work in modern chemistry, is well lighted and commodious, with accommodations for eighty students at one time. The general laboratory and the organic laboratory are both contiguous to the stock-room. The organic laboratory accommodates ninety-six students daily. These laboratories are equipped with the necessary apparatus. The laboratory used for Quantitative Analysis is on the second floor. The equipment of this laboratory is adequate to give training in the quantitative methods of chemistry and in most of the analytical work required in the laboratories of modern commercial establishments. The School of Agriculture demands in its students skill in analytical methods, and classes pursuing such training fill the main quantitative laboratory during the greater part of the day.

COURSES

Ch 101, 102, 103. **General Chemistry.** (1) Fundamental principles and their application; the non-metallic elements and their compounds; laboratory work in the identification of anions. A two-week introductory course in elementary physical concepts precedes the regular work. (2) Metallic elements and their compounds; introductory

study of chemical equilibrium; theory of solution; law of mass-action and the periodic law. The laboratory work completes anion classification and identification, and includes study of the reactions of the cations and their identification. Note: Students who have had one year of Chemistry in a standard high school may be permitted to take an examination for credit in Ch 101 and 102 provided their high school credits in Chemistry are not used as entrance units. This examination will be held one week after the opening of the first term. Laboratory note-books must be presented. (3) Metallic elements and their compounds; elementary study of the principles of qualitative analysis; further extension and application of the principles of chemical equilibrium; the law of mass-action; theory of solution; the periodic law; laboratory work in elementary qualitative analysis and, in addition, a few typical exercises in gravimetric and volumetric analysis, including acidimetry and alkalimetry. Ch 101, 102, 103 form a sequence. Credit given only on completion of all three courses or their equivalents.

Required in Agriculture, Home Economics, and Engineering; freshman year; three terms; 3 credits each term; 1 lecture; 1 recitation; 2 two-hour laboratory periods. Fee \$4.50 each term. Deposit \$3.00 each term.

Ch 104. General Chemistry. Fundamental principles and their application; the non-metallic elements and their compounds; the atomic theory; valence; oxidation and reduction reactions studied from the standpoint of the electron theory; introductory study of chemical equilibrium; laboratory work in quantitative applications of the more important chemical principles, and the reactions and means of identification of the common anions.

Prerequisite: High-school Chemistry and Physics. Required in Chemical Engineering, Mining Engineering, and Pharmacy; freshman year; first term; 5 credits; 2 lectures; 2 recitations; 2 three-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 105. General Chemistry. Continuation of Ch 104. Metallic elements and their compounds; extension of the fundamental principles of the preceding course; chemical equilibrium and the law of mass-action considered quantitatively; solubility products; the periodic law; laboratory work in systematic classification and identification of the common ions, together with numerous quantitative exercises illustrative of the more important chemical principles.

Prerequisite: Ch 104 or equivalent. Required in Chemical Engineering, Mining Engineering, and Pharmacy; freshman year; second term; 5 credits; 2 lectures; 2 recitations; 2 three-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 106. **General Chemistry.** Continuation of Ch 105. Metallic elements and their compounds. Further development of the principles of the preceding courses; introductory study of complex ions; thermochemistry, electrochemistry, colloid chemistry, and the phase rule.

Prerequisite: Ch 105. Required in Chemical Engineering, Mining Engineering, and Pharmacy; freshman year; third term; 5 credits; 2 lectures; 2 recitations; 2 three-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 111, 112, 113. **Household Chemistry.** A modified course in general chemistry for those students in Home Economics who do not intend to take the full number of courses in Chemistry required in the degree curriculum. Application of the principles of general chemistry with respect to fuels and air, water, cleansing and bleaching agents; qualitative study of proteins, fats, carbohydrates, leavening agents, food adulterants, and textile fibers. Ch 111 and 113 not accepted as prerequisites to Ch 102 and 221 respectively.

Elective in Home Economics; freshman year; three terms; 3 credits each term; 2 recitations; 2 two-hour laboratory periods. Fee \$4.50 each term. Deposit \$3.00 each term.

Ch 221. **Organic Chemistry.** Study of occurrence, methods of preparation, characteristic reactions, and properties of the more common organic compounds; the paraffins, alcohols, aldehydes, ketones, ethers, fatty acids, esters, benzene, phenols, aniline and a few dyes.

Prerequisite: Ch 103. Required in Home Economics; sophomore year; first term; 5 credits; 2 lectures; 2 recitations; 3 two-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 222, 223. **Chemistry of Foods and Digestion.** Nature of the carbohydrates, proteins, fats in common food stuffs; qualitative tests for these; chemical changes foods undergo in the process of digestion and metabolism.

Prerequisite: Ch 221 or 226. Required in Home Economics; sophomore year; second and third terms; $2\frac{1}{2}$ credits each term; 1 lecture; 1 recitation; 2 two-hour laboratory periods. Fee \$3.75 each term. Deposit \$3.00 each term.

Ch 224. **Organic Chemistry.** A course similar to Ch 221, but dealing also with the carbohydrates, proteins, and other compounds of carbon which are of special importance along agricultural and biochemical lines.

Prerequisites: Ch 103, 247. Required in Agriculture; sophomore year; second term; 5 credits; 2 lectures; 2 recitations; 2 three-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 226, 227. **Organic Chemistry.** A two-term sequence in the chemistry of the carbon compounds; the aliphatics, aromatics, and derivatives, including methods of separation, preparation, identification, properties, and characteristic reactions.

Prerequisite: Ch 106. Required in Pharmacy; sophomore year; first and second terms; 5 credits each term; 2 lectures; 2 recitations; 2 three-hour laboratory periods. Fee \$7.50 each term. Deposit \$4.00.

Ch 228. **Chemistry of Fuels.** A course of lectures for Mining and other qualified students. The course deals with the manner of occurrence, winning and fractionation of crude oils; their uses; by-products and their uses; destructive distillation of wood and some of its by-products; destructive distillation of coal and its by-products, including gas, coke, and tar. This course is given to familiarize the student with the products themselves, rather than to present either geological or chemical engineering points of view.

Prerequisites: Ch 104, 105, 106. Required in Mines; sophomore year; third term; 3 credits; 4 lectures.

Ch 231. **Qualitative Analysis.** The classification, separation, identification of the common ions and cations; dissolving and analysis of solid subjects, including salts, alloys, etc.

Prerequisite: Ch 106 or equivalent. Required in Mining Engineering; sophomore year; first term; 3 credits; 3 three-hour laboratory periods. Fee \$4.50. Deposit \$3.00.

Ch 232. **Qualitative Analysis.** Similar to Ch 231 but more extended. Some work is given in the identification of the less common metals, and qualitative tests are made with boiler scale and cement.

Prerequisite: Ch 106 or equivalent. Elective in Mines; sophomore year; first term; 5 credits; 2 lectures; 1 recitation; 4 three-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 233. **Qualitative Analysis.** Advanced Course. Review of the theory and practice of analytical operations and the application of the principles of the preceding courses in General Chemistry and Qualitative Analysis. The separation and identification of the less common elements such as selenium, tellurium, vanadium, and tungsten. Some practice is given in "dry analysis" so as to enable the student to grasp these methods of attack in complete analysis.

Prerequisites: Ch 106, 231, or their equivalent. Elective; sophomore year; third term; 5 credits; 1 lecture; 2 recitations; 3 three-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 241. **Quantitative Analysis.** Elementary gravimetric and volumetric analysis as far as through oxidation and reduction.

Required in Mining Engineering; sophomore year; second term;

3 credits; 1 lecture or recitation; 9 hours laboratory work. Fee \$4.50. Deposit \$3.00.

Ch 242. **Quantitative Analysis.** Continuation of Ch 241. Gravimetric and volumetric analysis of limestone, iron, lead, zinc, arsenic, and antimony ores, and various products from the copper refineries.

Elective in Mines; sophomore year; third term; 3 credits; 1 lecture or recitation; 9 hours laboratory work. Fee \$4.50. Deposit \$3.00.

Ch 244. **Quantitative Analysis.** Elementary quantitative analysis.

Required in Pharmacy (third term) and in Chemical Engineering (second term); sophomore year; 5 credits; 1 lecture; 1 recitation; 12 hours laboratory work. Fee \$7.50. Deposit \$3.00.

Ch 245. **Quantitative Analysis.** Continuation of Ch 244. Analysis of steels, brasses, and metallurgical and industrial products.

Required in Chemical Engineering; sophomore year; third term; 5 credits; 1 recitation; 1 lecture; 12 hours laboratory work. Fee \$7.50. Deposit \$3.00.

Ch 247. **Quantitative Analysis.** For Agricultural students. Exercises in gravimetric and volumetric analysis of various materials related to agricultural pursuits, with a view of teaching skill in the manipulation of instruments of precision, especially in the use of the analytical balance; stoichiometrical problems.

Prerequisite: Ch 103. Required in Agriculture; sophomore year; first term; 5 credits; 1 lecture; 2 recitations; 3 three-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 251. **Agricultural Chemistry.** The lectures lay the foundation for the correlation of plant chemistry, soil chemistry, and fertilizer chemistry, and emphasize the economic importance of certain groups of compounds—as the carbohydrates, fats, and proteins—which characterize our commonly-grown farm crops. The laboratory work supplements the lecture work.

Prerequisites: Ch 224, 247. Required in Agriculture; sophomore year; third term; 5 credits; 3 lectures; 3 three-hour laboratory periods (one devoted to supervised study and recitation). Fee \$7.50. Deposit \$3.00.

Ch 321. **Textile Identification.** Identification of the different materials used in the textile industries.

Prerequisites: Ch 103, 221. Elective; junior year; third term; 2 credits; 1 lecture; 2 two-hour laboratory periods. Fee \$2.00. Deposit \$3.00.

Ch 322, 323. **Organic Chemistry.** A two-term sequence in organic chemistry planned for students specializing in science courses.

A general survey of both the aliphatic and aromatic series, including preparation, properties, interpretation of reactions, and commercial value of the main groups of compounds.

Prerequisite: Ch 106. Required in Chemical Engineering; first and second terms; 5 credits each term; 2 lectures; 2 recitations; 2 three-hour laboratory periods. Fee \$7.50 each term. Deposit \$4.00 each term.

Ch 328. **Organic Analysis.** Qualitative tests and analysis of some organic compounds and mixtures; quantitative determination of carbon, hydrogen, nitrogen, and sulfur in organic compounds.

Prerequisites: Ch 227, 244. Required in Chemical Engineering; junior year; third term; 5 credits; 1 recitation; 4 three-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 351. **Dairy Chemistry.** Chemistry of milk, butter, oleomargarine, cheese, and other dairy products.

Prerequisite: Ch 247 or equivalent. Elective; junior year; first term; 3 credits; 3 three-hour laboratory periods; recitations at discretion of instructor during laboratory periods. Fee \$4.50. Deposit \$3.00.

Ch 352. **Chemistry of Spraying Materials.** Chemistry of the various insecticides and fungicides and inspection of a number of the commercial spraying materials.

Prerequisite: Ch 247 or equivalent. Elective; junior year; second term; 3 credits; 3 three-hour laboratory periods. Fee \$4.50. Deposit \$3.00.

Ch 353. **Chemistry of Horticultural Products.** Chemistry of fruits and fruit products, vegetables and vegetable products, as related to industrial processes.

Prerequisite: Ch 244 or equivalent. Elective; junior year; third term; 3 credits; 3 three-hour laboratory periods. Fee \$4.50. Deposit \$3.00.

Ch 355. **Chemistry of Soil Fertility.** This course is concerned primarily with methods and principles involved in the chemical work required in soil fertility investigations. Acidity, alkalinity, carbonates, ammonia, nitrates, organic matter, and humus determinations are most prominent. Especially for juniors in Soils.

Prerequisites: Ch 224, 247. Elective; junior year; second term; 3 credits; 3 three-hour laboratory periods. Fee \$4.50. Deposit \$3.00.

Ch 361. **Physiological Chemistry of Nutrition.** Qualitative tests and quantitative analysis of the end products of metabolism. Effects of changes in diet on the composition of the blood and urine.

Prerequisites: Ch 221, 222. Elective in Home Economics; junior

year; 5 credits; 1 lecture; 1 recitation; 3 four-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 371. Alkaloidal Testing. Study of the properties of the common alkaloidal drugs; testing for detecting and methods for isolating the common poisons from plants and animal tissues.

Prerequisites: Ch 227, 224. Required in Pharmacy; junior year; first term; 3 credits; 3 three-hour laboratory periods. Fee \$4.50. Deposit \$3.00.

Ch 374. Drug Assaying. Quantitative estimation of the active principles of crude drugs and their preparations, such as solid and fluid extracts, tinctures, pills, etc.

Prerequisite: Ch 371. Required in Pharmacy; junior year; second term; 3 credits; 3 three-hour laboratory periods. Fee \$4.50. Deposit \$3.00.

Ch 375. Advanced Drug Assaying. An advanced course for students in Pharmacy who intend to enter manufacturing pharmaceutical laboratories.

Prerequisite: Ch 374. Elective; senior year; first term; 3 credits; 3 three-hour laboratory periods. Fee \$4.50. Deposit \$3.00.

Ch 377. Food and Drug Analysis. Designed to fit students for positions in food and drug laboratories. Qualitative and quantitative analysis of food and drug products commonly subject to adulteration.

Prerequisites: Ch 277, 224; Bot 109. Required in Pharmacy; senior year; second term; 3 credits; 3 three-hour laboratory periods. Fee \$4.50. Deposit \$3.00.

Ch 378. Advanced Food and Drug Analysis. Continuation of Ch 377.

Prerequisite: Ch 377. Elective in Pharmacy; senior year; second term; 3 credits; 3 three-hour laboratory periods. Fee \$4.50. Deposit \$3.00.

Ch 411. Elementary Glass Blowing and Repairing. Elements of the art of welding, cutting, and grinding glass. Each student must procure his own glass and files. Especially for those who expect to become instructors in high schools.

Elective; junior or senior year; 1 credit; 1 three-hour laboratory period. Fee \$3.00. Text: Woollatt, Laboratory Arts. Frary, Glass Blowing.

Ch 421, 422, 423. Advanced Organic Chemistry. Lectures and assigned readings on special topics in organic chemistry; class reactions; the mechanism of important reactions; organic nitrogen

derivatives; proteins; carbohydrates; geometric isomerism; optical isomerism; trivalent carbon; benzene; naphthalene; pyridines; and electronic structure of some organic compounds.

Prerequisites: Ch 228, 229, or 322, 323. Two lectures; 2 credits each term.

Ch 429. **Organic Synthesis.** The methods of synthesis for the more complex organic compounds; acetoacetic ester, malonic ester; Grignard's reagents; the zinc alkyls; diazonium compounds and their use in synthetic chemistry.

Prerequisites: Ch 227, 244. Elective; senior year; first term; 5 credits; 2 recitations; 3 three-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 461. **Physiological Chemistry.** Properties, chemical nature, and reactions of the important body tissues, enzyme action, digestion, metabolism; blood tests and urine analysis.

Prerequisites: Ch 222, 224, 227. Required in Pharmacy; senior year; third term; 5 credits; 2 recitations; 3 three-hour laboratory periods. Fee \$7.50. Deposit \$3.00.

Ch 481, 482, 483. **Physical Chemistry.** Molecular weight determinations; properties of liquids; dilute solutions; solubilities; conducting of solutions; chemical equilibrium; velocity of reactions; thermochemical measurements.

Prerequisites: Ch 106, 233, 245; Mth 131. Required in Chemical Engineering; senior year; three terms; 3 credits each term; 1 lecture; 2 recitations, first term; 1 recitation second and third terms; 1 three-hour laboratory period, first term; 2 three-hour laboratory periods, second and third terms. Fee \$4.50 each term. Deposit \$3.00 each term.

Ch 490. **Minor Seminar in Chemistry.** Required of student assistants in Chemistry; open also to students who intend to teach elementary Chemistry in high schools. Topics covered: the fundamental principles of Chemistry and methods of presentation to classes; discussion of note-books and examination papers; methods of grading; classroom and laboratory administration; assembling apparatus; laboratory furnishings; repairs.

Prerequisites: Ch 106, 244, 231, 481. Elective; graduate year; 3 lectures or laboratory periods. Fees and deposits to be arranged.

Ch 491, 492, 493. **Advanced Inorganic Chemistry.** A graduate course intended to classify and correlate the student's knowledge of the field of chemistry as viewed from the several standpoints of the various courses he has pursued. Lectures, collateral readings, and discussions on the periodic system from the point of view of Mendelejeff, Lothar Meyer, Harkins, and Werner; valency; X-ray and

crystal structure; molecular symmetry as exemplified in crystal form; chemistry of the rarer elements; higher order compounds; complex inorganic acids; inorganic stereochemistry and isomerism; electron theory and electromerism; correlation of inorganic and organic Chemistry based on the electron theory; the later ideas of valency; cooling curves and thermal analysis; colloids; and similar topics.

Elective; any term; 2 meetings each week.

Ch 494. **History of Chemistry.** Rise and development of chemical theories and laws.

Prerequisite: Ch 106 or equivalent. Elective; second term; 2 credits; 2 lectures or recitations.

ENGLISH LANGUAGE AND LITERATURE

It is the aim of this department to teach the student that the essential part of any effective composition, whether oral or written, is thought well organized and well expressed; that to comprehend clearly and to feel strongly what he has to say, are the indispensable conditions of making others comprehend and feel. Thought so organized and expressed is found in good literature; this he is taught to appreciate. In all the collegiate courses in English the work is correlated with that offered in the other departments, to bring it into harmony with the spirit of the institution.

Equipment. The College Library, with its excellent resources in general and technical literature, including all the leading periodicals, affords abundant opportunity for the student in English to carry on his studies with profit and satisfaction. In addition, the opportunities for expression and appreciation afforded by the student activities and organizations—forensic, dramatic, literary, and journalistic—are exceptionally attractive. (For courses in Public Speaking and Dramatics see pages 178-181.)

COURSES

Eng 101. **English Composition.** Review of principles of rhetoric; practice in written and oral composition; frequent conferences between instructor and student as aids in meeting individual needs.

Note: All students registering in Eng 101 are required to have passed the general examination given the first of the term; see page 77.

Prerequisites: Three units of English earned in standard high schools. Required in all schools; freshman year (in Engineering, freshman or sophomore year); first term; 3 credits; 3 recitations.

Fee \$0.25. Texts: Foerster and Steadman, Sentences and Thinking. Greever and Jones, Century Handbook.

Eng 102. **English Composition.** Continuation of Eng 101. Reading, practice writing, and discussion to cultivate clearness of thought and accuracy of expression. The work is modified and adapted to meet the requirements of the students in the several schools.

Prerequisite: Eng 101. Required in all schools except Commerce (see Eng 105) (in Engineering, freshman or sophomore year; in other schools, freshman year); second term; 3 credits; 3 recitations. Fee \$0.25. Text: Fulton, Expository Writing.

Eng 103. **Technical Composition.** Classes organized according to schools or curricula. Material for practice writing is worked out in active cooperation with instructors in technical courses. Literature of contemporary interest is used as a basis for discussion and writing.

Prerequisite: Eng 102. Required in all schools except in Commerce (see Eng 106) (in Forestry, sophomore year; in Engineering, freshman or sophomore year; in other schools, freshman year); third term; 3 credits; 3 recitations. Texts: *Engineering*: Sypherd, Handbook of English for Engineers. *Home Economics*: Moore, English Composition for College Women.

Eng 105. **Business Correspondence.** The business letter in detail, special attention being given to letters of application, letters of inquiry and information, circular letters, letters of complaint, sales letters, follow-up letters, and collection letters.

Prerequisite: Eng 101. Required in Commerce; freshman year; second term; 3 credits; 3 recitations. Fee \$0.25. Text: Butler and Burd, Commercial Correspondence.

S. H. Peterson, A. Howard, H. Tucker, C. Greenhood

Eng 106. **Advanced Business English.** The preparation of manuscript and copy for the printer; study of the advertising circular, students being required to plan and complete circulars for various advertising purposes; practice in writing informal trade agreements, specifications, and other business forms; study of postal regulations.

Prerequisite: Eng 105 or equivalent. Required in Commerce; freshman year; third term; 3 credits; 3 recitations. Text: Butler and Burd, Commercial Correspondence.

S. H. Peterson, A. Howard, H. Tucker

Eng 201. **Advanced English Composition.** The object of this course is to develop facility and clarity of expression. Intensive study of the popular essay; of the biography and the criticism as

special forms of exposition; exercises in analysis and in the application of the mechanics of expository outlines; long and short themes.

Prerequisites: Eng 101, 102, 103. Elective; sophomore or junior year; any term; 3 credits; 3 recitations. Text: Gardner, *The Forms of Prose Literature*.

Eng 211. **The English Essay.** Study of structure of the essay; the essay as expression of national life and thought; the growth of the economic, critical, historical, and personal essay. Class and individual assignments from Macaulay, Arnold, Pater, Ruskin, Stevenson, Emerson, and others; lectures and reports.

Prerequisites: Eng 101, 102, 103, or equivalent. Elective; sophomore or junior year; first term; 3 credits; 3 recitations. Texts: Heydrick, *Types of the Essay*. Bronson, *English Essays*. Hufford, *Essays of Ruskin*. Morley, *Modern Essays*. *F. Berchtold*

Eng 213. **The Short-Story.** Reading, study, and composition of the short-story as a distinct literary type; analysis of three prescribed stories emphasizing respectively plot, character, and setting. Lectures, recitations, tests.

Prerequisites: Eng 101, 102, 103, or equivalent. Elective; sophomore or junior year; third term; 3 credits; 4 recitations. Text: Brander Mathews, *Short-Story—Specimens Illustrating Its Development*. *L. B. Baldwin*

Eng 214. **The Novel.** Study of the structure and content of the realistic as well as the romantic novel; growth of the novel of manners, of character, of the problem novel; study of the modification, variation and persistence of the larger categories of fiction. Class and individual assignments, lectures, and reports.

Prerequisites: Eng 101, 102, 103. Elective; sophomore or junior year; second term; 3 credits; 3 recitations. Texts: Cross, *Development of the English Novel*. Burton, *Masters of the English Novel*. *F. Berchtold*

Eng 321. **English Literature.** A general outline course in the history of English literature. The aim is to cultivate an appreciation of what is excellent in quality and form. Masterpieces representing the best thought and form are studied in class or assigned to students for careful reading and reports. Field of study: English literature from its beginning to the end of the eighteenth century.

Elective; junior year; first term; 3 credits; 3 recitations. Text: Moody and Lovett, *History of English Literature*. *F. Berchtold*

Eng 322. **English Literature.** A continuation of Eng 321. Study of the master minds of the nineteenth century. Lectures, readings and discussion; critical reports on assigned topics required from all the students.

Elective; junior year; second term; 3 credits; 3 recitations. Text: Moody and Lovett, History of English Literature. *F. Berchtold*

Eng 323. **Contemporary English Literature.** English literature of the late nineteenth and twentieth centuries.

Elective; junior year; third term; 3 credits; 3 recitations. Text: Cunliffe, Century Readings in English Literature. *F. Berchtold*

Eng 431. **American Literature.** Study of the growth and development of literature in our country. Emphasis placed on the study of writers of the nineteenth century, including Irving, Cooper, Bryant, Poe, Hawthorne, Longfellow, Holmes, Lowell, and others. Lectures; class study; class reading; reports on assigned topics; essays.

Elective; junior or senior year; first term; 3 credits; 3 recitations. Text: Boynton, American Literature. *F. Berchtold*

Eng 432. **American Literature.** A continuation of Eng 431. The metropolitan writers; literature in the South; literature in the West; present schools and tendencies. Lectures; classroom work; reports; essays.

Elective; junior or senior year; second term; 3 credits; 3 recitations. Text: Boynton, American Literature. *F. Berchtold*

Eng 433. **American Literature.** A continuation of Eng 432. Study of American writers of the twentieth century, including the more important literature of the Great War. Contemporary American periodical literature. Lectures; assigned readings; reports; essays.

Elective; junior or senior year; second term; 3 credits; 3 recitations. Text: Pattee, American Literature since 1870. *F. Berchtold*

Eng 441. **Tennyson.** A study of the man as representative poet of the nineteenth century and of his outlook upon life, together with an introduction to the study of poetry through a careful reading of his more significant poems.

Elective; junior or senior year; first term; 3 credits; 2 lectures; 1 recitation. *M. E. Smith*

Eng 442. **Browning.** The most noteworthy of the shorter poems are read and carefully studied. The purpose of the course is to remove difficulties and to bring the student into touch with the robust, optimistic personality of the poet.

Elective; junior or senior year; second term; 3 credits; 2 lectures; 1 recitation. *M. E. Smith*

Eng 443. **Shakespeare.** A careful reading of plays of various types with a view to the forming of some estimate of the poet's

genius and outlook. Attention is paid to the relation between the Elizabethan Drama and the modern play.

Elective; junior or senior year; third term; 3 credits; 2 lectures; 1 recitation. *M. E. Smith*

Eng 444. **Present-Day American Poetry.** A survey of the most vital of the more recent work of present-day American poets, including Robert Frost, E. A. Robinson, Vachel Lindsay, E. L. Masters, Amy Lowell, and a number of others. For comparison, brief notice will be given to such British poets as Hardy, Masfield, and Noyes. Lecture, discussion, reports.

Elective; junior or senior year; first term; 3 credits; 3 lectures.

M. E. Smith

Eng 445. **The English Drama.** A rapid survey of the development of the English Drama (exclusive of Shakespeare), with reading of plays illustrating the pre-Shakespearean period, the drama of Shakespeare's contemporaries, the Restoration, Goldsmith and Sheridan, and the revival of the late Nineteenth and the Twentieth centuries.

Elective; junior or senior year; second term; 3 credits; 2 lectures; 1 recitation. *M. E. Smith*

Eng 481, 482, 483. **Seminar.** Reading and analysis of the recognized masterpieces of continental European literature in approved translations. French, Italian, Spanish—Scandinavian, Teutonic—Russian, Polish.

Elective; three terms; 2 credits each term; 2 recitations.

F. Berchtold

ENTOMOLOGY

The courses in Entomology are planned to acquaint the student with the proper relationship of Entomology to general agriculture; to train students for commercial honey production; to prepare students for specialized Entomology training; and to meet the needs of students from other departments who desire work in Entomology. Three fields of advanced work in Entomology are offered: Applied Entomology, Bee Culture, and Forest Entomology.

The general courses in Economic Entomology are designed to provide the student with a practical grasp of the principles of applied Entomology including a knowledge of the commoner pests, their general habits and life-history, and the application of the most approved principles in insect-pest control.

The work in Bee Keeping consists of a two-year major in Bee Culture available to Agriculture students who desire this as a specialty or as a minor with poultry, horticulture, or dairying, etc.

The arrangement of the course is so planned that the student may take the first year's work or greater or lesser units with profit where not desirous or where impossible to continue the full two years. Other courses of shorter duration are planned to meet the special needs.

Forest Entomology includes a general consideration of the main insect groups and their relationships. An intensive study of the main groups of forest insects is made and practical investigation of forest areas is assigned in order to teach the type and extent of insect infestation, methods in forest surveys and in report writing, and the principles underlying forest insect control.

Advanced courses are planned to equip students specializing in Entomology with a fundamental groundwork in the science sufficient to prepare them for effective service in applied Entomology and to fit them for advanced research study.

Equipment. This department occupies rooms on the third floor of Agricultural Hall. The laboratories are well equipped for teaching general Entomology and fairly well equipped for advanced research work. In the museum are 5000 determined species of insects, including a representative collection of Oregon material. A display of Ricker mounts and St. Louis boxes containing life-history studies of injurious forms and their typical injury are available. The College apiary consists of thirty full colonies of bees with sufficient supers and additional equipment to care for an average surplus crop. The entomological library is well supplied with old volumes, complete sets of entomological periodicals, reports, and memoirs. Through the courtesy of the librarian of the United States Department of Agriculture students may borrow entomological literature from the library of the Department of Agriculture and the Congressional library.

COURSES

Ent 131, 132, 133. **Commercial Bee Culture.** Designed primarily for the student who contemplates taking up honey production as an occupation. The course includes a study of the selection and preparation of equipment; the biology and life-history of the honey-bee; honey flora; fall, winter, spring, and summer management; marketing; disease control.

Elective; three terms; 3 credits each term; 2 recitations; 1 three-hour laboratory period. Fee \$2.00 each term. Text: Phillips, *Bee Keeping*.
H. A. Scullen

Ent 201. **Principles of Economic Entomology.** Designed primarily for Agriculture students. A consideration of typical economic forms of insects in the principal orders and more important families, and of the principles of insect-pest control.

Prerequisite: ZP 130. Required in Agriculture; sophomore year; any term; 3 credits; 3 recitations; 1 two-hour laboratory period. Fee \$2.00. Text: Fernald, Applied Entomology.

L. Lovett, W. J. Chamberlin

Ent 231, 232, 233. **Advanced Commercial Bee Culture.** Designed for students preparing for educational work in bee culture, inspection work, or extensive honey production. The course includes a study of apiary management, queen rearing, disease control, inspection work, etc.

Prerequisites: Ent 131, 132, 133, or 331. Elective; three terms; 4 credits each term; 3 recitations; 1 three-hour laboratory period. Fee \$3.00 each term.

H. A. Scullen

Ent 303. **General Entomology.** Collection, preservation, and elementary classification of insects. In field collecting, the economic aspects are emphasized. Life-history studies, the use of breeding cages, and practice in compiling field and laboratory notes receive attention.

Prerequisite: Ent 301. Required in Entomology; junior year; third term; 4 credits; 2 recitations; 2 two-hour laboratory periods. Fee \$3.00. Text: Comstock, Manual for the Study of Insects.

W. J. Chamberlin

Ent 321. **Forest Entomology.** An intensive study of insects injurious to forests and forest products, forest insect surveys, and the principles of forest insect control.

Required in Forestry; junior year; second term; 4 credits; 3 lectures, or recitations; 1 two-hour laboratory period. Fee \$2.00.

W. J. Chamberlin

Ent 333. **Bee Culture.** A practical course in actual apiary manipulations designed primarily for students interested in Horticulture. The College has a small apiary where the simpler manipulations may be mastered.

Elective; third term; 3 credits; 2 recitations; 1 three-hour laboratory period. Fee \$3.00. Text: Phillips, Beekeeping.

H. A. Scullen

Ent 351. **Insect Morphology.** A study of the fundamentals of external, internal, and comparative morphology of insects including adaptive structures and their utility, and wing venation. Especial attention is given to structures used in classification.

Prerequisite: Ent 301. Required in Entomology; junior year; second term; 3 credits; 1 recitation; 2 three-hour laboratory periods. Fee \$2.00.

L. Lovett

Ent 404. **Advanced Economic Entomology.** An intensive consideration of specific insect pests of farm, garden, and orchard particularly of the Northwest, and their control; latest developments in insecticides and their uses.

Prerequisite: Ent 301. Required in Entomology; elective to others; senior year; first term; 3 credits; 3 recitations or lectures; 1 two-hour laboratory period. Fee \$2.00. Text: Sanderson and Pears, *Insect Pests of Farm, Garden, and Orchard*. *L. Lovett*

Ent 422. **Forest Entomology.** Continuation of Ent 321.

Prerequisite: Ent 321. Elective; senior year; first term; 3 credits; 2 recitations or lectures; 1 three-hour laboratory period. Fee \$2.00. *W. J. Chamberlin*

Ent 452. **Insect Ecology.** A study of insects in relation to their surroundings, considering the interrelations of insects with each other and with other animals and plants; influence of climate and other natural phenomena upon the distribution and activities of insects and application of these factors to Economic Entomology.

Prerequisite: Ent 303. Required in Entomology; senior year; second term; 5 credits; 3 recitations; 2 two-hour laboratory periods. Fee \$3.00. Text: Folsom, *Entomology with Reference to Its Biological and Economic Aspects*. *L. Lovett*

Ent 453. **Insect Taxonomy.** The collection, preservation, and classification of insects of the several orders; intensive study of insects of selected groups; attention to phylogenetic relationships and distribution.

Prerequisite: Ent 307. Required in Entomology; senior year; third term; 5 credits; 2 recitations; 2 three-hour laboratory periods. Fee \$3.00. *L. Lovett*

Ent 473. **The Teaching of Entomology.** Designed primarily for high school teachers. The principles of Entomology including materials and methods.

Prerequisites: Bot 471, ZP 472. Elective to seniors and graduate students; third term; 5 credits; 4 lectures; 1 three-hour laboratory period. Fee \$2.00.

Ent 481, 482, 483. **Seminar.** Reading, discussing, and abstracting of the leading articles on entomological topics as they appear in current scientific literature.

Elective to senior and graduate students; three terms; 1 credit each term. *L. Lovett*

Ent 691, 692, 693. **Advanced Thesis and Research Methods.** A course offered only for graduate students. Students select problems in Applied Entomology; problems in Insect Ecology; monographic problems, etc.; emphasis on methods in research.

Elective to graduate students; three terms; credits to be arranged. *L. Lovett*

HISTORY

A knowledge of history is fundamental to leadership. Courses in History are required in the School of Commerce and are offered in all other schools of the College. The instruction is given largely by lectures, supplemented by the reference facilities of the College Library.

COURSES

Hst 124. American Exploration and Colonization.

Elective; first term; 3 credits; 3 recitations. *J. B. Horner*

Hst 125. American History. Political, constitutional, and economic history of the United States from the Revolution to the Civil War.

Elective; first term; 3 credits; 3 recitations. *J. B. Horner*

Hst 126. Recent History of the United States. History of the United States of America from the Civil War to the present time. Collateral with the text, such matters as the negro problem, the industrial revolution, capitalism and socialism, free silver, direct government, woman suffrage, the new nationalism, imperialism, the labor movement, the Panama-Colombia question, our relations with Europe and the Latin-American republics, are discussed.

Required in Industrial Arts (sophomore year) and in Commerce (freshman year); second or third term; 3 credits; 3 recitations.

J. B. Horner

Hst 212. The History of Western Civilization II. This course includes study of European history from A. D. 1500 to the banishment of Napoleon.

Required in Industrial Arts and Commerce; freshman or sophomore year; any term; 3 credits; 3 recitations. *W. H. Ellison*

Hst 213. The History of Western Civilization III. This course comprises a study of Europe from the fall of Napoleon to the present time.

Required in Industrial Arts and Commerce; sophomore year; second or third term; 3 credits; 3 recitations. *W. H. Ellison*

Hst 331. History of South America. The course includes the history of South America, Mexico, and Central America. Lectures and reading.

Elective; junior year; first or second term; 3 credits; 3 recitations.

W. H. Ellison

Hst 340. History of Oregon. Includes history of Old Oregon now known as the Northwest States. Five epochs: early explorations; fur trade and colonization; provisional government; territorial

government; state government; Indian folk-lore; history of Oregon literature.

Required in Commerce (junior year); elective to all other juniors or seniors; any term; 3 credits; 3 recitations. Text: Horner, Oregon. *J. B. Horner*

Hst 351. Representative Men and Women. Study of American leaders of thought and action. Students may elect fifty percent of their allotment of biographical reference work, subject to approval of the instructor. Lectures, assigned reading, and discussion.

Elective; junior year; third term; 3 credits; 3 recitations.

W. H. Ellison

Hst 361. History of the Pacific Ocean Area. The history of the activities of European peoples and of the United States in the Pacific Ocean and adjacent regions; study of the struggle for political and economic leadership; consideration of the present situation and problems within the area.

Elective; junior or senior year; first or second term; 3 credits; 3 recitations.

W. H. Ellison

Hst 411. History of the British Empire. A coherent view of the larger factors influencing the national development from early times to the British Empire of today.

Elective; senior year; first term; 3 credits; 3 recitations.

W. H. Ellison

Hst 421. American Diplomatic History. History of the chief events in American foreign affairs; changed policies of our Government; character studies of the leading men in our diplomatic work; application of our experience to present problems.

Elective; senior year; third term; 3 credits; 3 recitations.

W. H. Ellison

MATHEMATICS

COURSES

Mth 101. Counting Room Mathematics. Logarithms, simple interest, compound interest, nominal and effective rates of interest, present worth and discounts, with emphasis placed upon basic principles of the mathematical theory of interest. Laboratory instruction on calculating machines.

Required in Commerce; freshman year; any term; 3 credits; 3 recitations; 1 two-hour laboratory period.*

F. C. Kent, F. E. Young

* Upon approval by the instructor, the laboratory instruction upon calculating machines may be deferred and taken in connection with Mth 102 or Mth 103.

Mth 102. Mathematics of Investment. Applications of the mathematical theory of interest to annuities, amortization, bonds, sinking funds, and depreciation.

Prerequisite: Mth 101. Required in Commerce; freshman year; any term; 3 credits; 3 recitations. *F. C. Kent, F. E. Young*

Mth 103. Introduction to Mathematical Statistics. An elementary recitation-laboratory course dealing with graphic representation of data, frequency curves, curve smoothing, calculation of averages, standard deviation, probable error of mean and of standard deviation, correlation table, ratio and coefficient, curves of regression.

Prerequisites: Mth 101; 2 units of high school mathematics. Required in Commerce; freshman year; any term; 3 credits; 2 recitations; 1 two-hour laboratory period. *F. C. Kent, F. E. Young*

Mth 104. Advanced Calculating Machine Course. Instruction given on standard types of calculating machines with a view to practical office work.

Prerequisite: Mth 101. Elective; second or third term; 2 credits; 6 one-hour laboratory periods.

Mth 111. Plane Trigonometry. This course includes functions of acute angles, right angles, functions of any angle, relations between functions, inverse functions, trigonometric equations, and oblique triangles. Considerable time is devoted to the deduction of trigonometric formulae, study of trigonometric identities, and the solution of practical problems.

Required in Engineering; freshman year; any term; 4 credits; 5 recitations. *N. Tartar, H. L. Beard, J. A. van Groos, G. A. Williams, J. C. Gray*

Mth 121. Algebra. A course for freshmen in Engineering whose work in Mth 111 discloses need for further preparation in Algebra before continuing their Mathematics.

Required of Engineering students found deficient in Algebra; freshman year; second or third term; 4 credits; 5 recitations. *N. Tartar, G. A. Williams*

Mth 131. Elementary Analysis. Review of Algebra including radical expressions, quadratic equations, binomial theorem, progressions, and complex numbers. In Analytical Geometry the point, straight line, circle, conic sections, and some of the higher plane curves are studied. Considerable time is given to the plotting of curves in both rectangular and polar coordinates.

Required in Engineering, Forestry, and Mines; freshman year; any term; 4 credits; 4 recitations.

E. B. Beaty, N. Tartar, H. L. Beard, J. A. van Groos, G. A. Williams, J. C. Gray

Mth 132. Elementary Analysis. A continuation of Mth 131, Subjects studied are functions and graphs, formula for differentiation, tangents and normals, maxima and minima, rates, and standard forms of integration.

Required in Engineering, Forestry, and Mines; freshman year; any term; 4 credits; 5 recitations.

*E. B. Beaty, N. Tartar, H. L. Beard, J. A. van Groos,
G. A. Williams, J. C. Gray*

Mth 201, 202, 203. College Mathematics. These courses include portions of plane trigonometry, selected topics in advanced algebra, and a considerable amount of the elementary portions of the calculus, comprising a coherent year's work in college mathematics. Primarily, the aim is preparation for advanced work in applied mathematics, statistics, insurance, biology, and economics. But in both subject-matter and methods of presentation the cultural value of mathematics is by no means neglected.

Prerequisite: $2\frac{1}{2}$ units of high school mathematics or 2 units of high school and one term of college mathematics. Elective; freshman or sophomore year; 3 terms; 3 credits each term; 3 recitations.

F. C. Kent

Mth 251. Differential Calculus. Differentiation; simple applications of the derivative; successive differentiation; maxima and minima; points of inflection; curve tracing; differentials; rates; change of variable; indeterminate form; partial differentiation.

Required in Engineering; sophomore year; any term; 4 credits; 5 recitations.

*C. L. Johnson, E. B. Beaty, J. A. van Groos,
H. L. Beard, G. A. Williams*

Mth 252. Integral Calculus. Standard forms of integrations; integration of trigonometric differentials; constant of integration; the definite integral; integration of rational fractions.

Required in Engineering; sophomore year; any term; 4 credits; 5 recitations.

*C. L. Johnson, E. B. Beaty, J. A. van Groos,
H. L. Beard, G. A. Williams*

Mth 253. Integral Calculus. A continuation of Mth 252. Integration by rationalization; integration as a process of summation with applications; successive integration; ordinary differential equations.

Required in Engineering; sophomore year; any term; 4 credits; 5 recitations.

C. L. Johnson, E. B. Beaty, J. A. van Groos, G. A. Williams

Mth 301. Mathematics of Insurance. This course deals with the mathematical calculations involved in actuarial and investment problems.

Prerequisites: Mth 201, 202, 203. Elective; 3 credits; 3 recitations.

F. C. Kent

Mth 302. Statistical Mathematics. An advanced course in mathematical statistics for students majoring in economics, biology, education, or farm management.

Prerequisites: Mth 201, 202, 203, or an equivalent amount of other college mathematics. Elective; 3 credits; 3 recitations. *F. C. Kent*

Mth 361. Differential Equations. Study of the solution of ordinary and partial differential equations which the Engineering student is likely to encounter.

Prerequisites: Mth 251, 252, 253. Elective; junior year; first or third term; 4 credits; 4 recitations. *C. L. Johnson, E. B. Beaty*

Mth 371. Method of Least Squares.

Prerequisites: Mth 251, 252, 253. Elective; junior year; second term; 3 credits; 3 recitations. *C. L. Johnson, E. B. Beaty*

Mth 381. Hyperbolic Functions.

Prerequisites: Mth 251, 252, 253, 361. Elective; junior or senior year; third term; 2 credits; 2 recitations. *C. L. Johnson, E. B. Beaty*

MODERN LANGUAGES

The department of Modern Languages offers four years of work in French, German, and Spanish.

In harmony with all other courses of the College, the final aim of the instruction is practical use in the various spheres of activity and pursuits of life. While the disciplinary and cultural values of language study are duly recognized and emphasized, the predominant purpose is the development of personal power for social service.

A certain amount of specified work in a language is definitely required in some curricula. In other curricula, German, French, and Spanish may be taken as electives, and when so taken the student receives full credit for any work completed. Elementary classes are formed at the beginning of the first, second, and third terms. Students who have had considerable language work in high schools should consult with the head of the department before registering for a language course.

COURSES

FRENCH

ML 111. Elementary French. Drill in the rudiments of the language; oral and written exercises; idiomatic translations; reading of easy selections.

Elective; any year; any term; 3 credits; 3 recitations.

ML 112. **Elementary French.** Continuation of ML 111.

Prerequisite: ML 111 or equivalent. Elective; any year; second term; 3 credits; 3 recitations.

ML 113. **Elementary French.** Continuation of ML 112.

Prerequisite: ML 112 or equivalent. Elective; any year; third term; 3 credits; 3 recitations.

ML 211, 212, 213. **Intermediate French.** Advanced grammar; irregular verbs; subjunctive mode; reading of narrative, descriptive, and historical prose; oral exercises on texts read.

Prerequisites: ML 111, 112, 113, or equivalent. Elective; any year; three terms; 3 credits each term; 3 recitations.

ML 311, 312, 313. **Advanced French.** Reading of scientific, technical, and miscellaneous texts with corresponding composition and conversation.

Prerequisites: ML 211, 212, 213, or equivalent. Elective; any year; three terms; 3 credits each term; 3 recitations.

ML 411, 412, 413. **Advanced French.** Planned especially for prospective teachers of French and others desiring to acquire a comprehensive knowledge of the language. Advanced composition; reading of advanced texts of various classes of literature; oral and written reports.

Prerequisites: ML 311, 312, 313, or equivalent. Elective; any year; three terms; 3 credits each term; 3 recitations.

SPANISH

ML 121. **Elementary Spanish.** Essentials of vocabulary and grammar; auxiliaries, regular and radical changing verbs, and some of the more common irregular forms; reading of easy prose selections; idiomatic translations; much oral drill and conversation.

Elective; any year; any term; 3 credits; 3 recitations.

ML 122. **Elementary Spanish.** Continuation of ML 121.

Prerequisite: ML 121 or equivalent. Elective; any year; second term; 3 credits; 3 recitations.

ML 123. **Elementary Spanish.** A continuation of ML 122.

Prerequisite: ML 122 or equivalent. Elective; any year; third term; 3 credits; 3 recitations.

ML 221, 222, 223. **Intermediate Spanish.** Grammar continued; irregular verbs; subjunctive mode in all its uses; idiomatic phrases; social and epistolary forms; reading of suitable texts; oral and written exercises.

Prerequisites: ML 121, 122, 123, or equivalent. Elective; any year; three terms; 3 credits each term; 3 recitations.

ML 321, 322, 323. **Advanced Spanish.** Reading of commercial texts; commercial correspondence; descriptive and technical prose; much conversation.

Prerequisites: ML 221, 222, 223, or equivalent. Elective; any year; three terms; 3 credits each term; 3 recitations.

ML 421, 422, 423. **Advanced Spanish.** Especially for prospective teachers and others desiring a comprehensive knowledge of Spanish. Advanced composition; reading of advanced texts of the various classes of literature; oral and written reports.

Prerequisites: ML 321, 322, 323, or equivalent. Elective; any year; three terms; 3 credits each term; 3 recitations.

GERMAN

ML 131. **Elementary German.** Rudiments of the language; oral and written exercises; translation of easy selections.

Elective; any term; 3 credits; 3 recitations.

ML 132. **Elementary German.** Continuation of ML 131.

Prerequisite: ML 131 or equivalent. Elective; second term; 3 credits; 3 recitations.

ML 133. **Elementary German.** Continuation of ML 132.

Prerequisite: ML 132 or equivalent. Elective; third term; 3 credits; 3 recitations.

ML 231, 232, 233. **Intermediate German.**

Prerequisite: ML 131, 132, 133, or equivalent. Elective; three terms; 3 credits each term; 3 recitations.

ML 331, 332, 333. **Advanced German.**

Prerequisites: ML 231, 232, 233, or equivalent. Elective; three terms; 3 credits each term; 3 recitations.

ML 431, 432, 433. **Advanced German.**

Prerequisites: ML 331, 332, 333, or equivalent. Elective; three terms; 3 credits each term; 3 recitations.

PHYSICS

The department seeks to adapt each course to the needs of those enrolled in it. To attain this end the work in General Physics has been subdivided into several courses that suit the needs of the various technical schools of the College. These courses all cover the customary range of subjects: mechanics, sound, heat, light, electricity and magnetism, and all naturally emphasize the same fundamental principles; they differ in the relative amounts of time devoted to the several subjects and in the practical applications that are studied.

The advanced courses are built up on the same general scheme as the general courses; each emphasizes the fundamental principles

in its field and puts stress upon practical applications both in lecture and in laboratory.

A course in astronomy is taught by the department because it was best fitted to undertake this work when demand arose for a general course in this subject.

Equipment. The department has a good supply of lecture demonstration apparatus and of general laboratory apparatus that enables the students to verify quantitatively the most important laws, to determine accurately some of the physical properties of substances, and also to obtain practice in the use and care of the common measuring instruments. For advanced work, the department is well equipped in electrical measurements, photometry, photography, and wireless telegraphy and telephony.

In the general library are many recent Physics texts and allied works, as well as a number of Physics periodicals, which are available to all.

COURSES

Ph 111, 112, 113. **Engineering Physics.** A course in general physics adapted to students in Engineering. Trigonometry must precede or accompany this course.

Required in Engineering (freshman year) and in Forestry (sophomore year); three terms; 3 credits each term; 2 lectures; 2 recitations; 1 two-hour laboratory period. Fee \$2.00 each term. Text: Anderson, Physics for Technical Students.

W. Weninger, W. B. Anderson and others

Ph 121, 122, 123. **General Physics.** A course adapted to the needs of students in Pharmacy, especially to those preparing to study medicine.

Prerequisite: Geometry. Required in Pharmacy; freshman year; three terms; 4 credits each term; 2 lectures; 3 recitations; 1 two-hour laboratory period. Fee \$2.00 each term. *A. W. Marker*

Ph 201, 202. **General Physics.** A brief course in general physics.

Prerequisite: Geometry. Optional in Agriculture and Commerce; sophomore year; first and second terms; 3 credits each term; 2 lectures; 2 recitations; 1 two-hour laboratory period. Fee \$2.00 each term. Text: Anderson, Physics. *A. W. Marker*

Ph 221, 222, 223. **Physics.** Courses in general physics adapted to students who are taking calculus.

Prerequisite: Trigonometry; calculus must precede or accompany these courses. Required in Mines; sophomore year; three terms; 3 credits each term, first and third terms (fee \$2.00); 5 credits, second term (fee \$4.00); 2 lectures; 2 recitations; 1 two-hour laboratory period. *R. W. Uphoff*

Ph 243. **Descriptive Astronomy.** A brief elementary course covering the most important points relating to the heavenly bodies. Descriptive rather than mathematical in character.

Elective; third term; 3 credits; 3 recitations or their equivalent in lectures and observational work, depending upon weather conditions. Fee \$2.00. *W. B. Anderson*

Ph 292, 293. **General Physics.** A brief descriptive course with such applications as are of greatest interest to students in Home Economics.

Required in Home Economics; sophomore year; second and third terms; $2\frac{1}{2}$ credits each term; 1 lecture; 2 recitations; 1 two-hour laboratory period. Fee \$2.00 each term. *Maude T. Parr*

Ph 351. **Heat and Light.** An advanced course, taking up the phenomena of heat and light in detail, including recent discoveries.

Elective; first term; credit to depend on work done. Fee \$2.00.

Ph 353. **Wireless Telegraphy.** A study of the discoveries leading up to the practical application of electric waves to telegraphy; theory of modern radio transmission and receiving systems, including the wireless telephone. Laboratory measurements of inductance, capacity, and wave lengths; assembling and tuning complete transmitting and receiving sets; code practice. Laboratory sections limited to six students each.

Prerequisite: Ph 113. Elective; first or third term; 3 credits; 2 lectures; 2 recitations; 1 two-hour laboratory period. Fee \$2.00.

J. Jordan

Ph 361. **Introductory Photography.** A course designed to acquaint the student with photographic processes. Emphasis is placed upon the theoretical as well as the practical side of the subject. Students are taught the proper use of the hand camera in negative making, certain positive processes, enlarging, lantern slide making, the preparation of different stock solutions, etc.

Prerequisites: College Physics and Chemistry. Elective; first or third term; 3 credits; 1 lecture; 1 recitation; 4 hours of practical work. Fee \$5.00.

R. W. Uphoff

Ph 362. **Commercial Photography.** A continuation of Ph 361 with emphasis on commercial work. The work includes such topics as copying, flashlights, interiors, photo-microscopy, the air-brush, blocking negatives, the uses of contrast filters, making of multiple plate panoramas, photographing furniture and various other commercial articles, coloring, etc.

Prerequisite: Ph 361. Elective; second term; 3 credits; 1 lecture; 1 class discussion; 4 hours of practical work. Fee \$5.00.

R. W. Uphoff

Ph 363. **Pictorial Photography.** A continuation of Ph 361 with emphasis on pictorial work. Color photography, soft focus landscape work, and special work in enlarging. A study is made of the various pictorial mediums such as carbon, platinum, bromoil, etc.

Prerequisite: Ph 361. Elective; third term; 3 credits; 1 lecture; 1 class discussion; 4 hours of practical work. Fee \$5.00.

R. W. Uphoff

Ph 452. **Advanced Wireless Telegraphy.** An intensive study of the thermionic vacuum tube and related phenomena.

Prerequisites: Ph 351 and calculus. Elective; second term; 3 credits; 2 recitations; 1 two-hour laboratory period. Fee \$2.00.

J. Jordan

Ph 462. **Advanced Photography.** Special work in photography for students who have taken all the courses in this subject and desire additional training and assistance. Suggested topics include retouching, use of the air-brush, large prints, home portraiture, illumination, photomicrography.

Prerequisite: Ph 362 or 363. Elective; second term; three credits; 1 lecture; 1 class discussion; 4 hours practical work. Fee \$6.00.

R. W. Uphoff

Ph 472. **The Physics of Light Production.** A course on radiation and the development of modern illuminants.

Prerequisites: Ph 111, 112, 113 or their equivalents. Elective; second term; 3 credits; 2 lectures; 2 recitations; 1 two-hour laboratory period. Fee \$2.00.

W. Weniger

Ph 473. **Photometry.** A course in the theory and use of both precision and portable photometers, including the spectrophotometer.

Prerequisites: Ph 111, 112, 113 or their equivalents. Elective; third term; 3 credits; 1 lecture; 1 recitation; 2 two-hour laboratory periods. Fee \$4.00.

W. Weniger

Ph 481. **Recent Developments in Electricity.** A course embodying some of the recent electrical discoveries that are of interest to the engineer, but that are not discussed in any of the courses in Electrical Engineering.

Elective; first term; 3 credits; 2 lectures; 2 recitations; 1 two-hour laboratory period. Fee \$2.00.

W. Weniger

PUBLIC SPEAKING AND DRAMATICS

The purpose of this department is to aid students in the development of clear, original thinking and to give training in the correlation and organization of knowledge gained through study and ex-

perience. Much drill and criticism are given on organization of material, on platform work, and on the principles that underlie effective reading and speaking. The training goes far in helping to overcome self-consciousness and in aiding to build up a strong personal address.

The department offers not only courses that are designed to develop an appreciation of the best in reading and speaking, but also courses that are planned to suit the practical needs of the student.

While the work is adapted to the student who must get a maximum of platform experience in a few months, the courses are so correlated that one may secure progressive training covering a period of three years if he so desires.

Many plays, intramural and intercollegiate debates, and oratorical contests take place on the campus each year, and the department offers courses and much individual attention to students who wish to prepare for such work.

COURSES

PSP 254. Practical Public Speaking, I. Practice in the development and presentation of speeches on topics of special interest to the students; voice training; vocabulary building and pronunciation; some study of gesture, bearing, and elements of effectiveness in presentation; criticism on organization of material. Organization is stressed.

Elective; sophomore year; any term; 3 credits; 3 recitations. Text: Winans, *Public Speaking*.

C. B. Mitchell, P. L. Edwards, E. W. Wells

PSP 255. Practical Public Speaking, II. Practice in the construction and presentation of forms of addresses for special occasions; continuation of vocabulary building, pronunciation, voice training, and study of gesture and elements of effectiveness in delivery; criticism on organization and presentation. Delivery is stressed during this term. Some collateral reading.

Prerequisite: PSP 254. Elective; sophomore year; second or third term; 3 credits; 3 recitations. Text: Houghton, *The Elements of Public Speaking*.

C. B. Mitchell, P. L. Edwards, E. W. Wells

PSP 257. Argumentation. Consideration of the theory of argumentation. Practical work in brief-drawing, collection and handling of evidence, and construction of the argumentative speech. Each student constructs several briefs and delivers several speeches. Criticism on presentation and construction.

Prerequisite: PSP 254. Elective; first or third term; 3 credits; 3 recitations. Text: Foster, *Argumentation and Debating*.

C. B. Mitchell, E. W. Wells

PSp 258. **Advanced Public Speaking.** Construction and presentation of the extended address. Each student prepares and presents several long speeches. The psychology of public speaking is considered. Criticism on delivery and organization of material. Assigned readings. Students should confer with the instructor before electing this course. Limited to ten students.

Prerequisites: PSp 254, 255. Elective; third term; 3 credits; 3 recitations. *C. B. Mitchell*

PSp 264. **Expression.** Literary analysis and interpretation; foundation of voice and breath control; pantomime; diction; correction of erroneous habits of speech; correction of artificiality, affectation, and self-consciousness.

Elective; first or second term; 2 credits; 2 recitations. Text: Clark, Interpretation of the Printed Page. *Elizabeth Barnes*

PSp 265. **Expression.** Continuation of PSp 264. Impersonation; platform deportments.

Prerequisite: PSp 264. Elective; second or third term; 2 credits; 2 recitations. *Elizabeth Barnes*

PSp 350. **Parliamentary Drill.** This course covers the history and principles of parliamentary usage and gives each student an opportunity to serve as chairman of several meetings during the term. Much practice will be afforded in the presentation of motions and in impromptu speaking under the supervision of a critic. Assigned readings.

Elective; first term; 2 credits; 2 recitations. Text: Howe, Handbook of Parliamentary Usage. *E. W. Wells*

PSp 351. **Oratory.** A course designed for those who wish to enter oratorical work. Lecture and text-book work on the theory and technique of oratory; classroom exercises on the delivery of orations; preparation of original orations; study of classic and collegiate orations; personal conferences and criticism.

Prerequisite: PSp 254. Elective; first term; 3 credits; 3 recitations. Text: Shurter, The Rhetoric of Oratory. *P. L. Edwards*

PSp 357. **Debating.** Application of the principles of argumentation to debating; analysis and brief-drawing. Each student participates in several debates. Criticism on delivery and on the selection and handling of evidence in both constructive argument and refutation. Assigned readings.

Prerequisites: PSp 254, 257. Elective; first or second term; 3 credits; 3 recitations. *C. B. Mitchell, E. W. Wells*

PSp 464. **Dramatic Interpretation.** Advanced work in interpretation; impersonation; interpretative study of Shakespeare and modern drama; advanced pantomime; expressive voice.

Prerequisites: PSp 264, 265. Elective; first term; 3 credits; 3 recitations. *Elizabeth Barnes*

PSp 465. **Community Drama A.** Designed to meet the needs of community leaders. The study of plays suitable for use in different communities; practical work in selecting and coaching plays, pageants, etc.; stage make-up; bibliography. Students have the opportunity to direct one-act plays and are required to take part in at least one play. It is suggested that students take PSp 264, 265, and 464 before electing this course.

Elective; second or third term; 3 credits; 3 recitations.

C. B. Mitchell, Elizabeth Barnes

PSp 467, 468. **Story Telling.** Study of children's literature. Analysis and retelling of short stories suitable for the nursery, the kindergarten, and the primary grades. Bibliography.

It is recommended that students take as prerequisites PSp 264, 265. Elective; second and third terms; 2 credits each term; 2 recitations. *Elizabeth Barnes*

ZOOLOGY AND PHYSIOLOGY

The courses in the department are adapted to the particular needs of students in Agriculture, Pharmacy, Home Economics, Vocational Education, Physical Education, and Forestry. Opportunity is offered for advanced study or research in the various branches of Zoology and Physiology. The prescribed work for students in Pharmacy satisfies the pre-medical requirements for entrance into medical school.

Equipment. The laboratories, museum, and offices of the department are situated on the third floor of Agricultural Hall. These are equipped with microscopes, charts, specimens, and other necessary materials for the efficient conduct of the work in Zoology and Physiology.

COURSES

ZP 101, 102, 103. **General Zoology.** The fundamental problems of zoology. During the third term, particular attention is paid to vertebrate structures.

Required in Pharmacy and Vocational Education; elective to others; freshman year; three terms; 3 credits each term; 2 lectures; 1 three-hour laboratory period. Fee \$2.00 each term.

N. Fasten and assistants

ZP 130. Principles of Economic Zoology. The distribution, habits, and functions of animals with reference to their economic importance.

Required in Agriculture; freshman year; any term; 5 credits; 3 lectures; 2 three-hour laboratory periods. Fee \$3.50.

H. M. Wight and assistants

ZP 211, 212, 213. Mammalian Anatomy. Study of mammalian organization as a basis for the understanding of the human body. The laboratory work consists of some anatomy, histology, and embryology of a typical mammal.

Prerequisites: ZP 101, 102, 103, or equivalents. Required in Pharmacy; elective to others; sophomore year; three terms; 3 credits each term; 2 lectures; 1 three-hour laboratory period. Fee \$2.00 each term.

W. D. Courtney

ZP 223. Economic Ornithology. A study of the birds of Oregon with emphasis on their importance as destroyers of organisms which are injurious to grains and fruits.

Elective; third term; 3 credits; 2 lectures; 1 three-hour laboratory period. Fee \$1.50.

Florence Hague

ZP 233. Animal Ecology. The relation of animals to their environment. The habits, associations, and economic importance of the various groups of animals.

Prerequisite: ZP 130 or equivalent. Elective; sophomore or junior year; third term; 3 credits; 1 lecture; 2 three-hour laboratory periods. Fee \$1.50.

H. M. Wight

ZP 300. Histology. A study of the various tissues of animals with emphasis on mammalian structures. Training in micro-technique, killing, fixing, imbedding, sectioning, and mounting of tissues. Given alternate years, alternating with ZP 310. Given 1923-24.

Prerequisite: ZP 103 or equivalent. Elective; junior or senior year; third term; 4 credits; 2 lectures; 2 three-hour laboratory periods. Fee \$3.00.

Florence Hague

ZP 310. Embryology. The development of animals, with special reference to the frog, chick, and pig. Given alternate years, alternating with ZP 300. Not given 1923-24.

Prerequisite: ZP 103, or equivalent. Elective; junior or senior year; third term; 4 credits; 2 lectures; 2 three-hour laboratory periods. Fee \$3.00.

Florence Hague

ZP 321. Elements of Physiology. The object of this course is to give the Home Economics student knowledge of the processes and anatomical relationships which are necessary in maintaining the highest efficiency of the human body.

Required in Home Economics; junior year; first or second term; 5 credits; 3 lectures; 2 three-hour laboratory periods. Fee \$4.00.

Florence Hague

ZP 331. Taxidermy and Zoological Collecting. Laboratory and field course in the methods involved in the preparation of skins and the preservation of museum specimens; study and practice in the methods involved in field survey work.

Prerequisite: ZP 130 or equivalent. Elective; first term; credits to be arranged. Fee \$4.00.

H. M. Wight

ZP 342. Fish and Game Propagation. Lecture, laboratory and field course dealing with the propagation of fish and food animals of the field, forest, or farm. Special attention to the question of the utilization of farm streams and ponds for the rearing of fish and other valuable water-dwelling animals.

Prerequisite: ZP 130 or equivalent. Elective; junior or senior year; second term; 3 credits; hours to be arranged. Fee \$1.50.

H. M. Wight

ZP 351. Genetics. A lecture course dealing with the fundamental principles of variation and heredity as applied to animal and plant breeding.

Prerequisite: One term of Botany or Zoology, or equivalent. Required in Agriculture; elective to others; junior or senior year; first term; 3 credits; 3 lectures; 1 recitation. Fee \$0.50.

N. Fasten

ZP 352. Evolution and Eugenics. A lecture course dealing with the various ideas concerning the origin, development, and relation of organisms, with emphasis on human welfare.

Prerequisite: One term of Botany or Zoology, or equivalent. Elective; junior or senior year; second term; 3 credits; 3 lectures; 1 recitation. Fee \$0.50.

N. Fasten

ZP 361. Animal Parasites. A study of the role played by the lower animals in the production of disease.

Prerequisite: ZP 102 or 130, or equivalent. Elective; junior or senior year; third term; 3 credits; hours to be arranged. Fee \$2.00.

N. Fasten

ZP 681, 682, 683. Zoological Seminar. Current problems in Zoology. The instructional staff and advanced students in the department attend and contribute original articles or abstracts of papers published in the current biological journals.

Required in Zoology; senior or graduate year; three terms; one credit each term; one hour a week.

ZP 691, 692, 693. Advanced Study and Thesis. Opportunity is given students who desire to specialize in Zoology or Physiology to

take up work not given in the regular courses, or to undertake the investigation of special problems under the direction of one of the instructors in the department. Either major or minor work for the master's degree may be carried in this department.

Elective for senior or graduate students; any term; credits, prerequisites, etc., to be arranged by the instructor in charge, subject to the approval of the head of the department.

School of Commerce

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.

JOHN ANDREW BEXELL, A.M., Dean of the School of Commerce; Professor of Business Administration.

HELEN MOORE, B.Sc., Secretary of the School of Commerce.

Business Administration

JOHN ANDREW BEXELL, A.M., Professor of Business Administration.
ALFRED SCHMITT, Ph.D., Assistant Professor of Business Administration.

FRANK LESLIE ROBINSON, Instructor in Accounting.

LOCHE HARDEMAN MARDIS, B.Sc., Instructor in Accounting.

LEE CLEVELAND BALL, Instructor in Accounting.

Economics and Sociology

HECTOR MACPHERSON, Ph.D., Professor of Economics and Sociology; Director of the Bureau of Organization and Markets.

NEWEL HOWLAND COMISH, M.S., Professor of Economics and Sociology.

WILLIAM HENRY DREESEN, Ph.D., Assistant Professor of Economics and Sociology.

EDWARD BECKER MITTELMAN, Ph.D., Instructor in Economics and Sociology.

JAMES FRANKLIN PAGE, M.A., Instructor in Economics and Sociology.

MERCY JANE GAIN, B.Sc., Instructor in Economics and Sociology.

RALPH STEPHEN BESSE, M.A., Extension Specialist in Marketing.

Office Training

HERBERT TOWNSEND VANCE, Professor of Office Training and Stenography.

ETHA MABEL MAGINNIS, Assistant Professor of Office Training.

LILLIAN BURNS, B.Sc., Instructor in Stenography.

BERTHA ALICE WHILLOCK, B.Sc., Instructor in Office Training.

MINNIE CLARE KOOPMAN, B.Sc., Instructor in Office Training.

MINNIE DEMOTTE FRICK, Instructor in Office Training.

ELYNORE DOROTHEA SWEENEY, B.Sc., Instructor in Office Training.

Political Science

ULYSSES GRANT DUBACH, Ph.D., Professor of Political Science.

FRANK ABBOTT MAGRUDER, Ph.D., Associate Professor of Political Science.

ROY RENO HEWITT, Ph.B., M.A., LL.B., Assistant Professor of Political Science.

Special Lecturers

WILLIAM H. ANDERSON, C.P.A., Member Whitfield, Whitcomb, & Co.
A course of lectures in Accounting and Auditing.

JOHN M. DOLPH, Advertising Specialist. A course of lectures in the Psychology of Advertising.

W. S. KIRKPATRICK, Advertising Sales Expert. A course of lectures in Advertising and Selling.

R. T. JACOB, Tax Expert. A course of lectures in Federal Income Tax.

About twenty special lecturers, chiefly prominent business and professional men throughout the state, deliver addresses during the year. The lectures, which are usually held under the auspices of the O. A. C. Chamber of Commerce, are open to all students of the institution.

Degree Curriculum. The School of Commerce offers a four-year curriculum leading to the degree of Bachelor of Science in Commerce. Both the theoretical and the practical sides of every subject are emphasized, the constant aim being to train the student for service, efficiency, and business leadership.

In the baccalaureate curriculum lower classmen may emphasize accounting, salesmanship, or secretarial studies, the latter including stenography and office practice. In the junior year, the student may further specialize in one of the following: (1) Business Administration, (2) Economics and Sociology, (3) Political Science, (4) Secretarial Studies, or (5) Markets and Salesmanship. In addition to the foregoing options, a liberal range of general electives is offered, so that in the junior or senior year, the men may elect minors in Agriculture, Forestry, or Industrial Arts, while the women may elect minors in Home Economics or Physical Education.

Graduate Curriculum in Agricultural Economics and Rural Sociology. Course sequences will be outlined leading to the degree of Master of Science in Agricultural Economics and Rural Sociology.

The aim is to make the graduate work in this field fit students for positions as county agriculturists, positions in the United States

Department of Agriculture, especially in the Bureau of Markets, teachers in colleges and rural high schools, and for rural leadership in general. Students are also prepared for civil service examinations in this general field.

Facilities. The new Commerce Building, a handsome, commodious structure specially designed for executive offices and for departments related to administration and commerce, offers superior facilities for instruction and administration. The most approved methods of heating, lighting, ventilation, and sanitation are employed. The building is equipped with the most modern office appliances, including calculating, manifoldng, and typing machines.

Departments. For administrative purposes, the School of Commerce is organized into four distinct departments: (1) Business Administration, (2) Economics and Sociology, (3) Office Training and Stenography, and (4) Political Science.

Requirements for Graduation in the School of Commerce. For the bachelor's degree in the School of Commerce, a total of 207 college credits must be completed by men and 192 credits by women. It is expected that the suggested schedule as listed elsewhere for this School will be closely followed. Excepting those who major in Marketing of Agricultural Products (as outlined on page 190), students must complete before graduation credits as indicated in the following table:

	Men	Women
Business Administration and Office Training	39	39
Economics and Sociology	32	32
Political Science	28	28
General English or Modern Language	9	9
Business English	9	9
Mathematics	9	9
Science	9	9
History	9	9
Library Practice	1	1
Gymnasium	3	9
Military Science and Tactics	12	0
Hygiene	0	1
Social Ethics	0	1
Electives	47	36
Total	207	192

The nine required credits in Physical Science must be selected from the following courses: Bac 204, 205; Bot 101, 102, 202, 203, 204; Ch 101, 102, 103, 111, 112, 113; Ent 303; G 301, 301a 301b, 301c, 302; Ph 111, 112, 113, 121, 122, 123, 201, 202, 292, 293; ZP 101, 102, 103, 351, 352. Not less than six of these credits must be taken in sciences requiring laboratory work. All Science requirements must be completed by the end of the junior year.

DEGREE CURRICULUM IN COMMERCE

(B.Sc. Degree)

BUSINESS ADMINISTRATION

Freshman Year

	1st	Term 2d	3d
①②Introduction to Accounting (BA 101).....	3	.....	.....
②Principles of Accounting (BA 102).....	.....	3	.....
②Accounting Practice (BA 103).....	.....	.....	3
Counting Room Mathematics (Mth 101).....	3	.....	.....
Mathematics of Investments (Mth 102).....	.....	3	.....
Introduction to Mathematical Statistics (Mth 103).....	.....	.....	3
Elementary, Intermediate, Advanced Typing (OT 111, 112, 113).....	2	2	2
English Composition (Eng 101).....	3	.....	.....
Business Correspondence (Eng 105).....	.....	3	.....
Advanced Business English (Eng 106).....	.....	.....	3
Commercial Geography (ES 101).....	4	.....	.....
③Economic History of Europe (ES 111).....	.....	4	.....
③The History of Western Civilization II (Hst 212).....	.....	.....	3
Library Practice (Lib 100).....	.....	.....	1
Social Ethics (PEw 121), Hygiene (PEw 122) (Women).....	(1)	(1)	.....
Gymnasium (Men).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Gymnasium (Women).....	(1)	(1)	(1)
Military Science and Tactics.....	2	2	2
	<u>17½</u>	<u>17½</u>	<u>17½</u>

Sophomore Year

Corporation Accounting (BA 201).....	3	.....	.....
Industrial Accounting (BA 202).....	.....	3	.....
Cost Accounting (BA 203).....	.....	.....	3
Office Methods and Appliances (OT 251, 252, 253).....	2	2	2
Advanced Business Law (PS 201, 202).....	4	4	.....
Principles of Economics (ES 203).....	.....	.....	4
④The History of Western Civilization III (Hst 213).....	.....	3	.....
④Economic History of United States (ES 201).....	3	.....	.....
④Recent History of U.S. (Hst 126).....	.....	.....	3
English Literature or Modern Language.....	3	.....	.....
American Literature or Modern Language.....	.....	3	.....
Public Speaking or Modern Language.....	.....	.....	3
Gymnasium (Women).....	(1)	(1)	(1)
Gymnasium (Men).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics.....	2	2	2
	<u>17½</u>	<u>17½</u>	<u>17½</u>

①Students who have had at least one year of bookkeeping should register for BA 102 the first term and BA 103 the second term.

②Students who intend to specialize in Markets and Salesmanship may substitute BA 141, 142, 143, for Accounting.

③Option in Home Economics: HAd 445, HA 118, HS 101.

④Optional with Science in the sophomore year, but nine credits in History are required for graduation.

SCHOOL OF COMMERCE

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Junior Year

	1st	Term 2d	3d
Business Organization (BA 331).....	3
Business Management (BA 332).....	3
Purchasing and Selling (BA 343).....	.....	.....	3
Money and Banking (ES 311).....	4	.....	.....
General Sociology (ES 305).....	.....	4	.....
National Government (PS 301).....	3	.....	.....
State and Local Government (PS 302).....	.....	3	.....
Municipal Government (PS 303).....	.....	.....	3
Natural Science.....	3	3	3
①Electives.....	4	4	8
	17	17	17

Senior Year

Public Finance (ES 401).....	4	.....	.....
Markets and Marketing (ES 402).....	.....	4	.....
Transportation (ES 403).....	.....	.....	4
Comparative Governments (PS 402).....	3	.....	.....
International Relations (PS 401).....	.....	.....	4
①Electives.....	10	13	9
	17	17	17

OFFICE TRAINING AND STENOGRAPHY

Freshman Year

Elementary, Advanced Stenography (OT 101, 102, 103).....	3	3	3
Elementary, Intermediate Typing (OT 111, 112, 113).....	2	2	2
②③Introduction to Accounting (BA 101).....	3	.....	.....
③Principles of Accounting (BA 102).....	.....	3	.....
③Accounting Practice (BA 103).....	.....	.....	3
English Composition (Eng 101).....	3	.....	.....
Business Correspondence (Eng 105).....	.....	3	.....
④Advanced Business English (Eng 106).....	.....	.....	3
④Economic History of Europe (ES 111).....	4	.....	.....
④The History of Western Civilization II (Hst 212).....	.....	3	.....
Commercial Geography (ES 101).....	.....	.....	4
Library Practice (Lib 100).....	.....	1	.....
Social Ethics (PEw 121), Hygiene (PEw 122) (Women).....	(1)	(1)	(1)
Gymnasium (Men).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Gymnasium (Women).....	(1)	(1)	(1)
Military Science and Tactics.....	2	2	2
	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$

①See pages 191ff.

②Students who have had at least one year of bookkeeping, should register for BA 102 the first term, and BA 103 the second term.

③Students who intend to specialize in Markets and Salesmanship may substitute BA 141, 142, 143 for Accounting.

④Option in Home Economics: HAd 445, HA 118, HS 101.

Sophomore Year

	1st	Term 2d	3d
Advanced Stenography and Typing (OT 201, 202).....	5	5	.....
Office Training for Stenographers (OT 203).....	.....	.....	5
Advanced Business Law (PS 201, 202).....	4	4	.....
Principles of Economics (ES 203).....	.....	.....	4
①Economic History of United States (ES 201).....	3	.....	.....
①The History of Western Civilization III (Hst 213).....	.....	3	.....
①Recent History of United States (Hst 126).....	.....	.....	3
English Literature or Modern Language.....	3	.....	.....
American Literature or Modern Language.....	.....	3	.....
Public Speaking or Modern Language.....	.....	.....	3
Gymnasium (Men).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Gymnasium (Women).....	(1)	(1)	(1)
Military Science and Tactics.....	2	2	2
	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$

Junior and Senior Years

See page 189.

MARKETING OF AGRICULTURAL PRODUCTS**Freshman and Sophomore Years**

Major work in Marketing is open to students who have completed the freshman and sophomore years in Commerce. A similar course for students who have completed two years in Agriculture is outlined under the School of Agriculture.

Junior Year

	1st	Term 2d	3d
Rural Finance (ES 367).....	3	.....	.....
Economic Organization of Agriculture (ES 364).....	.....	3	.....
Rural Sociology (ES 464).....	.....	.....	3
Business Organization (BA 331).....	3	.....	.....
Auditing (BA 302).....	.....	3	.....
Science.....	3	3	3
①Courses in Agriculture.....	5	5	5
Electives.....	3	3	6
	<hr/> 17	<hr/> 17	<hr/> 17

Senior Year

Markets and Marketing (ES 402, 603).....	.....	4	4
Transportation (ES 403).....	.....	.....	4
Public Finance (ES 401).....	4	.....	.....
National Government (PS 301).....	3	.....	.....
State and Local Government (PS 302).....	.....	3	.....
Municipal Government (PS 303).....	.....	.....	3
Principles of Advertising (BA 441).....	.....	3	.....
①Courses in Agriculture.....	3	3	3
Electives.....	7	4	3
	<hr/> 17	<hr/> 17	<hr/> 17

①Courses in Agriculture must be selected, upon the approval of the major professor, in some one department in Agriculture.

SUGGESTED ELECTIVE COMBINATIONS

While the student may choose other subjects than those enumerated below, he is strongly urged to adopt one of the suggested combinations. A major shall include not less than 36 credits and a minor not less than 18 credits in the group selected. Men are urged to elect Military Science and Tactics. Women are urged to select PEw 123, Sanitary Science. The nine required credits in Physical Science must be completed in the junior year. See page 187.

1. MAJOR IN BUSINESS ADMINISTRATION

Junior Year		Term	
	1st	2d	3d
Advanced Accounting Theory and Practice (BA 301).....	3	.....	.....
Auditing (RA 302).....	.....	3	.....
Income Tax Procedure (BA 303).....	.....	.....	3
Public Speaking .....	.....	.....	3
Electives	1	1	2
	4	4	8
Senior Year			
Governmental and Institutional Accounting (BA 401).....	3	.....	.....
Analysis of Accounts (BA 402).....	.....	3	.....
C. P. A. Problems (BA 403).....	.....	.....	3
Elements of Statistics (ES 313).....	.....	.....	3
Principles and Practice of Advertising (BA 441).....	.....	3	.....
Elementary Industrial Journalism (IJ 200).....	3	.....	.....
Practical Banking (BA 333).....	.....	4	.....
Electives	4	3	3
	10	13	9

2. MAJOR IN ECONOMICS AND SOCIOLOGY

Junior Year			
Modern Language	3	3	3
Cooperation (ES 323).....	.....	.....	4
Electives	1	1	1
	4	4	8
Senior Year			
Governmental and Institutional Accounting (BA 401).....	3	.....	.....
Analysis of Accounts (BA 402).....	.....	3	.....
Modern Language	3	3	3
Electives	4	7	6
	10	13	9

3. MAJOR IN POLITICAL SCIENCE

Junior Year			
English	3	3	3
Electives	1	1	5
	4	4	8

Senior Year

	1st	Term 2d	3d
Governmental and Institutional Accounting (BA 401).....	3	.....	.....
Analysis of Accounts (BA 402).....	.....	3	.....
Advanced American Government (PS 411).....	4	.....	.....
Practical Legislation (PS 412).....	.....	4	.....
Comparative Governments (PS 403).....	.....	.....	3
Electives	3	6	6
	<hr/> 10	<hr/> 13	<hr/> 9

4. MAJOR IN OFFICE TRAINING**Junior Year**

Secretarial Studies (OT 301).....	5	.....	.....
Secretarial Practice (OT 302).....	.....	2	.....
Corporation Accounting (BA 201).....	.....	.....	3
Electives .....	.....	2	5
	<hr/> 5	<hr/> 4	<hr/> 8

Senior Year

Reporters' Course (OT 401, 402, 403).....	3	3	3
Principles and Practice of Advertising (BA 441).....	.....	3	.....
General Sociology (ES 305).....	4	.....	.....
Applied Sociology (ES 413).....	.....	.....	3
Elementary Industrial Journalism (IJ 200).....	3	.....	.....
Electives .....	.....	7	3
	<hr/> 10	<hr/> 13	<hr/> 9

5. MAJOR IN MARKETING AND SALESMANSHIP**Junior Year**

Elementary Psychology (Psy 301).....	3	.....	.....
Practical Public Speaking (PSP 254).....	.....	3	.....
Practical Public Speaking (PSP 255).....	.....	.....	3
Cooperation (ES 323).....	.....	.....	4
Electives	1	1	1
	<hr/> 4	<hr/> 4	<hr/> 8

Senior Year

Introduction to Foreign Trade (ES 306).....	.....	4	.....
Advanced Commercial Geography (ES 304).....	.....	3	.....
Insurance (ES 303).....	.....	.....	4
Elementary Industrial Journalism (IJ 200).....	3	.....	.....
Industrial Journalism (IJ 310).....	.....	2	.....
Technical Journalism (IJ 330).....	3
Debating (PSP 357).....	3
Electives	4	4	2
	<hr/> 10	<hr/> 13	<hr/> 9

SCHOOL OF COMMERCE

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6. MINOR IN COMMERCIAL EDUCATION

Junior Year		Term	3d
	1st	2d	
Elementary Psychology (Psy 301).....	3
Vocational Psychology (Psy 312).....	.....	.....	3
Educational Psychology (Psy 322).....	.....	.....	3
History of Oregon (Hst 340).....	.....	.....	3
Electives	1	4	.....
Senior Year		4	9
Secondary Education in Commerce (CEd 451).....	3	.....	.....
Supervised Teaching in Commerce (CEd 461, 462).....	.....	5	5
Electives in Vocational Education	7	8	4
	10	13	9

7. MINOR IN AGRICULTURE

Junior Year			
Crop Production (FC 100).....	5	.....	.....
Elements of Horticulture (Hrt 100).....	.....	5	.....
Elements of Dairying (DH 200).....	.....	.....	4
Electives in Agriculture .....	.....	.....	5
Senior Year		5	9
Stock Judging I (AH 111).....	3	.....	.....
Farm Management (FMg 302).....	.....	4	.....
Soil Drainage and Irrigation (SIs 203).....	.....	.....	3
Electives in Agriculture	7	9	6
	10	13	9

8. MINOR IN HOME ECONOMICS

Junior Year			
Principles of Foods and Cookery (HS 101 or HS 201).....	3	.....	.....
Short Course in Dressmaking (HA 118).....	.....	4	.....
Household Management (HAd 445).....	.....	.....	3
Electives	2	1	6
Senior Year		5	9
Household Chemistry (Ch 111, 112, 113).....	3	3	3
Electives in Home Economics	7	10	6
	10	13	9

Students who have taken these subjects in the freshman and sophomore years will select advanced courses, subject to approval of the head of the department.

9. MINOR IN ENGINEERING

Junior Year			
Plane Trigonometry (Mth 111).....	4	.....	.....
Algebra (Mth 121).....	.....	4	.....
Differential Calculus (Mth 251).....	.....	.....	4
Engineering Survey (ME 101).....	.....	1	.....
Carpentry (IA 222).....	.....	3	.....
Elective in Engineering .....	.....	.....	3
	4	8	4

OREGON AGRICULTURAL COLLEGE

Senior Year

	1st	Term 2d	3d
①Linear Drawing and Lettering (ME 111).....	2	.....	.....
①Gas or Steam Engines (ME 223 or 222).....	.....	3	.....
Automobile Mechanics (IA 181).....	.....	.....	2
Electives in Engineering	8	10	7
	10	13	9

10. MINOR IN PHYSICAL EDUCATION (WOMEN)

Junior Year

General Zoology (ZP 101, 102, 103).....	3	3	3
Dancing (PEW 331, 332, 333).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Advanced Outdoor Sports (PEW 241, 242, 243).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives (Education recommended).....	.....	.....	4
	4	4	8

Senior Year

Mammalian Anatomy (ZP 211, 212, 213).....	3	3	3
Organization and Administration of Physical Education and Recreation (PEW 472).....	.....	3	.....
Advanced Hygiene and Sanitary Science (PEW 423).....	.....	.....	2
History of Physical Education (PEW 431).....	3	.....	.....
Electives (English or Education recommended).....	4	7	4
	10	13	9

11. MINOR IN INDUSTRIAL JOURNALISM

Junior Year

Elementary Industrial Journalism (IJ 200).....	3	.....	.....
Industrial Journalism (IJ 310).....	.....	3	.....
Editing (IJ 320).....	.....	.....	3
Electives in English, Industrial Journalism, and Military Science and Tactics	1	1	5
	4	4	8

Senior Year

Editorial Writing (IJ 440).....	3	.....	.....
Journalism Practice I (IJ 204).....	.....	2	.....
Technical Journalism (IJ 330).....	.....	.....	3
Electives in English, Industrial Journalism, and Military Science and Tactics	7	11	6
	10	13	9

①Optional with selected subjects in other departments of Engineering, subject to approval of the head of the department.

BUSINESS ADMINISTRATION

The distinctive work of the department of Business Administration is to train men and women for efficient business organization and management. This includes thorough courses in the various phases of accounting, auditing, business organization, scientific management, advertising, and salesmanship.

While the courses in Business Administration are primarily designed to fit students for the counting-house and business office, including banking, such positions are generally only stepping stones to work of greater trust and responsibility. A large percentage of the commercial students eventually engage in business of their own.

The School of Commerce has taken a leading part in developing courses in business methods especially adapted to the farm and other industrial enterprises, the home, and cooperative institutions. Such courses are given not only in residence but also by correspondence.

When it is remembered that every vocation has its business side, and that this phase of all pursuits is receiving increasing attention, it is apparent that the avenues of employment and the chances for promotion for the really competent business expert are almost unlimited. As a preparation for law or public accounting, the work of this department, combined with Economics and Political Science, is especially attractive. A large proportion of the graduates in Commerce find employment as teachers of commercial subjects in state and private schools; to them the courses in Business Management are very important.

Equipment. The department of Business Administration is completely equipped for thorough and efficient work in modern business courses. Each room is especially designed and furnished for the work conducted in it. The furniture of the department consists of individual desks and counters and complete sets of office fixtures. Permanent blank books, letter files, rubber stamps, blanks, and similar material are provided by the department. Modern accounting and office machinery of various types, including adding machines, posting machines, a bookkeeping typewriter, calculating machines, duplicators, mimeographs, dictaphones, mimeoscope, filing cabinets, and typewriters, is available for student practice.

For outline of courses in Business Administration, see pages 188-189.

COURSES

BA 101. Introduction to Accounting. A thorough but rapid study of the general principles of bookkeeping. The aim of this course is to afford those students who have not had a year of bookkeeping, an opportunity to secure preparation which will enable them to carry course BA 102.

Required in Commerce; freshman year; any term; 3 credits; 3 recitations. Fee \$1.00. Text: Rittenhouse and Clapp, *Accounting Theory and Practice*.
L. C. Ball, L. H. Mardis

BA 102. Principles of Accounting. Modern accounting as practiced in the best business establishments; the use of special columns; controlling accounts, and their adaptations; labor-saving devices of all kinds studied with a constant view to secure greater accuracy and to diminish work; practice in retail, wholesale, and financial statements.

Prerequisite: BA 101 or equivalent. Required in Commerce; freshman year; any term; 3 credits; 3 recitations. Fee \$1.00. Text: Rittenhouse and Clapp, *Accounting Theory and Practice*.

L. C. Ball, L. H. Mardis

BA 103. Accounting Practice. A continuation of BA 102. A further study of special columns; partnership profits; admission of new partner; depreciation, reserves, and good-will; opening corporation books.

Prerequisite: BA 102. Required in Commerce; freshman year; any term; 3 credits; 2 lectures; 1 recitation. Fee \$1.00. Text: Rittenhouse and Clapp, *Accounting Theory and Practice*.

L. C. Ball, L. H. Mardis

BA 141. Retail Selling. A general course covering the leading principles of retail salesmanship, and the development and expansion of the different aspects of the vocation, such as systems, policies, and conditions in retail stores.

Required in Markets and Salesmanship and in Pharmacy; freshman year; first term; 3 credits; 3 lectures. Text: Norton, *Retail Selling*.

H. T. Vance

BA 142. Introduction to Advertising. A general introductory course in advertising, covering a study of the possible fields of advertising, materials of advertising mediums, a study of advertising campaigns, and a justification of advertising as a fixed expense.

Required in Markets and Salesmanship; freshman year; second term; 3 credits; 3 lectures.

H. T. Vance

BA 143. Credits and Collections. A general course in the accountancy of salesmanship, stressing practices of retail houses in the extension of credit, measurements of a risk, responsibility of the salesman to the credit department, and all phases of collection practices.

Required in Markets and Salesmanship; freshman year; third term; 3 credits; 3 lectures.

H. T. Vance

BA 201. Corporation Accounting. Theory of corporation accounting and the preparation of accounts illustrating the principles involved. Considerations of depreciation, surplus, reserves, and dividends, advanced forms of final statement. Throughout the course, theory is supplemented by problems and practice to develop initiative and originality.

Prerequisite: BA 103. Required in Commerce; sophomore year; first or third term; 3 credits; 2 lectures; 1 recitation. Fee \$1.00. Text: Kester, Accounting Theory and Practice, Vol II.

F. L. Robinson

BA 202. Industrial Accounting. A continuation of BA 201. A study of the theory and practice of accounting adapted to a large wholesale and manufacturing corporation using the voucher system.

Prerequisite: BA 201. Required in Commerce; sophomore year; second term; 3 credits; 3 recitations. Fee \$1.00. *F. L. Robinson*

BA 203. Cost Accounting. This course covers the broader economic phases of accounting. Emphasis is laid on accounts as a means of administrative control and economy of production. (a) Theory of Cost Accounting. The elements of costs; cost and stock records; relation of cost accounts to the financial records; distribution of overhead; cost statements; graphical representation of costs. (b) Factory Costs. A laboratory course especially adapted to a manufacturing business with a considerable pay-roll.

Prerequisite: BA 103 or BA 261. Required in Commerce; sophomore year; third term; 3 credits; 3 recitations. Fee \$1.00. Text: Jordan and Harris, Cost Accounting.

BA 301. Advanced Accounting Theory and Practice. Advanced forms of financial statement; the comparative balance sheet and profit and loss statement; statement of affairs and deficiency accounts; realization and liquidation; consolidated balance sheet; accounting for branch houses; consignments; bonds; supplemented with practical problems.

Prerequisite: BA 202. Required in Commerce; junior year; first term; 3 credits; 2 lectures; 1 recitation. Fee \$1.00. Text: Kester, Accounting Theory and Practice and Selected Exercises, Vol II.

F. L. Robinson

BA 302. Auditing. The duties and responsibilities of the auditor; his function in the executive staff; his relation to the accounting department; different classes of audits; investigation in the conduct of the utility corporations, municipalities, and public institutions. Typical audits will be studied and compared. Text supplemented by selected exercises.

Prerequisite: BA 201 or 203. Elective in Commerce; junior year; second term; 3 credits; 3 recitations. Text: Montgomery, Auditing in Principle and Practice.

BA 303. Income Tax Procedure. A thorough study of income, excess profits, and other Federal taxes as they affect business, with particular reference to the accounting department. The aim is to train the student to determine these taxes correctly and to prepare the required returns and reports. The preparation of regular return forms is required in connection with the solution of practical problems.

Prerequisite: BA 201. Elective in Commerce; junior year; third term; 3 credits; 3 recitations. *L. C. Ball*

BA 331. Business Organization. General nature of business organization; evolution and forms of business units; structure and life-history of typical corporations; the corporation and trust problem; public utility corporations; reorganization and receivership; blue sky laws and state control.

Required in Commerce; elective to others; junior year; first term; 3 credits; 2 lectures; 1 recitation. *A. C. Schmitt*

BA 332. Business Management. Emphasis on the internal organization of a business for the purpose of securing efficiency; departmental organization and coordination; various systems of scientific management studied and compared.

Required in Commerce; elective to others; junior year; second term; 3 credits; 2 lectures; 1 recitation. Texts: Marshall, Business Administration. Babson's Reports. *J. A. Bexell*

BA 333. Practical Banking. A combination of banking principles and banking practice under the direction of an experienced banker. Visits of inspection to local banks, lectures by practical bankers on the operation of the various departments. The aim of this course is to familiarize the student with the management and operation of a bank. It is designed particularly for those intending to engage in banking or taking up some financial pursuit.

Prerequisites: BA 201 or equivalent, ES 311. Elective in Commerce; junior or senior year; second term; 4 credits; 4 recitations. Text supplemented by selected exercises. *A. C. Schmitt*

BA 343. Purchasing and Selling. (a) Purchasing. Principles of purchasing; relations of buying to successful merchandising and manufacturing; ethics of buying; the purchasing organization; records of purchasing; stores, their function and operation; selected problems in purchasing. (b) Selling. Qualifications of a salesman;

business ethics; wholesaling and retailing; brokerage and commission; specialty selling; the sale of service; planning a selling campaign; special sales; prices and profits; selected problems in selling.

Required in Commerce; elective to others; junior year; third term; 3 credits; 2 lectures; 1 recitation. Texts: Rindfoos, *Purchasing*. Babson's Reports. *H. T. Vance*

BA 361. Farm Accounting. While this course is a thorough discussion of systems of accounts suited to the farm, the fundamental principles of accounting are not ignored. Cost accounting is especially emphasized, with a view to determining the results of different enterprises. A thorough study is made of the income tax law as related to farm accounting.

Required in Agriculture; junior year; first or second term; 3 credits; 1 lecture; 2 recitations. Text: Bexell and Nichols, *Principles of Bookkeeping and Farm Accounts*. *F. L. Robinson*

BA 363. Market Business Practice. This course covers the business management of cooperative societies. It includes bookkeeping and cost accounting especially adapted to different types of cooperative associations in the United States, such as creamery associations and cow-testing associations; auditing; banking and finance; depreciation of assets; conduct of membership meetings; annual reports and audits.

Prerequisite: BA 101 or equivalent. Elective in Agriculture; junior year; third term; 3 credits; 1 lecture; 2 recitations. Text: *The Cooperative Secretary*. United States Bureau of Markets Bulletins. *F. L. Robinson*

BA 371. Business Management for Women. The aim of this course is to treat in a practical way the ordinary rules and methods of conducting business affairs. Two distinct phases are emphasized as follows: (a) Finance. Value of money, how savings grow, banking and credit, general principles of investment, loan associations, bonds, stocks, and insurance. (b) Fundamentals of Business Law. The principles of the law of contracts, of negotiable paper, mortgages, real property, and wills.

Required in Home Economics; junior year; third term; 3 credits; 1 lecture; 2 recitations. *A. C. Schmitt*

BA 381. Business Organization and Management. A condensed course for students other than Commerce. Principles of business organization; types, including partnerships, corporations, and other business units; locating an industry; plant and equipment; buying, receiving, storing, and recording material; financing an enterprise;

NOTE: BA 361, 362, 363, 371, and 381 are not open to students in Commerce.

budgets and reports; banking practice; determination of costs; standardization; wage systems; welfare and employment problems.

Required in Industrial Arts (senior year, second term), Civil Engineering (junior year, third term), and Mechanical Engineering (senior year, third term); elective to others except Commerce students; junior year; third term; 3 credits; 3 lectures or recitations.

A. C. Schmitt

BA 385. Principles of Accounting for Engineers. An abbreviated course covering the general principles of accounting, designed especially for Engineering students. Emphasis is placed on accounting principles, rather than technique. The ultimate aim is to prepare the student to read and interpret accounting facts, rather than to construct accounts.

Required in Civil Engineering (second term) and in Logging Engineering (third term); junior year; 3 credits; 3 lectures. Fee \$1.00.

F. L. Robinson

BA 391. Army Paper Work. A study of the business methods and accounting of the United States Army as represented by its blanks and forms, and the regulations governing the use of such forms. The business methods of the Supply and Adjutant General Department are analyzed and compared with those used in civil life. Considerable outside reading is required to obtain credit in this course. The lectures are given by members of the R. O. T. C. Staff. The outside work is based upon Army Regulations and Instructions.

Elective; junior or senior year; first or second term; 2 credits; 1 lecture; 1 recitation.

BA 401. Governmental and Institutional Accounting. Financial and property accounting, especially as applied to the municipal, state, and national governments and institutions; estimates, appropriations, apportionments, allotments, methods of handling pay; purchase of supplies and equipment; property accounting and accountability; how supplies and property are obtained, issued, and accounted for in the various organizations; the preparation of budgets and reports.

Prerequisite: BA 201 or equivalent. Elective; senior year; first term; 3 credits; 1 lecture; 2 recitations. Text: Eggleston, Municipal Accounting.

L. C. Ball

BA 402. Analysis of Accounts. Interpretation of balance sheets, income sheets, and financial reports; graphical representation of business statistics; advanced accounting problems. Government documents and bulletins used as texts.

Prerequisites: BA 302, 332. Elective; senior year; second term; 3 credits; 1 lecture; 2 recitations.

BA 403. C. P. A. Problems. This course covers a large variety of practical problems viewed from the standpoint of the manager rather than the accountant. The material is drawn from certified public accountancy examinations and other sources. The student does not follow any prescribed form of treatment or solution, but is expected to develop analytical initiative, resourcefulness, and originality. Designed as a preparation for the C. P. A. examination. Text supplemented by selected exercises.

Prerequisite: BA 303. Elective in Commerce; senior year; third term; 3 credits; 3 recitations.

BA 404. Seminar. A research course on the organization and management of a business in which the student is especially interested.

Elective in Commerce; junior or senior year; three terms; 1 credit each term; 1 period.

BA 441. Principles and Practice of Advertising. Psychology and functions of advertising; classification and mediums; writing of copy and proof reading; types and display; engraving and printing methods; advertising and follow-up systems; advertising agencies.

Prerequisite: BA 142. Required in Commerce; elective to others; senior year; second term; 3 credits; 2 lectures; 1 recitation.

H. T. Vance

ECONOMICS AND SOCIOLOGY

Including Rural Markets and Rural Organization

The work of this department serves the following purposes:

(1) **To train both men and women for citizenship.** Every citizen has business relations requiring a knowledge of the fundamental principles of economics. The necessity of such knowledge is especially felt in a democracy where every man and woman has the right to vote and is called upon to mold legislation directly. The basis for intelligently exercising this paramount duty of citizenship can only be supplied by a training in economics and sociology, the problems of which form the subject-matter of most legislation.

(2) **To provide economic training for technical students.** Three credits in economics are required of all students in the College. In consultation with the deans of the various schools, required and elective courses have been worked out supplementary to the work of each school.

(3) **To train specialists in Agricultural Economics and Rural Sociology.** The School of Agriculture provides that students may elect a minor in Agricultural Economics and Rural Sociology. Such

a minor affords excellent preparation for those who intend to go back to the farm and assume positions of business, educational, and political leadership. It gives the training needed for positions in state and Federal bureaus of markets. It lays a foundation for a business career as commission man, broker, jobber, wholesaler, or exporter of farm products. It should give the best possible training for positions as county agents, where capacity for leadership outweighs all other considerations.

(4) **To do field work.** The Bureau of Organization and Markets. In 1914 the Board of Regents established the Bureau of Organization and Markets for the purpose of assisting farmers in marketing their products. The Bureau has been carrying on its work in cooperation with the Bureau of Markets of the United States Department of Agriculture.

The work of the Bureau, in the first place, is investigational. It aims to find out the conditions fundamental to successful marketing, and to place the results of its investigation at the disposal of all who are interested. In the second place, it is at the service of any group of farmers contemplating the establishment of any sort of business organization. It has worked out model constitutions and by-laws and standardized systems of accounting; it has lists of equipment and, in cooperation with the various technical departments of the College, can inform farmers where such equipment can be most cheaply obtained. It also assists organizations in planning the kind of plants necessary to carry on their business.

Equipment. The department has for some years been developing a commercial museum for use in the various courses in economic and social science. The museum has now grown to such an extent that it is a very important factor in making the work of the department practical and successful. The Bureau of Organization and Markets also has a collection of bulletins, pamphlets, lantern slides, and documents illustrating the farmers' marketing and organization movement in all parts of the world.

COURSES

ES 101. **Commercial Geography.** The physiographic basis of commerce and industry; the natural resources of the different countries of the world; the geographic distribution of labor and industry as determined by natural conditions such as climate, topography, soil, and mineral resources. Specimens from the Commercial Museum are used by the students. Assigned readings, outline maps. (Not to be taken by students presenting Commercial Geography for entrance credit.)

Required in Commerce and Industrial Arts (freshman year) and in Mechanical Engineering (sophomore year); any term; 4 credits; 4 recitations. Text: Robinson, Commercial Geography.

W. H. Dreesen, J. F. Page

ES 103. Commercial Geography. An advanced course for students who have had Commercial Geography in high school.

Required in Commerce; freshman year; third term; 4 credits; 4 recitations.

W. H. Dreesen

ES 111. Economic History of Europe. A course covering the most important economic changes and achievements in Europe during the past three hundred years; study of the rise and decline of the manorial system; important changes in agriculture; rise of factory system; trades unionism; the development of commercial policies; labor conditions and legislation, together with socialism and social insurance.

Required in Commerce; freshman year; any term; 4 credits; 4 recitations. Text: Ogg, Economic Development of Modern Europe.

E. B. Mittelman

ES 201. Economic History of the United States. On the basis of a knowledge of our natural resources and of the previous commercial and economic development of the world, attempt is made to outline and interpret the economic and social progress of the United States. The development of agriculture, the growth of manufacturing, the improvement of transportation, the history of labor organization and legislation, the evolution of our monetary and credit systems, changes in the protective tariff, progress towards economic and social solidarity, etc., are traced from Colonial times onward.

Prerequisites: ES 101, 111. Required in Commerce; sophomore year; first term; 3 credits; 3 recitations.

H. Macpherson

ES 203. Principles of Economics. A general course covering our industrial and commercial organization, the nature of wealth, its production, consumption, and distribution; law of diminishing returns; division of labor and efficiency in production; exchange and distribution in their relation to the price-making process; factors determining prices, wages, interest, rent and profits; problems of taxation; public expenditures; protection and free trade; money and banking; labor problems and transportation. Text-book, lectures, and reports on assigned readings.

Prerequisites: ES 101, 201. Required in Commerce; sophomore year; second or third term; 4 credits; 4 recitations. Texts: Ely, Outline of Economics. Marshall, Wright and Field, Materials for the Study of Elementary Economics. *W. H. Dreesen, E. B. Mittelman*

ES 211. Conservation. Economic wastes arising out of the exploitation of natural resources; the mal-adjustment of industry; the misdirection of labor; the present order of consumption; conservation laws and policies tending to eliminate wastes and abuses.

Elective to any student who has had ES 203, ES 391, or ES 362, or equivalent; first term; 4 credits; 4 recitations. *N. H. Comish*

ES 301. Labor Problems. Brief historical review of the rise of a labor class; influence of occupation upon the laborer; beginnings of organization; structure, aims, methods of offense and defense; achievements of associations of labor; application of the injunction in labor disputes; political activity of labor organizations; the employers' association; profit-sharing and cooperation in relation to labor problems. Text-book, lectures, and assigned readings. Studies are made of typical historical and current labor disputes and embodied in term papers and class discussion.

Prerequisite: ES 203 or ES 391. Elective in Commerce (junior or senior year); required in Forestry (sophomore year); second term; 4 credits; 4 recitations. *H. Macpherson*

ES 303. Insurance. A course designed to cover, in a general way, the whole field of insurance. Nature and statistical basis of different kinds of insurance; application of the principles discovered to different forms of insurance such as straight life, endowment, accident, industrial, old age, fire, livestock, hail, etc., taken up in detail.

Elective; junior or senior year; third term; 4 credits; 4 recitations. Text: Heubner, Life Insurance, Property Insurance. *W. H. Dreesen*

ES 304. Advanced Commercial Geography. An advanced course in the study of ocean trade routes, ship canals, ports, and terminals, ocean transportation service and marine insurance. For students planning to enter foreign trade.

Elective to students who have had ES 101 and ES 203; first term; 3 credits; 3 recitation and lecture periods. *W. H. Dreesen*

ES 305. General Sociology. Origin, development, present conditions, and social functioning of our social units, such as the family, the school, the church, clubs, associations, institutes, etc.; the city, state, and nation; interpretation of the causes of the strength and weakness of modern social institutions, showing their influence upon the general welfare of society and the progress toward greater efficiency; analysis of the social causes and effects of ignorance; vice and crime; poverty; unstable family relations; general discussion of the principles underlying their elimination.

Elective; junior year; any term; 4 credits; 4 recitations.

H. Macpherson, J. F. Page

ES 306. **Introduction to Foreign Trade.** International values; international commercial policies and treaties; bases of foreign trade; consular service; foreign exchange and international banking systems; ocean routes and carriers; methods of packing and shipping; shipping documents; marine insurance; foreign trade organizations.

Elective to students who have had ES 101 and ES 203; second term; 4 credits; 4 recitation and lecture periods. *W. H. Dreesen*

ES 311. **Money and Banking.** (a) Money. The nature and functions of money; legal tender; the factors affecting price, and their relation to business conditions; brief history of the various forms of paper money; silver legislation; present problems and conditions. (b) Banking. Functions of banks; history of banking, including our national banking system, with emphasis upon the Federal Reserve Bank Act; currency and banking principles underlying United States and foreign banking systems; comparison of our banking system with those of foreign countries. Assigned readings. Two sections first term; one section second term.

Prerequisite: ES 203. Commerce; junior year; first or second term; 4 credits; 4 recitations. Text: Holdsworth, *Money and Banking*. *W. H. Dreesen*

ES 313. **The Elements of Statistics.** A description of the methods of collecting and interpreting original and secondary data; practice in scientifically presenting statistics in such forms as tables, charts, diagrams, curves, and maps.

Elective; junior, senior, or graduate year; third term; 3 credits; 3 recitations. Text: Secrist, *Introduction to Statistical Methods*. *E. B. Mittelman*

ES 323. **Cooperation.** Origins, structures, objects, methods, and results of cooperative producers', consumers', and marketing associations, including, for example, such cooperative organizations as creameries, cheese factories, meat factories, stores, purchasing societies, consumers' leagues, warehouses, grain elevators, fruit and vegetable associations, livestock societies, credit and insurance companies.

Elective to juniors and seniors who can not take ES 364 and ES 367, and who have had ES 203, ES 391, or ES 362, or equivalent; third term; 4 credits; 4 recitations. *N. H. Comish*

ES 362. **Agricultural Economics.** Fundamental principles of production, consumption, and distribution with special reference to agriculture; land tenure; land values; the law of proportions; price-making processes; money; banking; rural credit; cooperation; marketing; transportation; taxation; rent; interest; wages; and profits.

Required in Agriculture; junior year; first or third term; 3 credits; 3 recitations. Text: Taylor, *Agricultural Economics*. *N. H. Comish*

ES 364. The Economic Organization of Agriculture. The economic organization of farmers for more efficient production, purchasing, and marketing. A discussion of such organizations as the Grange, the Farmers' Union, the American Society of Equity, the Gleaners, and the Farm Bureau.

Open to all students who have had ES 362 or its equivalent. Elective; junior or senior year; second term; 3 credits; 3 recitations.

N. H. Comish

ES 365. National Vitality. The general field of national vitality; its importance; the conditions underlying it, and the means of maintaining such conditions. This course will not be given unless at least fifteen students register for it.

Elective; third term; 2 credits; 2 recitations. *H. Macpherson*

ES 366. The Literature and Exposition of Rural Life. A critical study of the general field of literature bearing upon rural life; typical interpretations of rural life from the best poetry and prose; the rural press studied with a view to estimating its sociological and economic influence; themes upon current economic and sociological topics and the subject-matter discussed in the classroom to familiarize the student with the problems involved in the rural life movement.

Elective; junior, senior, or graduate year; second term; 4 credits; 4 recitations.

H. Macpherson

ES 367. Rural Finance. Various phases of farm finance, including, among other topics, the following: principles of money, banking, and credit; rural credit laws; registration of land titles; rental and transfer contracts; land settlement and colonization policies; types of rural insurance; and the taxation of rural properties.

Open to those who have had ES 362 or equivalent. Elective; junior or senior year; first term; 3 credits; 3 recitations.

N. H. Comish

ES 391. Introduction to Economics. Abbreviated course (see ES 203).

Required except in Commerce and Agriculture; year as specified in the respective curricula; any term; 3 credits; 3 recitations. Text: Ely, Outlines of Economics.

N. H. Comish, E. B. Mittleman

ES 393. Introduction to Sociology. Abbreviated course (see ES 305).

Required in Home Economics; elective for all students except Commerce; year as may be specified in the respective curricula; any term; 3 credits; 3 recitations.

H. Macpherson, J. F. Page

ES 396. Introduction to Labor Problems. This course is based upon ES 301, but is abbreviated and adapted to meet the needs of technical students who have had ES 391, or equivalent.

Prerequisite: ES 391, or equivalent. Required in Forestry; elective to all students except Commerce; junior or senior year; third term; 3 credits; 3 recitations. *H. Macpherson*

ES 401. **Public Finance.** Public expenditures, local, state, and national; brief history of reforms calculated to secure efficiency in these expenditures; forms of taxes, customs, and fees whereby revenues are raised; present systems of land taxation studied in the light of proposed reforms; special attention to war finance; bonds versus taxes in public finance; management of national and local debts. Assigned readings.

Required in Commerce; senior year; first term; 4 credits; 4 recitations. Text: Plenn, Introduction to Public Finance.

W. H. Dreesen

ES 402. **Markets and Marketing.** A critical study of the marketing of staples, semi-staples, and perishable farm products, including the geographical location of producing areas, marketing routes from the producer to the consumer, types of middlemen, direct marketing, marketing costs, standardization, factors influencing prices, and a general description of our whole marketing system as it exists today.

Required in Commerce; elective to other students by permission of instructor; senior year; second term; 4 credits; 4 recitations.

N. H. Comish

ES 403. **Transportation.** Relation of transportation systems to industrial and commercial progress; a brief historical review of the development of systems of transportation; organization and financing of different systems; effect of competition in the railroad business; freight classification and the making of rates and fares; the necessity of government control and attempts at regulation by state and Federal governments; government ownership in the light of European experience.

Elective; senior year; third term; 4 credits; 4 recitations. Text: Ripley, Rates and Regulation.

E. B. Mittelman

ES 406. **Employment Management.** This course aims to introduce the student to the labor problem as found in the shop, mill, or factory, in contradistinction to the labor problem as found in the hopes, aims, and activities of the laborer and his organization. How the principles of scientific management affect the laborer; job analysis; psychological tests; systematic placing and promoting; labor justification in management; the public's concern in such justification. Recommended for seniors in Commerce and Forestry and juniors and seniors in Engineering who expect to employ and manage men.

Elective; junior or senior year; third term; 3 credits; 3 recitations.

E. B. Mittelman

ES 413. **Applied Sociology.** Application of the principles of sociology to the promotion of social welfare; ethical gains through legislation and through voluntary associated and individual effort for the control of housing, relief of poverty, the suppression of vice, the control of juvenile delinquents, prison reforms, cooperation among religious institutions, elimination of corruption from politics, care and elimination of mental and physical defectives; lectures, supplementary readings, and problem investigation.

Open to students who have had either ES 405 or ES 464. Elective; third term; 3 credits; 3 recitations. *H. Macpherson*

ES 464. **Rural Sociology.** Special problems of the evolution of rural institutions, the rural community, the rural family, the rural school, the rural church, rural societies and associations; rural systems of transportation and communication; the dependence of national welfare upon the rural community.

Elective; junior or senior year; third term; 3 credits; 3 recitations. *H. Macpherson*

ES 603. **Markets and Marketing.** Continuation of ES 402. An intensive study of the products entering domestic and foreign trade and the methods of marketing them. Among other topics taken up are the following: development of marketing systems; speculation, organized and unorganized; local, state, and national commercial programs and policies; commercial clubs, boards of trade, chambers of commerce; foreign trade relations; transportation routes; the consular service; commercial treaties; tariffs; bounties; and foreign exchange.

Elective to graduate and senior students upon consultation with the instructor; third term; 4 credits; 4 recitations. *N. H. Comish*

ES 605. **The Principles and Method of the Rural Survey.** The principles of the scientific method and their statistical application to rural economic and sociological research; the purposes, forms, and preparation of schedules; editing, tabulation, and interpretation of data; principles of graphic presentation; study of a wide range of typical social and economic surveys, showing varieties of form and method adapted to different purposes. A seminar course for graduate students in Economics and Rural Sociology, to which seniors may be admitted by permission of the instructors.

Prerequisites: ES 203 or ES 391 or ES 362, and ES 305 or ES 393. Elective; senior or graduate year; third term; 5 credits; 2 meetings.

OFFICE TRAINING AND STENOGRAPHY

The courses offered by this department are for four classes of students: (a) those desiring a thorough training as stenographers and typists; (b) those desiring to go further into the field of court reporting and secretarial training; (c) those desiring to enter the teaching profession; and (d) those commercial teachers desiring advanced training.

The ground covered by the work of this department is as follows: Stenography and Typewriting, two years; Secretarial Training, one year; Convention and Court Reporting, one year; and Methods of Teaching Commerce, one year.

Equipment. The Office Training department is equipped with the latest appliances and fixtures, including the standard types of typewriters, duplicators, mimeographs, dictaphones, mimeoscope, filing cabinets, and adding and bookkeeping machines. Each student is given access to equipment upon payment of a fee required for the course in which he is registered. All equipment and apparatus are kept in constant repair, and students are taught how to keep the apparatus they use in proper order.

COURSES

OT 101. *Elementary Stenography. Theory of manual, Gregg shorthand, lessons one to six inclusive. Principles of shorthand penmanship and phrasing emphasized; practical application of theory principles in sentence dictation at thirty-five words a minute; typing course OT 111 must be taken concurrently with this course unless student has had an equivalent course.

Required in Commerce; elective to others; freshman year; any term; 3 credits; 4 recitations. Texts: Gregg Shorthand. Gregg Writer. Markett, Word and Sentence Drills.

OT 102. Intermediate Stenography. A continuation of OT 101. Theory of manual, Gregg shorthand, lessons seven to twelve inclusive. Transcription of shorthand plates, Hunter's Graded Readings, lessons one to twelve inclusive; sentence and letter dictation at fifty words a minute; typing course OT 112 must be taken concurrently with this course unless student has had an equivalent course.

Required in Commerce; elective to others; freshman year; any term; 3 credits; 4 recitations. Texts: Gregg Shorthand. Gregg

*Less than 9 credits in Stenography or 6 credits in Typing will not be counted toward the bachelor's degree in Commerce. Students in other schools may offer less as elective work.

Writer, Markett, Word and Sentence Drills. Hunter, Graded Readings in Gregg Shorthand.

OT 103. ***Advanced Stenography.** A continuation of OT 102. Theory of manual, Gregg Shorthand, lessons thirteen to twenty inclusive. Dictation at sixty words a minute; transcription; typing course OT 113 must be taken concurrently with this course unless student has had an equivalent course.

Required in Commerce; elective to others; freshman year; first or third term; 3 credits; 4 recitations. Texts: Gregg Shorthand, Gregg Writer. Markett, Word and Sentence Drills. Hunter, Graded Readings in Gregg Shorthand.

OT 111. ***Elementary Typing.** Touch typing. Theory and practice of touch typing, covering mastery of alphabet and numerals. Finger gymnastics, rhythm drills, dictation exercises. A speed of twenty words a minute is required. Required for OT 101 students.

Required in Commerce; elective to others; freshman year; any term; 2 credits; 5 one-hour laboratory periods; 1 hour home assignment. Fee \$2.00. Text: Rational Typewriting.

OT 112. ***Intermediate Typing.** Continuation of OT 111. Drill. Writing paragraphs, continuous matter. Punctuation and mechanical arrangement of business correspondence. A speed of thirty-five words a minute is required. Required of OT 102 students.

Required in Commerce; elective to others; freshman year; any term; 2 credits; 5 one-hour laboratory periods; 1 hour home assignment. Fee \$2.00. Text: Rational Typewriting.

OT 113. ***Advanced Typing.** Continuation of OT 112. Legal forms, tabulating, centering, manifold, and speed practice. Speed certificates granted. A speed of fifty words a minute is required. Required of OT 103 students.

Required in Commerce; elective to others; freshman year; any term; 2 credits; 5 one-hour laboratory periods; 1 hour home assignment. Fee \$2.00. Text: Rational Typewriting.

OT 201. ***Applied Stenography and Typing.** Advanced principles and phrases, Gregg or Pitman Shorthand. Dictation and transcripts covering vocabularies of representative businesses such as law, banking, insurance, publishing, railway, and manufacturing. Advanced typing and effective arrangement of business correspondence.

*Less than 9 credits in Stenography or 6 credits in Typing will not be counted toward the bachelor's degree in Commerce. Students in other schools may offer less as elective work.

Prerequisites: OT 103, 113, or equivalent; Eng 106. Required in Commerce; sophomore year; first or second term; 5 credits; 5 recitations; 5 hours home work; 5 one-hour laboratory periods. Fee \$2.00. Texts: Gregg Speed Studies. Gregg Writer. Gardner, Constructive Dictation.

OT 202. ***Applied Stenography and Typing.** Advanced dictation, legal forms, newspaper and magazine articles. Court and convention reporting introduced. Sections for Gregg and Pitman students.

Prerequisite: OT 201 or equivalent. Required in Commerce; sophomore year; second or third term; 5 credits; 5 recitations; 5 hours home work; 5 laboratory periods. Fee \$2.00. Texts: Gardner, Constructive Dictation. Gregg Writer.

OT 203. **Office Training for Stenographers.** Training course in office practice and business procedure; advanced dictation; study and use of office appliances commonly used in the modern office, such as the mimeograph, mimeoscope, adding machines, and filing equipment.

Prerequisite: OT 202 or equivalent. Required in Commerce; sophomore year; any term; 5 credits; 2 lectures; 4 two-hour laboratory periods. Fee \$2.00.

OT 251. **Office Methods and Appliances.** Designed for Commerce students not taking stenography. Study and use of modern office appliances such as mimeoscope, mimeograph, dictaphones, calculating and bookkeeping devices. Filing and office routine.

Prerequisite: OT 113, BA 103. Required in Commerce; sophomore year; first term; 2 credits; 1 one-hour lecture; 4 one-hour laboratory periods; 1 hour home assignment. Fee \$2.00.

OT 252. **Office Methods and Appliances.** Continuation of OT 251. Practice and principles of scientific office management covering organization, arrangement, and operation, with special consideration of the employment, training, and payment of office workers. Study and drill in office efficiency problems and business ethics.

Prerequisite: OT 251. Required in Commerce; sophomore year; second term; 2 credits; 1 lecture; 4 one-hour laboratory periods. Fee \$2.00. Text: Galloway, Office Management.

OT 253. **Office Methods and Appliances.** Continuation of OT 252. Required in Commerce; sophomore year; third term; 2 credits; 1 lecture; 4 one-hour laboratory periods. Fee \$2.00.

*Less than 9 credits in Stenography or 6 credits in Typing will not be counted toward the bachelor's degree in Commerce. Students in other schools may offer less as elective work.

OT 261. **Expert Typing.** Designed to give expert finger training. Emphasis on artistic typing and rapid tabulating, billing, and manifolded, with absolute accuracy. A speed of sixty-five words a minute is required. Proficiency certificates for speed and accuracy will be granted.

Prerequisite: OT 113. Elective, primarily for other than Commerce students; sophomore year; first or third term; 2 credits; 5 laboratory periods; 1 hour home assignment. Fee \$2.00. Text: Rational Typewriting.

OT 301. **Secretarial Studies.** Continuation of OT 203. Dictaphone and bookkeeping machines studied; practical use of modern office appliances in commercial work; training in the duties of a private secretary, managing callers, handling correspondence; outlines and reports; sources of information; editing and proof reading; appointments, diaries, and accounts; ethics; systematizing the office.

Prerequisite: OT 203. Elective in Commerce; junior year; any term; 5 credits; 2 lectures; 4 two-hour laboratory periods. Fee \$2.00.

OT 302. **Secretarial Practice.** Continuation of OT 301.

Elective in Commerce; junior year; any term; 2 credits; 6 hours a week actual practice in College administrative offices.

OT 401. **Reporters' Course.** Designed for those having completed OT 203 and desiring to specialize in court or convention reporting.

Elective; junior or senior year; first term; 3 credits; 2 recitations; 3 one-hour laboratory periods. Fee \$1.00.

OT 402. **Reporters' Course.** A continuation of OT 401.

Elective; junior or senior year; second term; 3 credits; 2 recitations; 3 one-hour laboratory periods. Fee \$1.00.

OT 403. **Reporters' Course.** A continuation of OT 402. Verbatim reporting of addresses, lectures, and talks given on the campus. Accurate transcripts to be made.

Elective; junior or senior year; third term; 3 credits; 2 recitations; 3 one-hour laboratory periods. Fee \$1.00.

POLITICAL SCIENCE

In the courses in Political Science proper the department seeks to instruct in the basic general principles of all government, the construction and operation of modern governments, with particular attention to that of the United States, and the rules and principles which regulate the relations of governments to each other. The courses are planned with the purpose of equipping students for an

intelligent participation in governmental affairs. The work culminates in the courses in Advanced American Government and Practical Legislation, designed to instruct in the fundamentals of law-making. The work assumes that, as citizens, our students will take a dynamic part in the various activities of government, including law-making.

In the Business Law courses the department endeavors to train students for practical business affairs, particularly to give the legal information necessary to prevent the common business errors. Special attention is given to industrial and rural problems. In order to acquaint the student with the rudiments of court procedure, a practical case is tried by the class, the students performing all the parts.

For outline of courses in Political Science in the School of Commerce, consult pages 191-192.

COURSES

PS 163. Business and Rural Law. A short course in the laws of business, covering briefly much the same field as PS 201 and PS 202, but applied particularly to the special needs of students. Work for Pharmacy students gives emphasis to strictly business law. Work for Agriculture students stresses farm law. Recitations and discussions.

Required in Pharmacy, Farm Management, Animal Husbandry, and Landscape Gardening; elective to others except Commerce; third term; 3 credits; 3 recitations. Text: Huffcut, *Elements of Business Law*.
R. R. Hewitt

PS 201. Advanced Business Law. (a) Contracts in General. Requisites, formation, interpretation, and remedies for breach of contracts. (b) Sales of Personal Property. Passage of title, warranties and remedies. Note: Credit will not be given for PS 201 without PS 202 except on special permission from the department.

Required in Commerce and Forestry; elective to others; sophomore year; first or second term; 4 credits; 4 recitations. Texts: Spencer, *Manual of Commercial Law*. Bays, *Cases on Commercial Law*.
U. G. Dubach, R. R. Hewitt

PS 202. Advanced Business Law. Continuation of PS 201. (c) Negotiable Instruments. Requisites of contract assignment and negotiation. Liability of maker, drawer, acceptor, and indorser. Proceedings to protect rights of parties. (d) Agency. Appointment powers and responsibilities of agents. (e) Partnership and Corporation. Comparison of methods of formation, dissolution, and powers

and liabilities of members. (f) Property Classes. Title, abstracts, mortgages, and leases. The case method is used throughout the entire course. Lectures, reports, and discussions.

Required in Commerce and Forestry; elective to others; sophomore year; second or third term; 4 credits; 4 recitations. Texts: Spencer, Manual of Commercial Law. Bays, Cases on Commercial Law. *U. G. Dubach, R. R. Hewitt*

PS 301. National Government. Consideration of the organization, functions, and present-day problems of the American Federal Government.

Required in Commerce and Mines; elective in other curricula; any term; 3 credits; 3 recitations. Text: Munro, Government of the United States. *U. G. Dubach, F. A. Magruder*

PS 302. State and Local Government. Consideration of the organization, functions, and present-day problems of state, county, and township government in the United States. The government of Oregon receives special attention.

Required in Commerce and Mines; elective to others; junior or senior year; second term; 3 credits; 3 recitations. Text: Munro, Government of the United States. *U. G. Dubach, F. A. Magruder*

PS 303. Municipal Government. Consideration of the organization, functions, and present-day problems of city and town government. The cities of the Northwest receive special attention.

Required in Commerce; elective to others; junior or senior year; third term; 3 credits; 3 recitations. *F. A. Magruder*

PS 401. International Relations. A brief description of the leading governments of the world and a discussion of their inter-relations, with emphasis upon their relations with the United States. General principles of international law, the League of Nations, and current political events are considered.

Required in Commerce; elective to others; senior year; first or third term; 4 credits; 4 recitations. *F. A. Magruder*

PS 402. Comparative Governments. A critical study of the governments of the principal countries of Europe, with emphasis on modern movements and features of government that are problems in the United States at present. Lectures, reports, and discussions.

Elective; senior year; second term; 3 credits; 3 recitations.

F. A. Magruder

PS 403. **Comparative Governments.** Continuation of PS 402, covering governments of Canada and the countries of Latin America. Lectures, reports, and discussions.

Elective; senior year; third term; 3 credits; 3 recitations.

U. G. Dubach

PS 411. **Advanced American Government.** Supplementary to PS 301, 302, and 303, giving chief attention to the interpretation of Federal and state constitutions, and the relation of legislation to the constitutions. Court reports are used liberally to show the interpretation of the rights of the people guaranteed in the constitutions and of the powers granted to the government by these instruments.

Prerequisite: PS 301. Elective; junior or senior year; first term; 4 credits; 4 recitations. Text: Hall, Constitutional Law.

U. G. Dubach

PS 412. **Practical Legislation.** Instruction in practical bill drafting; attention given to correct form, and expression of desired content of bills; emphasis on the necessity of preparing laws with reference to prior legislation and court decisions; emphasis on rural and industrial legislation.

Prerequisite: PS 411. Elective; junior or senior year; second term; 4 credits; 4 recitations. Text: Jones, Statute Law Making in the United States.

U. G. Dubach

PS 601. **Business Law.** Class work same as PS 201 with special research work required in addition.

For graduate students other than Commerce; first term; 4 credits; 4 recitations.

U. G. Dubach, R. R. Hewitt

PS 602. **Business Law.** Class work same as PS 302; special research work required in addition.

For graduate students other than Commerce; second term; 4 credits; 4 recitations.

U. G. Dubach, R. R. Hewitt

School of Engineering and Mechanic Arts

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.
GRANT ADELBERT COVELL, M.E., Dean of the School of Engineering and
Mechanic Arts; Professor of Mechanical Engineering.
ESTELLE VARELL GRAYBILL, Secretary to the Dean.

Civil Engineering

STUART HOBBS SIMS, B.Sc., Professor of Civil Engineering.
HARRY STANLEY ROGERS, B.Sc., Professor of Hydraulics and Irriga-
tion Engineering.
SAMUEL MICHAEL PATRICK DOLAN, C.E., Associate Professor of Civil
Engineering.
DEXTER RALPH SMITH, B.Sc., Assistant Professor of Civil Engineering.
BURDETTE GLENN, B.Sc., Assistant Professor of Civil Engineering.
LESLIE BRIGHAM, B.Sc., Instructor in Civil Engineering.
GLENN WILLIS HOLCOMB, B.Sc., Instructor in Civil Engineering.
EMORY DOUGLAS ROBERTS, B.Sc., Instructor in Civil Engineering.
CHARLES ARTHUR MOCKMORE, B.Sc., Instructor in Civil Engineering.
JAMES EDWARD FITZGERALD, B.Sc., Instructor in Civil Engineering.

Electrical Engineering

RICHARD HAROLD DEARBORN, A.B., M.E., Professor of Electrical Engi-
neering.
LAWRENCE FISHER WOOSTER, B.Sc., Professor of Applied Electricity.
FRED ORVILLE McMILLAN, M.S., Assistant Professor of Electrical Engi-
neering.
JOHN HARRISON BELKNAP, B.Sc., Assistant Professor of Electrical Engi-
neering.
BENJAMIN BURTON BESSESEN, B.Sc., Instructor in Electrical Engineering.
BENJAMIN HODGE NICHOLS, B.Sc., Instructor in Electrical Engineering.
JOHN CLIFTON GARMAN, B.Sc., Teaching Fellow in Electrical Engineer-
ing.

Highway Engineering

GORDON VERNON SKELTON, C.E., Professor of Highway Engineering.

Industrial Arts

HENRY CLAY BRANDON, A.M., Professor of Industrial Arts; Director of Shops.

AMBROSE ELLIOTT RIDENOUR, B.Sc., Instructor in Foundry Practice.

MARTIN LOUIS GRANNING, Instructor in Automobile Mechanics.

GLENN HARTMAN HILL, Instructor in Machine Shops.

DARWIN GREENE THAYER, B.Sc., Instructor in Industrial Arts.

WILLIAM HAMILTON HORNING, Instructor in Forging.

Mechanical Engineering

GRANT ADELBERT COVELL, M.E., Professor of Mechanical Engineering.

WALLACE HOPE MARTIN, M.E., Professor of Heat Engineering.

JOHN RANDOLPH DUPRIEST, B.Sc., M.M.E., Professor of Technical Engineering.

MARK CLYDE PHILLIPS, B.M.E., Associate Professor of Mechanical Engineering; Superintendent of Heating.

RAY BOALS, B.Sc., Assistant Professor of Mechanical Engineering.

MORRIS WENK, A.B., E.E., Assistant Professor of Mechanical Engineering.

ALFRED WILLIAM BECHLEM, B.Sc., Instructor in Mechanical Engineering.

EARL CLARK WILLEY, B.Sc., Instructor in Mechanical Drawing.

ALFRED CLINTON HARWOOD, Mechanician, Engineering Laboratory.

Mechanics and Materials

SAMUEL HERMAN GRAF, M.S., Professor of Mechanics and Materials.

CHARLES EDWIN THOMAS, M.E., Assistant Professor of Mechanics and Materials.

IVAN FREDERICK WATERMAN, C.E., Assistant Professor of Mechanics and Materials.

JAMES CAREY OTHUS, M.E., Instructor in Mechanics and Materials.

Baccalaureate Degrees. Four-year curricula leading to the degree of Bachelor of Science are offered in the School of Engineering as follows: a curriculum in Civil Engineering, with a senior option in Highway Engineering; a curriculum in Electrical Engineering; a curriculum in Industrial Arts; a curriculum in Mechanical Engineering.

Requirements for Graduation. In each of the four baccalaureate degree curricula offered in the School of Engineering, 207 college credits are required, of which 192 are to be academic credits, 12 are to be credits in military drill, and 3 are to be credits in physical education.

Advanced Degrees. The professional degree of Civil Engineer, Electrical Engineer, or Mechanical Engineer, is offered to graduates of the College, or other colleges of equal rank, who have attained the degree of Bachelor of Science in the corresponding engineering curriculum, and met the College requirements for graduate study. These requirements specify one full year of resident work amounting to 48 college credits, including an acceptable thesis. (See pages 69-70).

DEGREE CURRICULUM IN CIVIL ENGINEERING

(B.Sc. Degree)

Freshman Year

	1st	Term 2d	3d
Engineering Drawing (CE 111, 112), Drawing and Descriptive Geometry (CE 113).....	3	3	3
Plane Surveying (CE 121, 122, 123).....	5	4	5
Engineering Physics (Ph 111, 112, 113).....	3	3	3
Trigonometry (Mth 111), Elementary Analysis (Mth 131, 132).....	4	4	4
Freshman Engineering (CE 101, 102, 103).....	---	1*	---
Gymnasium (PEm 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics.....	2	2	2
	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$

Sophomore Year

Differential and Integral Calculus (Mth 251, 252, 253).....	4	4	4
General Chemistry (Ch 101, 102, 103).....	3	3	3
Practical Public Speaking I (PSP 254).....	---	3	---
Curves and Earthwork (CE 231, 232).....	---	2	5
English Composition (Eng 101, 102, 103).....	3	3	3
Steam and Gas Machinery (ME 233).....	5	---	---
Gymnasium (PEm 211, 212, 213).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics.....	2	2	2
	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$

* For CE 101, 102, 103, which run through all three terms, one-third credit is given each term.

Junior Year

	1st	Term 2d	3d
Mechanics (MM 361, 362).....	4	.....	4
Strength of Materials (MM 353).....	.....	3	.....
Materials of Engineering (MM 311).....	.....	3	.....
Hydrology (CE 341), Hydraulics (CE 342, 343).....	3	3	3
Masonry and Foundations (CE 372).....	.....	3	.....
Structural Analysis (CE 381).....	.....	.....	5
Roads and Pavements (HE 313).....	5	.....	.....
Introduction to Economics (ES 391).....	3	.....	.....
Principles of Accounting for Engineers (BA 385).....	.....	3	.....
Business Organization and Management (BA 381).....	.....	.....	3
Electives	2	2	2
	17	17	17

Senior Year

General Geology (G 301a)	3	.....	.....
Structural Engineering (CE 482), Structural Design (CE 483, 484)	4	4	5
Seminar (CE 491, 492, 493).....	1	1	1
Reinforced Concrete (CE 471).....	.....	5	.....
Structural Laboratory (MM 427).....	.....	2	.....
Reclamation Engineering (CE 461).....	.....	.....	4
Hydraulic Machinery (CE 441).....	4	.....	.....
Railroad Engineering (CE 433).....	3	.....	.....
Electricity for Civil Engineers (EE 255).....	.....	.....	5
Electives	2	5	2
	17	17	17

Senior Year

(Highway Engineering Option)

Structural Engineering (CE 482), Structural Design (CE 483, 484)	4	4	5
Contracts and Specifications (HE 427).....	.....	.....	3
Highway Engineering (HE 411, 412, 413).....	4	3	4
Highway Materials Laboratory (MM 420).....	3	.....	.....
Economics of Highway Construction (HE 416).....	3	.....	.....
Reinforced Concrete (CE 471).....	.....	5	.....
Seminar (CE 494, 495, 496).....	1	1	1
Electives	2	4	4
	17	17	17

DEGREE CURRICULUM IN ELECTRICAL ENGINEERING

(B.Sc. Degree)

Freshman Year

	1st	2d	3d
Elements of Electricity (EE 101, 102, 103).....	3	3	3
Plane Trigonometry (Mth 111), Elementary Analysis (Mth 131, 132)	4	4	4
Engineering Physics (Ph 111, 112, 113).....	3	3	3
Library Practice (Lib 100).....	1	.....	.....
Engineering Survey (ME 101, 102).....	.....	$\frac{1}{2}$	$\frac{1}{2}$
Mechanical Drawing (ME 111, 112) or (ME 112, 114).....	2	2	.....
Descriptive Geometry (ME 113).....	.....	.....	3
Patternmaking (IA 212), Blacksmithing (IA 152), Machine Shop (IA 262).....	2	2	2
Gymnasium (PEM 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
	<hr/> 17 $\frac{1}{2}$	<hr/> 17	<hr/> 18

Sophomore Year

Introduction to Electrical Engineering (EE 201, 202, 203).....	3	3	3
Differential, Integral Calculus (Mth 251, 252, 253).....	4	4	4
General Chemistry (Ch 101, 102, 103).....	3	3	3
English Composition (Eng 101, 102, 103).....	3	3	3
Machine Shop (IA 263).....	2	.....	.....
Plane Surveying (CE 124, 127).....	.....	2	2
Gymnasium (PEM 211, 212, 213).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$

Junior Year

Electrical Engineering (EE 301, 302, 303).....	3	3	3
Electrical Laboratory (EE 321, 322, 323).....	3	3	3
Mechanics (MM 351, 352).....	3	3	.....
Strength of Materials (MM 353).....	.....	.....	3
Heat Power Engineering (ME 331, 332, 333).....	3	3	3
Materials of Engineering (MM 311).....	3	.....	.....
Hydraulics (CE 344).....	.....	3	.....
Hydraulic Power Plants (CE 346).....	.....	.....	3
Electives	2	2	2
	<hr/> 17	<hr/> 17	<hr/> 17

Senior Year

Electrical Engineering (EE 401, 402, 403).....	3	3	3
Electrical Design (EE 411, 412, 413).....	1	1	1
Electrical Laboratory (EE 421, 422).....	3	3	.....
Introduction to Economics (ES 391).....	3	.....	.....
Business Administration (BA 381).....	.....	3	.....
National Government (PS 301).....	.....	.....	3
Practical Public Speaking I (PSp 254).....	.....	7	3
Electives	7	7	7
	<hr/> 17	<hr/> 17	<hr/> 17

DEGREE CURRICULUM IN INDUSTRIAL ARTS

(B.Sc. Degree)

Freshman Year

	Term		
	1st	2d	3d
Shop Drawing (IA 191, 192, 193).....	2	2	2
Manual Training (IA 111, 112, 113).....	3	3	3
General Chemistry (Ch 101, 102, 103).....	3	3	3
English Composition (Eng 101, 102, 103).....	3	3	3
Commercial Geography (ES 101).....	4	.....	.....
Plane Trigonometry (Mth 111).....	.....	4	.....
Gymnasium (PEm 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
Approved electives .....	.....	.....	4
	<hr/> 17½	<hr/> 17½	<hr/> 17½

Sophomore Year

Ind. Arts Drawing (A 211), Ind. Arts Design (A 221).....	2	2	.....
Patternmaking (IA 213).....	3	.....	.....
History of Western Civilization II and III (Hst 212, 213), Recent History of the United States (Hst 126).....	3	3	3
Engineering Physics (Ph 111, 112, 113).....	3	3	3
Mill Work and Machine Wood Working (IA 223).....	.....	3	.....
Carpentry (IA 222).....	.....	.....	3
Gymnasium (PEm 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
Approved electives	4	4	6
	<hr/> 17½	<hr/> 17½	<hr/> 17½

Junior Year

Special Methods in Manual Training (IEd 341).....	3	.....	.....
Tool Making and Tempering (IA 254).....	.....	.....	1
Forging (IA 351).....	3	.....	.....
Elementary Psychology (Psy 301).....	3	.....	.....
Mechanical Drawing (ME 112, 114).....	2	2	.....
Descriptive Geometry (ME 113).....	.....	.....	3
Hammered Metal Work (IA 352).....	.....	3	.....
Introduction to Education (Ed 302).....	.....	2	.....
Foundry Practice (IA 242).....	3	.....	.....
Wood Turning (IA 333).....	.....	2	.....
Educational Psychology (Psy 322).....	.....	.....	3
Commercial Woods (F 334).....	.....	.....	3
Approved electives	3	8	7
	<hr/> 17	<hr/> 17	<hr/> 17

Senior Year

	1st	Term 2d	3d
Machine Shop (IA 461, 462).....	3	3	---
Introduction to Economics (ES 391).....	3	---	---
Materials of Engineering (MM 311).....	3	---	---
Advanced Mechanical Drawing (ME 315).....	---	3	---
Business Organization and Management (BA 381).....	---	3	---
Vocational Education (Ed 323).....	---	2	---
Hydraulics (CE 345).....	---	3	---
Automobile Mechanics (IA 182).....	---	3	---
National Government (PS 301) or State and Local Govern- ment (PS 302).....	---	---	3
Supervised Teaching (IEd 462).....	5	---	---
Electives	3	---	14
	17	17	17

DEGREE CURRICULUM IN MECHANICAL
ENGINEERING*(B.Sc. Degree)*

Freshman Year

	1st	Term 2d	3d
English Composition (Eng 101, 102, 103).....	3	3	3
Plane Trigonometry (Mth 111).....	4	---	---
Elementary Analysis (Mth 131, 132).....	---	4	4
General Chemistry (Ch 101, 102, 103).....	3	3	3
Linear Drawing and Lettering (ME 111).....	2	---	---
Elementary Mechanical Drawing (ME 112).....	---	2	---
Mechanical Drawing (ME 114).....	---	---	2
Patternmaking (IA 212).....	2	---	---
Foundry Practice (IA 141).....	---	2	---
Blacksmithing (IA 152).....	---	---	2
Library Practice (Lib 100).....	1	---	---
Engineering Survey (ME 101, 102).....	---	$\frac{1}{2}$	$\frac{1}{2}$
Gymnasium (PEm 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
	17 $\frac{1}{2}$	17	17

Sophomore Year

Differential, Integral Calculus (Mth 251, 252, 253).....	4	4	4
Engineering Physics (Ph 111, 112, 113).....	3	3	3
Elements of Heat Engineering (ME 221).....	3	---	---
Steam Engines (ME 222).....	---	3	---
Gas Engines (ME 223).....	---	---	3
Descriptive Geometry (ME 211).....	2	---	---
Machine Drawing (ME 212).....	---	2	---
Mechanism (ME 213).....	---	---	3
Plane Surveying (CE 226).....	3	---	---
Toolmaking and Tempering (IA 254).....	---	1	---
Machine Shop (IA 262, 263).....	---	2	2
Gymnasium (PEm 211, 212, 213).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$

Junior Year

	1st	Term 2d	3d
Introduction to Economics (ES 391).....	3	...	...
National Government (PS 301).....	...	3	...
Mechanics (MM 351, 352).....	3	3	...
Strength of Materials (MM 353).....	...	...	3
Hydraulics (CE 345).....	3	...	...
Hydraulic Machinery (CE 347).....	...	3	...
Materials of Engineering (MM 312).....	...	...	4
Heating and Ventilating (ME 461).....	...	...	3
Heat Engineering (ME 321, 322).....	3	3	...
Structural Analysis (CE 387).....	...	...	2
Direct Currents (EE 251).....	3	...	...
Alternating Currents (EE 252).....	...	3	...
Elementary Industrial Journalism (IJ 200), or Practical Public Speaking I (PSP 254).....	...	...	3
Electives	3	2	2
	18	17	17

Senior Year

Engineering Laboratory (ME 451, 452, 453).....	3	3	3
Wood and Steel Structures (CE 488).....	3	...	...
Contracts and Specifications (HE 427).....	...	3	...
Reinforced Concrete and Foundation Design (CE 473).....	...	...	3
Steam Turbines (ME 323) or Gas Engineering (ME 421) .....	...	...	3
Power Plant Engineering (ME 432, 433).....	3	3	...
Power Plant Design (ME 442, 443).....	2	2	...
Seminar (ME 483).....	...	...	2
Business Organization and Management (BA 381).....	...	...	3
Machine Design (ME 411, 412, 413).....	3	4	2
Electives	3	2	1
	17	17	17

CIVIL ENGINEERING

Graduates in Civil Engineering who enter that profession will be expected to render an increasing service in some one, or more, of its branches. These are: surveying and geodesy; highway, railroad, hydraulic, structural, sanitary, and municipal engineering; and valuation. More specifically, the work of the civil engineer consists of the economic location, design, construction, maintenance, operation, and oftentimes the appraisal, of systems of highways, railroads, water supply, irrigation, water power, sewerage and sewage disposal; the economic development and improvement of cities, rivers, and harbors; the economic design and construction of foundations and of the masonry, steel, or wooden structures which they support. Many civil engineering graduates enter business; and, in addition, the engineering profession is being called upon, at an accelerating rate, for service in administrative and in governmental as well as in technical fields.

As indicated by the trend of engineering education, educators are well agreed that the engineering school can best serve by providing a thorough training in the fundamentals of the basic sciences and economics; by providing specific opportunities for the broadening of its students and the development of their characters.

Curriculum and Pedagogy. In preparing the degree curriculum in Civil Engineering the aim has been threefold. First, to provide ample opportunity for the student to learn thoroughly the fundamental principles of mathematics, physics, mechanics, and economics; to understand the application of these principles to engineering problems, both old and new; to obtain knowledge of the best professional practice; and to acquire a technique which will qualify him to compete successfully after entrance upon professional work. Second, to provide opportunity for the student to gain an appreciation of the professional field of engineering and to inculcate in him high ideals. Third, to provide opportunity for the student to form an acquaintance with, and an interest in, non-technical subjects of general interest which are valuable in increasing his breadth of knowledge and power of appreciation.

The pedagogy in each of the component courses which make up the curriculum has been carefully planned to effect as rapid a rate of thorough learning as possible; to teach the student how to study, how to analyze, how to record his thoughts efficiently, and to communicate them logically, clearly and effectively, whether in writing or orally; to cultivate effective personal qualities and business habits, scientific and personal honesty, courage, loyalty, industry, cheerfulness; and to develop his judgment and balance in specific ways.

Equipment. The department is provided with excellent quarters and equipment for performing its work thoroughly and efficiently. The entire third floor of Apperson Hall, a large portion of the Engineering Laboratory, and a large room on the ground floor of Mechanic Arts Building are devoted to its uses.

The quarters in Apperson Hall are used for classrooms, drawing and designing rooms, and offices. All are of sufficient size, are well lighted, and thoroughly equipped with modern equipment, which includes drafting machines, railroad curves, beam compasses, planimeters, pantographs, and the like, in addition to an excellent collection of maps and plans for illustrative purposes.

The instrument room is located on the ground floor of Mechanic Arts Building. The equipment consists of twenty-nine transits, twenty-five levels, sixteen plane tables, six Price current meters, together with an adequate supply of stadia, level, and line rods, hand levels, tapes, and all the necessary minor equipment. Each of the

instruments is of high-grade American make and is kept in its individual locker with all of the necessary small equipment sufficient to outfit a surveying party.

The hydraulic laboratory occupies the middle third of two floors of the new Engineering Laboratory. It is equipped with storage tanks, adequate facilities for measuring the flow and pressure of water, and a variety of pumps and turbines.

The major equipment consists of two storage tanks of 1500 cubic feet capacity from which two 8-inch Pelton centrifugal pumps, so interconnected as to operate either in series or parallel, and driven by 40-horse-power motors, discharge water through a Venturi meter into a pressure tank. The flow from the pressure tank may be discharged either through a Pelton impulse water wheel, designed to develop 16 horse-power and equipped with a prony brake for testing, or through a horizontal, single-discharge Pelton Francis turbine of the spiral encased type arranged to carry a prony brake. The turbines discharge into one of two weir-tanks of approximately 750 cubic feet capacity, from which the flow passes to a distributing hopper that discharges into either of two large-capacity weighing tanks and thence returns to the storage tanks.

The minor equipment consists of a storage tank of 850 cubic feet capacity, measuring tanks, pipe set-ups for determining losses, orifices, wiers, displacement and Venturi meters, manometers, hydraulic ram, several single-and triple-stage centrifugal pumps, several displacement pumps, 12-inch Doble laboratory water motor, and a vertical-shaft water wheel.

In addition, use is made of the Mechanical and Electrical Engineering laboratories and the Materials Testing laboratory.

COURSES

CE 101, 102, 103. **Freshman Engineering.** A series of lectures by members of the College Faculty, notable engineers, and others. Designed to acquaint the student with the field of engineering, and to further his general development.

Required in Civil and Highway Engineering; first, second, and third terms; $\frac{1}{3}$ credit each term; 1 lecture. *S. H. Sims*

CE 111. **Engineering Drawing.** Theoretical instruction and drafting-room practice in the use and care of drawing instruments; principles of orthographic projection; use of standard conventional symbols; practice in free-hand lettering.

Required in Civil and Highway Engineering; freshman year; first term; 3 credits; 1 lecture; 8 hours laboratory instruction. Fee \$1.25. Text: French, Engineering Drawing. *D. R. Smith*

CE 112. Engineering Drawing. A continuation and extension of CE 111, including a series of graded practice plates in orthographic and isometric projection, topographic drawing, sketching, etc.

Prerequisite: CE 111. Required in Civil and Highway Engineering; freshman year; second or third term; 3 credits; 1 lecture; 8 hours laboratory instruction. Fee \$1.25. Text: French, Engineering Drawing.

D. R. Smith

CE 113. Drawing and Descriptive Geometry. Theoretical instruction and drafting-room practice in projection of lines, points, surfaces, and solids.

Prerequisite: CE 112. Required in Civil and Highway Engineering; freshman year; first, second, or third term; 3 credits; 1 lecture; 8 hours laboratory instruction. Fee \$1.25. Text: Higbee. Essentials of Descriptive Geometry.

D. R. Smith

CE 121. Plane Surveying. Theory, use, and adjustment of level and transit. Measurement and subdivision of land.

Required in Civil and Highway Engineering and Landscape Gardening (freshman year) and in Mining Engineering (sophomore year); first or third term; 5 credits; 2 recitations; 9 hours field work. Fee \$1.00. Text: Breed and Hosmer, Elementary Surveying.

G. Holcomb, J. E. Fitzgerald, Jr.

CE 122. Plane Surveying. A continuation of CE 121. A study of surveying problems as related to subdivision of public land, farm, and city surveying; special problems and methods; further practice in use of instruments; note-keeping.

Prerequisite: CE 121. Required in Civil and Highway Engineering (freshman year) and in Landscape Gardening (sophomore year); second term; 4 credits; 2 recitations; 6 hours field work. Fee \$1.00. Text: Breed and Hosmer, Elementary Surveying.

G. Holcomb, J. E. Fitzgerald, Jr.

CE 123. Plane Surveying. Use of stadia and of plane table; topographical mapping and drawing; determination of meridian by stellar and by solar observation.

Prerequisite: CE 122. Required in Civil and Highway Engineering (freshman year) and Landscape Gardening (sophomore year); third term; 5 credits; 2 recitations; 9 hours field work. Fee \$1.25. Text: Breed and Hosmer, Higher Surveying.

G. Holcomb, J. E. Fitzgerald, Jr.

CE 124. Plane Surveying. Theory, use, and adjustments of tape, compass, and level.

Required in Electrical Engineering; sophomore year; second term; 2 credits; 1 recitation; 3 hours field work. Fee \$1.00. Text: Breed and Hosmer, *Elementary Surveying*.

S. M. Dolan, J. E. Fitzgerald, Jr.

CE 125. Plane Surveying. Theory, use, and adjustments of tape, compass, and level.

Required in Forestry and Logging Engineering; freshman year; second term; 3 credits; 1 recitation; 6 hours field work. Fee \$1.00. Text: Breed and Hosmer, *Elementary Surveying*.

S. M. Dolan, J. E. Fitzgerald, Jr.

CE 126. Plane Surveying. A continuation of CE 124. Theory, use, and adjustment of transit. Measurement and subdivision of land.

Prerequisite: CE 125. Required in Forestry and Logging Engineering; freshman year; third term; 5 credits; 2 recitations; 9 hours field work. Fee \$1.00. Text: Breed and Hosmer, *Elementary Surveying*, Vol. I.

S. M. Dolan, J. E. Fitzgerald, Jr.

CE 226. Plane Surveying. Theory, use, and adjustment of engineer's level and transit.

Required in Mechanical Engineering; sophomore year; first term; 3 credits; 1 recitation; 6 hours field work. Fee \$1.00. Text: Breed and Hosmer, *Elementary Surveying*.

S. M. Dolan

CE 227. Plane Surveying. A continuation of CE 124. Theory, use, and adjustment of transit.

Prerequisite: CE 124. Required in Electrical Engineering; sophomore year; third term; 2 credits; 1 recitation; 3 hours field work. Fee \$1.00. Text: Breed and Hosmer, *Elementary Surveying*.

S. M. Dolan

CE 229. Precise Surveying and Geodesy. Instruction in precise leveling, triangulation, base line measurement, stellar and solar observations.

Prerequisite: CE 123. Elective after freshman year; any term; 3 credits; 1 recitation; 6 hours field work. Fee \$1.00.

CE 231. Curves and Earthwork. Instruction and field work in simple curves and earthwork measurement and computation.

Prerequisite: CE 123. Required in Civil and Highway Engineering; sophomore year; second term; 2 credits; six hours laboratory and field work. Fee \$1.25. Text: Allen, *Railroad Curves and Earthwork*.

E. D. Roberts

CE 232. Curves and Earthwork (continued). Instruction and field work in compound, easement, and parabolic curves as related

to railroads, highways, and canals. Complete survey of a transportation line, reconnaissance, preliminary, and location surveys; estimates of quantities.

Prerequisite: CE 231. Required in Civil and Highway Engineering; sophomore year; third term; 5 credits; 2 recitations; 9 hours field work. Fee \$1.25. Text: Allen, Railroad Curves and Earthwork. *E. D. Roberts*

CE 341. **Hydrology.** A study of precipitation and run-off; field studies in standard methods of measurement.

Required in Civil and Highway Engineering; junior year; first term; 3 credits; 2 recitations; 3 hours field and laboratory work. Fee \$1.00. *H. S. Rogers, L. E. Brigham*

CE 342. **Hydraulics.** A study of the principles underlying pressure and flow of water; laboratory measurements of pressure and flow.

Prerequisite: CE 341. Required in Civil and Highway Engineering; junior year; second term; 3 credits; 1 recitation; 6 hours laboratory work. Fee \$3.00. *H. S. Rogers, L. E. Brigham*

CE 343. **Hydraulics.** A continuation of CE 342; a study of the impulse and reactions of jets and energy of water.

Prerequisite: CE 343. Required in Civil and Highway Engineering; junior year; third term; 3 credits; 1 recitation; 6 hours laboratory work. Fee \$1.00. *H. S. Rogers, L. E. Brigham*

CE 344. **Hydraulics.** A study of the principles underlying and laboratory measurements of the pressure, flow, and energy of water.

Required in Electrical Engineering (junior year) and in Industrial Arts (senior year); second term; 3 credits; 2 recitations; 3 hours laboratory work. Fee \$3.00.

CE 345. **Hydraulics.** A course similar to CE 344 for students in Mechanical Engineering.

Required in Mechanical Engineering; junior year; first term; 3 credits; 2 recitations; 3 hours laboratory work. Fee \$3.00.

CE 346. **Hydraulic Power Plants.** A study of the application of the principles of hydraulics to power production in hydroelectric plants; stream flow, dams, head works, pipe lines, wheels, and speed regulation.

Prerequisite: CE 344. Required in Electrical Engineering; junior year; third term; 3 credits; 2 recitations; 3 hours laboratory work. Fee \$3.00.

CE 347. **Hydraulic Machinery.** A study of the application of the principles of hydraulics to the design of pumps and turbines and the layout of pumping and power plants.

Prerequisite: CE 345 or 346. Required in Mechanical Engineering; junior year; second term; 3 credits; 2 recitations; 3 hours laboratory work. Fee \$3.00.

CE 348. **Hydraulics.** A study of the principles underlying pressure and flow of fluids and methods of measurement; laboratory measurements of pressure and flow.

Required in Chemical Engineering; junior year; second term; 1 recitation; 6 hours laboratory work. Fee \$3.00.

CE 372. **Masonry and Foundations.** Study and design of masonry foundations, walls, piers, dams, and arches.

Required in Civil and Highway Engineering; junior year; second term; 3 credits; 2 recitations; 3 hours laboratory work. Fee \$1.50.

CE 381. **Structural Analysis.** Graphical and algebraic analysis of simple roof and bridge structures.

Prerequisite: MM 351. Required in Civil and Highway Engineering; junior year; third term; 5 credits; 3 recitations; 6 hours laboratory work. Fee \$1.50. Text: Johnson, Bryan, Turneure, *Modern Framed Structures, Vol. I.* S. H. Sims, B. Glenn

CE 387. **Structural Analysis.** Analysis of roof trusses.

Prerequisite: MM 351. Required in Mechanical Engineering; junior year; third term; 2 credits; 1 recitation; 3 hours laboratory work. Fee \$1.00. Text: Johnson, Bryan, Turneure, *Modern Framed Structures, Vol. I.* S. H. Sims, B. Glenn

CE 433. **Railroad Engineering.** A study of methods in railway construction, maintenance, and valuation, of standard structures, trestles, tunnels, culverts, minor bridges, ballast, rails and rail fastenings, yards, terminals, etc.

Prerequisite: CE 232. Required in Civil and Highway Engineering; senior year; first term; 3 credits; 2 recitations; 3 hours laboratory work. Fee \$1.00. Text: Raymond, *Elements of Railroad Engineering.* E. D. Roberts

CE 441. **Hydraulic Machinery.** Operation, characteristics, efficiency, theory, design, and installation of pumps and turbines; laboratory studies.

Prerequisite: CE 343. Required in Civil Engineering; senior year; first term; 4 credits; 2 recitations; 6 hours laboratory work. Fee \$3.00. H. S. Rogers, L. E. Brigham, C. A. Mockmore

CE 442. **Hydraulic Structures.** Selection and design of structures for the storage, conveyance, distribution, control, and measurement of water.

Prerequisites: CE 343, 483. Elective in Civil Engineering; senior year; third term; 4 credits; 2 recitations; 6 hours laboratory work. Fee \$1.00.

CE 443. Water Power Engineering. Development of water-power; storage and load factor; characteristics of modern turbines; selection of turbines; practical problems in design.

Prerequisite: CE 343. Elective for seniors or graduates; senior year; second term; 3 credits; 1 recitation; 6 hours laboratory work. Fee \$1.00.

CE 444. Hydraulics. Practical application of the principles of hydraulics to irrigation farming, especially for agricultural students; pressure in tanks, pipes, and flumes; measurement of water by weirs, orifices, and current meters; losses of head in pipes; design of open channels; seepage losses; operation of pumps and other lifting devices.

Elective in Agriculture; senior year; first term; 3 credits; 3 lectures. Fee \$3.00.

CE 445. Hydraulic Laboratory. A laboratory study of the pressure, flow, measurement, and pumping of water.

Elective in Soils; senior year; second term; 2 credits; 6 hours laboratory work. Fee \$3.00.

CE 451. Water Supply and Sewerage. A study of the quality of water and of works for its collection, purification, and distribution; a study of the amount of sewage and works for its removal and disposal; design problems.

Elective in Civil Engineering; senior year; any term; 5 credits. Fee \$1.00.

CE 461. Reclamation Engineering. Preliminary investigations and design of drainage and irrigation systems.

Prerequisite: CE 343. Required in Civil Engineering; senior year; third term; 4 credits; 2 recitations; 6 hours laboratory work. Fee \$1.00.

CE 462. Irrigation Operation. Operation and maintenance of irrigation systems; protection of canals; maintenance of structures; delivery of water; organization; financial phases of operation.

Prerequisite: CE 444 or 445. Elective in Civil Engineering and to Agriculture students majoring in Soils; senior year; third term; 3 credits; 3 recitations.

CE 471. Reinforced Concrete. Study and design of slabs, beams, and columns of reinforced concrete.

Prerequisite: MM 353. Required in Civil Engineering; senior year; second term; 5 credits. Fee \$1.00.

CE 472. Concrete Building Design. Study of various types and design of typical structural elements.

Prerequisite: CE 471. Elective in Civil Engineering; senior year; third term; 3 credits; 9 hours laboratory work. Fee \$1.50.

CE 473. Reinforced Concrete and Foundation Design. Fundamental principles of reinforced concrete applied to design of power stations and machinery beds.

Prerequisite: MM 353. Required in Mechanical Engineering; senior year; third term; 3 credits; 1 recitation; 6 hours laboratory work. Fee \$1.00. Text: Hool, Reinforced Concrete Construction. Vol. I.

CE 482. Structural Engineering. Continuation of CE 381. Study of stresses in simple bridge trusses; influence lines; fundamental principles of design of structural members and connections.

Prerequisite: CE 381. Required in Civil and Highway Engineering; senior year; first term; 4 credits; 2 recitations; 6 hours laboratory work. Fee \$1.50. Text: Johnson, Bryan, Turneure, Modern Framed Structures, Vols. I, II. *S. H. Sims, B. Glenn*

CE 483. Structural Design. Design and estimate of plate girder, steel roof, and bridge trusses.

Prerequisite: CE 482. Required in Civil and Highway Engineering; senior year; first term; 4 credits; 2 recitations; 6 hours laboratory work. Fee \$1.50. Text: Johnson, Bryan, Turneure, Modern Framed Structures, Vols. I-III. *S. H. Sims, B. Glenn*

CE 484. Structural Design. Continuation of CE 483. Design of voussoir and elastic arches.

Prerequisite: CE 383. Required in Civil and Highway Engineering; senior year; third term; 5 credits; 2 recitations; 9 hours laboratory work. Fee \$1.50. Text: Johnson, Bryan, Turneure, Modern Framed Structures. Vols. I-III. *S. H. Sims, B. Glenn*

CE 485. Advanced Structural Analysis. A study of statically indeterminate structures.

Prerequisite: CE 381. Elective; senior year; second term; 3 credits; 1 recitation; 6 hours laboratory work. Fee \$1.50. Text: Johnson, Bryan, Turneure, Modern Framed Structures, Vol. II.

CE 486. Elastic Deformations and Secondary Stresses. A continuation of CE 485.

Prerequisite: CE 485. Elective; senior year; third term; 3 credits; 1 recitation; 6 hours laboratory work. Fee \$1.50. Text: Johnson, Bryan, Turneure, Modern Framed Structures, Vol. II.

CE 488. Wood and Steel Structures. Design of mill buildings.

Prerequisite: CE 387. Required in Mechanical Engineering; senior year; first term; 3 credits; 1 recitation; 6 hours laboratory

work. Fee \$1.50. Text: Howe, Design of Simple Trusses in Wood and Steel.

CE 489. **Trusses and Towers.** Design of steel roof trusses and transmission towers.

Optional in Electrical Engineering; senior year; first term; three credits; 1 recitation; 6 hours laboratory work. Fee \$1.00.

CE 491, 492, 493. **Seminar.** The members of the senior classes in Civil and Highway Engineering and the departmental faculty constitute the seminar. The purposes of the seminar are to examine current engineering literature and practice and to provide additional practice in the use of oral and written English.

Required in Civil and Highway Engineering; senior year; three terms; 1 credit each term; 1 lecture. Fee \$2.00. *S. H. Sims*

ELECTRICAL ENGINEERING

This curriculum is designed especially to train the young engineer in the theory of his profession, such practical work as is given in shop and laboratory being subordinated to this end. Practical acquaintance with actual conditions can be acquired only in the field during vacation and after graduation. For this reason, and in order to supplement his college education, the student is urged to spend at least a part of his vacation in some line of electrical industry.

Equipment. The four laboratories of this department occupy the first floor of Apperson Hall. The freshman laboratory is equipped with the simpler pieces of apparatus for illustrating the fundamentals of electricity. The sophomore laboratory has facilities for accurate measurements and tests of a more refined character, galvanometers, standard cells, standard instruments, inductances, capacities, storage batteries, etc. The general power laboratory has alternating and direct current generators and motors of all usual types, supplemented by special machines and their auxiliaries. These machines are mounted on five concrete platforms each five feet by twenty-four feet. The main source of power is a 100-horse-power three-unit synchronous motor-generator set from which 110 to 220 volt power is available for D. C. and A. C. experiments. This power is supplemented by three-phase service from a transmission line. The fourth laboratory with one 100 KVA, 350,000 volt transformer, one 10 KVA, 110,000 volt transformer, oscillograph, sphere gaps, etc., is well equipped for high tension experiments.

COURSES

EE 101, 102, 103. **Elements of Electricity.** An elementary course in the construction and operation of the simpler types of electrical equipment.

Required; freshman year; three terms; 3 credits each term; 2 lectures; 1 three-hour laboratory period. Fee \$2.50 a term. Text: Timbie, *Essentials of Electricity*. *Essentials of Alternating Currents.*
R. H. Dearborn, B. B. Bessesen.

EE 201, 202, 203. **Introduction to Electrical Engineering.** An introduction to the study of electrical engineering problems, including measuring instruments, connections, and circuits.

Required; sophomore year; three terms; 3 credits each term; 2 lectures; 1 three-hour laboratory period. Fee \$3.50 a term. Text: Fish, *Electric and Magnetic Circuits.*
J. H. Belknap

EE 251. **Direct Currents.** A preliminary electrical course for non-electrical engineering students, covering the fundamentals of direct current circuits and direct current machines.

Prerequisites: Ph 111, 112, 113. Required in Mechanical Engineering (junior year, first term); elective to others; first or second term; 3 credits; 2 lectures; 1 two-hour laboratory period. Fee \$2.50. Text: Gray, *Principles and Practice of Electrical Engineering.*
B. H. Nichols

EE 252. **Alternating Currents.** A continuation of EE 251, covering alternating current circuits and alternating current machines.

Required in Mechanical Engineering (junior year, second term); elective to others (second or third term); 3 credits; 2 lectures; 1 two-hour laboratory period. Fee \$2.50. Text: Gray, *Principles and Practice of Electrical Engineering.*
B. H. Nichols

EE 253. **Electrical Applications.** A continuation of EE 252, covering the application of electricity to special classes of service, the selection of motors for different service conditions, and the operation and control of electrical machines.

Elective; third term; 3 credits; 2 lectures; 1 two-hour laboratory period. Fee \$2.50. Text: Gray, *Principles and Practice of Electrical Engineering.*
B. H. Nichols

EE 255. **Electricity for Civil Engineers.** A consolidation and abbreviation of EE 251, EE 252.

Required in Civil Engineering; senior year; third term; 5 credits; 4 lectures; 1 two-hour laboratory period. Fee \$2.50. Text: Gray, *Principles and Practice of Electrical Engineering.*
B. H. Nichols

EE 301, 302, 303. **Electrical Engineering.** A study of electrostatics, electromagnetism, and direct alternating current machinery.

Required; junior year; three terms; 3 credits each term; 3 recitations. Text: Christies, Electrical Engineering. *L. F. Wooster*

EE 321, 322, 323. **Electrical Laboratory.** The testing and determination of direct current machinery characteristics; parallel operation and loading back tests; wave form study; alternating current measurements; and an introduction to alternating current machinery.

Required; junior year; three terms; 3 credits each term; 1 four-hour laboratory period. Fee \$3.50 each term. *O. E. Osburn*

EE 401, 402, 403. **Electrical Engineering.** An analysis of electric-power generation, transmission, and distribution with special reference to the technical, economic, and financial problems involved.

Required; senior year; three terms; 3 credits each term; 3 lectures. *R. H. Dearborn*

EE 411, 412, 413. **Electrical Design.** Design and computations supplementary to courses EE 401, 402, 403.

Required; senior year; three terms; 1 credit each term; 1 three-hour period. *R. H. Dearborn*

EE 421, 422. **Electrical Laboratory.** Alternating current machinery testing in accordance with the standards of the American Institute of Electrical Engineers; study of phenomena with the oscillograph; alternating current wave analysis from oscillograms taken in the laboratory.

Required; senior year; first and second terms; 3 credits each term; 1 four-hour laboratory period. Fee \$3.50 each term.

F. O. McMillan

EE 431. **Electric Lighting.** Study of electric lamps and their application to exterior and interior illumination.

Elective; senior year; first term; 2 credits; 2 recitations.

L. F. Wooster

EE 432. **Electric Railways.** Study of the application of electricity to street and interurban railways; traffic conditions; rolling stock; speed time curves.

Elective; senior year; second term; 2 credits; 2 recitations.

L. F. Wooster

EE 433. **Electric Signaling.** Study of telegraph, telephone, and wireless equipment and their application to the transmission of intelligence.

Elective; senior year; third term; 2 credits; 2 recitations.

L. F. Wooster

EE 443. **Railway Electrification.** A study of conditions governing the electrification of trunk lines.

Elective; senior year; third term; 3 credits; 3 lectures.

L. F. Wooster

EE 452. **Industrial Lighting.** Problems in the application of modern ideas of illumination to industrial conditions.

Elective; senior year; second term; 2 credits; 1 lecture; 1 recitation.

L. F. Wooster

EE 453. **High Voltage Engineering.** The study and experimental investigation of high voltage and high frequency phenomena; special attention to insulation and corona problems as applied to transmission.

Elective; senior year; third term; 3 credits; 2 recitations; 1 four-hour laboratory period. Fee \$3.00. Text: Peck, Dielectric Phenomena in High Voltage Engineering.

F. O. McMillan

EE 481, 482, 483. **Seminar.** Presentation of abstracts and discussion of articles in the current electrical periodicals.

Elective; senior year; three terms; 1 credit each term; 1 recitation.

R. H. Dearborn

EE 493. **Thesis.** A course, elective by permission, for those whose records indicate ability to complete a satisfactory thesis.

Elective; senior year; third term; 3 credits.

R. H. Dearborn

HIGHWAY ENGINEERING

There are few lines of public endeavor where more money is being spent, or where a higher degree of technical skill and training is required, than in the field of highway engineering. The purpose of these courses is to meet the demand in this state and throughout the Northwest for men equipped to take charge of road and street construction and maintenance work. In addition to the opportunity for useful and honorable service, no field, it is believed, offers greater encouragement in a financial way to the young man of ambition and ability.

Thorough theoretical instruction is accompanied by as much laboratory and field practice as possible. The curriculum includes such basic studies as Mathematics, Chemistry, Physics, Drawing, Materials of Engineering, Applied Mechanics, and Hydraulics, in addition to the technical work given by this department.

In the study of highways, special reference is made to the conditions and needs of Oregon. Besides study of the higher types of roads, due consideration is given to the construction and maintenance of the earth, gravel, and broken-stone roads. In consequence

of the vast area of the state, this class of roads must, of necessity, constitute the greater part of its highways for many years.

Equipment. The equipment of the department is modern and adequate. The department of Mechanics and Materials is equipped with modern testing laboratories, including the best cement- and highway-testing machinery, thus affording students in Highway Engineering the opportunity of studying by direct observation and experiment the strength and properties of the various engineering materials.

COURSES

HE 313. Roads and Pavements. A study of the fundamental principles of location, construction, and maintenance of roads; materials used in road and street building; asphalt, brick, wood block, stone, concrete, and other types of pavements. This course is given in connection with a laboratory course, MM 312.

Required in Civil, Highway, and Irrigation Engineering, and in Landscape Gardening; junior year; first term; 5 credits; 5 recitations.

G. V. Skelton

HE 411. Highway Engineering. Economic grades and proper location for different soils and surfacing materials; surface and sub-surface drainage; culvert design and construction; construction and maintenance of earth, sand-clay, gravel, macadam, concrete, brick, and other types of roads; dust preventives and road binders; reconnaissance, surveys, estimates, plans, and specifications; organization of construction and engineering forces; cost data; methods of handling work.

Prerequisite: HE 313. Senior year; first term; 4 credits; 2 recitations; 2 three-hour laboratory periods.

G. V. Skelton

HE 412. Highway Engineering. Continuation of HE 411.

Required in senior year; second term; 3 credits; 2 recitations; 1 three-hour laboratory period.

G. V. Skelton

HE 413. Highway Engineering. Continuation of HE 411 and 412.

Required in senior year; third term; 4 credits; 2 recitations; 2 three-hour laboratory periods.

G. V. Skelton

HE 416. Economics of Highway Construction. Economic and social advantages of improved roads; the traffic census; local and centralized systems of control; highway laws of different states; organization of construction and engineering forces; cost data; estimates; methods of handling work; forms of contract—lump sum, unit price, percentage, and cost plus fixed sum.

Required in senior year; first term; 3 credits; 3 three-hour laboratory periods. *G. V. Skelton*

HE 417. Highway Transportation. A study of the various methods of highway transportation with especial reference to cost; the traffic census and its application; highway laws of different states; methods of financing highway construction; relation of character of traffic to type of construction, etc.

Elective; senior or graduate year; first term; 3 credits; 3 recitations. *G. V. Skelton*

HE 427. Contracts and Specifications. A study of the general principles and laws of contracts as applied to engineering, including preparation and study of specifications and contracts based upon engineering structures designed by the individual student.

Required in Highway and Mechanical Engineering; senior year; second or third term; 3 credits; 3 recitations. *G. V. Skelton*

HE 438. Municipal Engineering and City Planning. The modern city streets, boulevards, and transportation systems; drainage and sanitation; water supply; lighting. A course of lectures and assigned readings.

Required in senior year; third term; 3 credits; 3 recitations.

G. V. Skelton

INDUSTRIAL ARTS

There is a steadily increasing demand for competent, trained teachers of the Industrial Arts subjects, at beginning salaries ranging from \$1,800 to \$2,400, to teach in elementary, secondary, and vocational schools of Oregon and other states. The manual instruction for boys and girls below the seventh grade is generally given by the regular grade teachers, but the supervisor or special teacher of manual training should be able to organize this work and correlate it with other school subjects and with the later formal courses in manual arts. For boys, this work will take the form of instruction in woodworking, blacksmithing, auto repairing, cement work, and vocational work in the various trades. Where the work is highly specialized along some trade line it is partly financed by the Federal Government.

A degree curriculum of the same general standard as the other baccalaureate curricula is provided in order that the young man who specializes in this field may receive preparation that will place him upon a par with high-school teachers of other branches. The Industrial Arts department is a part of the School of Engineering and has under its supervision all the shop courses offered in the other departments of the College.

Equipment. This department provides the necessary equipment for carrying on the different lines of shop work.

The Wood Shop, supplied with the best machines and tools the market affords, contains twenty-four double benches of modern design, accommodating forty-eight students. Each bench is provided with patent rapid-action vises for holding the work, and is furnished with two sets of hand tools, consisting of rip-saws, cut-off saws and backsaws, planes, chisels, marketing gauges, try-squares, hammers, dividers, and oilstones. The machine equipment of this shop consists of fifteen wood-turning lathes, each furnished with a set of tools; one iron saw-table with rip and cut-off saws, one hand-saw, one jig-saw, 24-inch surface planer, 16-inch glue joiner, one hollow chisel mortiser, one belt sander, one veneering press, one disc sander built by the students, two grindstones, and an exhaust system to carry off sawdust. There are also two glue tables with clamps of various sizes, two electric glue heaters. The power is furnished by three three-phase induction motors of 15, 7½, and 5 horse-power.

The Forge Shop contains forty-two down-draft forges of the most approved pattern. Blast is furnished by a steel pressure blower driven by a 10-horse-power induction motor, and the smoke and gases are removed by an 80-inch exhaust fan, driven by a 20-horse-power motor. Each forge is provided with an anvil, hammers, hardies, tongs, and other small tools. An emery grinder, built by students, has been added to the equipment. There are also swedge blocks and vises at convenient points in the room for general use. A power hammer and a furnace for the heat treatment of metals have recently been added.

The Machine Shop contains one 24x24-inch iron planer, one 15-inch shaper, one 12-inch shaper, one universal milling machine, one universal tool grinder, one wet tool grinder, one radial drill, one 20-inch drill press, one sensitive drill press, one 20-inch engine lathe, one 16-inch engine lathe, one 16-inch universal turret lathe, one 14-inch modern geared lathe, five 14-inch engine lathes, two 10-inch speed lathes, one shop saw, one automatic knife grinder, and twelve bench vises. The following new machines have recently been added: one universal milling machine; one 16-inch by 10-foot quick-change gear lathe; one 14-inch by 8-foot quick-change lathe; one 11-inch by 5-foot engine lathe; one 14-inch by 10-foot quick-change gear lathe; one 14-inch by 8-foot high duty quick-change gear lathe; one universal cutter and tool grinder; one 1-ton, low bed crane; and one electric drill. A 20-horse-power induction motor furnishes the power. A tool-room adjacent contains the small tools. These tools are given out to the students on the check plan.

The Foundry contains a 22-inch Colliáu cupola having a capacity of two tons per hour, one 1,200-pound crane ladle, one 800-pound crane ladle, bull ladles, and hand ladles, one 16-inch brass furnace, brass molder's tub, crucibles, one large core-oven, one portable core-oven, one two-ton jib crane, one wall crane for charging floor, one air compressor, one Delano pulley molding machine No. 2, besides shovels, rammers, and small tools to accommodate twenty students at one time. An emery grinder, built by the students, has been added.

The Auto Mechanics Shop, well lighted and conveniently located, is equipped with all the standard tools usually found in a modern commercial garage. Among the tools are speed wrenches, special wrenches, standard reamers, taps and dies, valve-seating tools, electric drill, jacks, and pliers. The general equipment includes two portable cranes, a twin jack, motor generator set, vulcanizing outfit, 5-horse-power motor, line shafting, emery grinder, drill press, one 15-inch by 8-foot engine lathe, one Marvel cylinder boring machine, one engine stand, and battery repairing tools. A Ford car and a Maxwell truck, used in towing cars and for general utility purposes, together with various parts of cars for instructional purposes, are also elements of the automobile mechanics equipment.

COURSES

IA 111. Manual Training. Designed to meet the needs of those students who desire to teach manual training in the sixth, seventh, eighth, and ninth grades of the public schools. A course in wood construction and design; theory and practice in the proper use of tools; growth and structure of woods; shrinkage, warpage, and seasoning of timber; staining and finishing; study of shop methods, equipment, and courses of study.

Required in Industrial Arts; freshman year; any term; 3 credits; 1 lecture; 2 three-hour laboratory periods. Fee \$4.00. Deposit \$1.00.

H. C. Brandon

IA 112. Manual Training. Continuation of IA 111. Problems requiring more technical skill and more knowledge of design and tool processes are taken up.

Required in Industrial Arts; freshman year; second or third term; 3 credits; 1 lecture; 2 three-hour laboratory periods. Fee \$4.00. Deposit \$1.00.

H. C. Brandon

IA 113. Manual Training. Intended to familiarize those students who wish to teach manual training in the high school with commercial methods in wood-working such as are used in the average jobbing shop and with such machinery as is found in the better

equipped high school. Well-designed pieces of furniture are made and finished.

Prerequisites: IA 111, 112. Required in Industrial Arts; freshman year; third term; 3 credits; 1 lecture; 2 three-hour laboratory periods. Fee \$4.00. Deposit \$1.00. *H. C. Brandon*

IA 114. **Cabinet Work.** Designing and construction of furniture according to the ability of the individual student; mixing of stains, fillers, and various finishes, with their application; study of the design and construction of drawers and panel work; primary upholstery.

Elective; any term; 2 credits; 2 laboratory periods. Fee \$4.00. Deposit \$1.00. *D. G. Thayer*

IA 132. **Patternmaking.** Offered to students having two-credit courses in patternmaking or equivalent. Construction of the more complicated patterns and core boxes necessary for the building of steam and gas engines or other machine parts.

Elective; first or second term; 2 credits; 2 three-hour laboratory periods. Fee \$4.00. Deposit \$1.00. *D. G. Thayer*

IA 141. **Foundry Practice.** Includes a study of foundry equipment; care and management of cupolas; mixing and melting of iron; molding in green and dry sand; preparation of cores; casting in iron and brass.

Required in Mechanical Engineering; freshman year; any term; 2 credits; 2 three-hour laboratory periods. Fee \$4.00.

A. E. Ridenour

IA 142. **Advanced Foundry Practice.** Elective; freshman year; any term; 2 credits; 2 three-hour laboratory periods. Fee \$4.00.

A. E. Ridenour

IA 152. **Blacksmithing.** The student is taught to make and manage a forge fire; to shape iron by bending, upsetting, drawing, and welding. Many useful articles are made, including hooks, staples, rings, clevises, and chains.

Required in Mechanical Engineering (freshman year, third term) and in Electrical Engineering (freshman year, second term); 2 credits; 2 three-hour laboratory periods. Fee \$4.00.

W. H. Horning

IA 181. **Automobile Mechanics.** Intended for owners and drivers of cars, emphasizing adjustment, maintenance, and ordinary running repairs of the various parts and units of the automobile; lubrication; cleaning; care of batteries and electrical systems; various types of construction as employed in machines of different manu-

factures; actual inspection of different types of cars afforded by cars that are being overhauled in the shop.

Elective; any year; any term; 2 credits; 2 three-hour laboratory periods. Fee \$4.00. *M. L. Granning*

IA 182. **Automobile Mechanics, Elementary.** The object of this course is to afford the student a systematic introduction to automobile mechanics by means of a detailed survey of the vital parts and their function. It includes practical work involving the assembling and disassembling of parts, testing for, and locating troubles, making replacements and repairs. There are lectures, demonstrations, and class discussions. A modern text is used.

Required in Industrial Arts; senior year; second term; 3 credits; 1 lecture; 2 three-hour shop periods. Fee \$4.00.

M. L. Granning

IA 191, 192, 193. **Shop Drawing.** For those students who plan to teach manual training. The elements of drawing; use of drawing instruments; lettering; general construction; methods of representation; free-hand sketching; considerable attention to drawings of pieces of furniture and constructions in wood that may be worked out in the shop. In the third term the problem of furniture design receives considerable attention.

Required in Industrial Arts; freshman year; three terms; 2 credits each term; 2 three-hour laboratory periods. Fee \$0.50 each term.

H. C. Brandon

IA 212. **Patternmaking.** The student is given a broad view of modern pattern-shop practice, emphasis being placed upon the relation of patternmaking to drafting, design, foundry work, and machine-shop operations. Lectures, demonstrations, and practical work on patterns, involving typical methods of construction.

Required in Mechanical and Electrical Engineering; freshman year; any term; 2 credits; 2 three-hour laboratory periods. Fee \$4.00. Deposit \$1.00.

D. G. Thayer

IA 213. **Patternmaking.** Course more thorough than IA 212, in which emphasis is placed upon the methods of teaching patternmaking.

Required in Industrial Arts; sophomore year; first term; 3 credits; 1 lecture; 2 three-hour laboratory periods. Fee \$4.00. Deposit \$1.00.

D. G. Thayer

IA 222. **Carpentry.** Involves discussion of foundations and forms, practices in framing, applications of the steel square, exterior and interior finish, estimates of quantities of materials and costs.

Required in Industrial Arts; sophomore year; second term; 3 credits; 3 three-hour shop periods. Fee \$6.00. Deposit \$1.00.

IA 223. **Mill Work—Machine Wood Working.** Emphasis is laid upon the care and adjustment of wood working machinery of the average instructional shop; upon the setting up of the machines; upon the laying out and construction of gigs to secure uniformity and accuracy of results, combined with rapidity of production. Practical application of these appliances is obtained by routing a number of duplicate pieces through the shop.

Required in Industrial Arts; sophomore year; second term; 3 credits; 3 three-hour shop periods. Fee \$6.00. Deposit \$1.00.

D. G. Thayer

IA 242. **Foundry Practice.** More comprehensive than IA 141.

Required in Industrial Arts; junior year; third term; 3 credits; 1 lecture; 2 three-hour laboratory periods. Fee \$4.00.

A. E. Ridenour

IA 252. **Advanced Blacksmithing.** Continuation of IA 152 or equivalent for those who wish to take another term of blacksmithing.

Elective; sophomore year; any term; 2 credits; 2 three-hour laboratory periods. Fee \$4.00.

W. H. Horning

IA 253. **Forging and Tool Dressing.** After a minimum amount of preliminary work in forging iron the remainder of the term is devoted to making, tempering, and dressing chisels, drills, and other tools.

Elective in Mining Engineering and Chemical Engineering; sophomore year; third term; 2 credits; 2 three-hour laboratory periods. Fee \$4.00.

W. H. Horning

IA 254. **Tool Making and Tempering.** Devoted to the study of the heat treatment of steel as exemplified in the making and tempering of springs, machine tools, and other articles of steel.

Prerequisite: IA 152 or equivalent. Required in Mechanical Engineering and Industrial Arts; sophomore year; first or third term; 1 credit; 1 three-hour laboratory period. Fee \$2.00.

W. H. Horning

IA 262. **Machine Shop.** Both bench and machine work involving principles of chipping, filing, and hand finishing; exercises on lathe, shaper, planer, drill press, and milling machine; lectures on the proper uses of machine tools; cutting speeds; and labor- and time-saving methods.

Required in Mechanical Engineering (sophomore year, second term) and in Electrical Engineering (freshman year, third term); 2 credits; 2 three-hour laboratory periods. Fee \$4.00. Deposit \$1.00.

G. H. Hill

IA 263. **Machine Shop.** Continuation of IA 262. Considerable time is given to labor-saving devices in rapid production work.

Required in Mechanical Engineering (sophomore year, third term) and in Electrical Engineering (sophomore year, first term); 2 credits; 2 three-hour laboratory periods. Fee \$4.00. Deposit \$1.00.

G. H. Hill

IA 333. **Wood Turning.** A series of exercises in wood turning intended to familiarize the student with the various uses of lathe tools; methods of centering and chucking; segment work; staining and polishing. Small pieces of furniture such as vases, bowls, rings, trays, tables, and stools are worked out.

Required in Industrial Arts; elective to others; junior year; second term; 2 credits; 2 three-hour laboratory periods. Fee \$4.00. Deposit \$1.00.

H. C. Brandon

IA 351. **Forging.** Deals with the equipment of the blacksmith shop; exercises in bending, shaping, upsetting, and welding iron; instruction in hardening and tempering steel; brazing; lectures on the management of a shop, instruction, and shop equipment.

Required in Industrial Arts; junior year; first term; 3 credits; 3 three-hour laboratory periods. Fee \$6.00.

IA 352. **Hammered Metal Work.** Consists of hand-wrought metal work, including hard and soft soldering; the formation of bowls, trays, boxes, lamp shades; and design and construction of furniture fittings.

Required in Industrial Arts; junior year; second term; 3 credits; 3 three-hour laboratory periods. Fee \$6.00.

H. C. Brandon

IA 363. **Machine Shop.** Includes both bench and machine work, taught by a series of exercises in chipping, filing, and finishing; machine work on lathe, shaper, planer, drill press, and milling machine.

Required in Logging Engineering; junior year; third term; 3 credits; 3 three-hour laboratory periods. Fee \$6.00. Deposit \$1.00.

G. H. Hill

IA 461. **Machine Shop.** Hand processes of chipping, filing, and polishing; practical work on the lathe, drill press, planer, and shaper, taught by carefully planned exercises; lectures on the proper use of tools; selection, care, and use of machine tools; methods of instruction.

Required in Industrial Arts; senior year; first term; 3 credits; 3 three-hour laboratory periods. Fee \$6.00. Deposit \$1.00.

G. H. Hill

IA 462. **Machine Shop.** Continuation of IA 461, in which the student becomes familiar with the milling machine, and general

machine shop practice. Considerable attention is given to factory methods, and to processes of rapid production.

Required in Industrial Arts; senior year; second term; 3 credits; 3 three-hour laboratory periods. Fee \$6.00. Deposit \$1.00.

G. H. Hill

MECHANICAL ENGINEERING

The curriculum in Mechanical Engineering has for its purpose the preparing of young men for positions of usefulness and responsibility in the industrial life of the country. Instruction is given by means of lectures, recitations, and laboratory exercises. The scientific principles involved in machines, mechanical movements, and machine design are investigated and studied by solving numerous problems in classroom and laboratory. The study of transformation of heat energy into power is taken up in early courses, where the student becomes familiar with the various types of engines by actual contact in the laboratory. At the same time the physical laws governing the principles of operation of engines and transformation of heat energy are explained in the lectures and illustrated by problems.

As the courses advance, the financial side of engineering is made the subject of special study and investigation and finally in the senior year the principles of efficiency and economy are embodied in the design of complete power plants.

Other technical subjects such as mechanics, surveying, hydraulics, and electrical machinery are included in the curriculum to give the student a general knowledge of engineering.

The basic courses of Mathematics, English, Chemistry, and Physics are required, as well as Economics, Political Science, and Business Organization, in order that students may be prepared for useful citizenship as well as for engineering.

Equipment. The equipment of this department consists of drawing tables, drawing boards, and laboratory equipment in steam and gas engineering. The gas and steam engine laboratory equipment is located in the new Engineering Laboratory building.

The gas-engine laboratory contains some twenty engines, including examples of practically every type in use. A number of these are gasoline and kerosene four- and two-cylinder engines, ranging in size from three to eighteen horse-power. Many of these engines are intended for practice in operation, repair work, and general maintenance; but all of the principal units are especially fitted for testing and experimentation.

The steam laboratory contains several steam boilers of different types, plain slide-valve, high-speed automatic and Corliss engines,

and steam turbines; also pumps, injectors, fans, hot blast heating system, and other auxiliary equipment. The laboratory courses teach the operation, care, and maintenance of power-plant equipment, as well as testing, power measurement, and economy.

The shop equipment used by engineering students is under the supervision of the department of Industrial Arts and includes machines and tools usually found in modern college shops.

COURSES

ME 101, 102. Engineering Survey. The purpose of these courses is to acquaint the student with the general field of activities in engineering. Attention is directed to methods of study and economical use of time in college work.

Required in Mechanical and Electrical Engineering; freshman year; second and third terms; $\frac{1}{2}$ credit each term; 1 lecture period.

G. A. Covell

ME 111. Linear Drawing and Lettering. Training in the use of drafting instruments to construct accurate pencil drawings and clean-cut ink lines; practice in making well-shaped engineering lettering and titles. Intended for students who have had no training in mechanical drawing. A student who, by submitting certified work in linear drawing and lettering, or by taking a special examination satisfies the instructor that he has had the equivalent of this course may be excused from this work. The instruments and materials for the course cost about \$20.00; the instruments are used in all later drawing courses.

Required in Electrical, Mechanical, and Mining Engineering and in Forestry; freshman year; first term; 2 credits; 3 two-hour laboratory periods. Text: French, *Engineering Drawing*.

M. Wenk, E. C. Willey

ME 112. Elementary Mechanical Drawing. Practice in making working drawings of machine parts; methods of dimensioning and checking; making tracings from these drawings; free-hand sketching; pictorial representation.

Prerequisite: ME 111 or equivalent. Required in Electrical, Mechanical, and Mining Engineering; freshman year; first or second term; 2 credits; 3 two-hour laboratory periods. Text: French, *Engineering Drawing*.

M. Wenk, E. C. Willey

ME 113. Descriptive Geometry. Theory and problems on the projection of points, lines, surfaces, and solids. Effort is made to make the work as practical as possible and to reveal its relation to mechanical drawing and drafting-room problems.

Required in Electrical Engineering; freshman year; third term; 3 credits; 2 three-hour laboratory periods; 1 lecture. Text: Ferris, Elements of Descriptive Geometry. *M. Wenk*

ME 114. **Mechanical Drawing.** A continuation of ME 112.

Required in Mechanical Engineering; freshman year; third term; 2 credits; 3 two-hour laboratory periods. Fee \$0.50. Text: French, Engineering Drawing. *M. Wenk, E. C. Willey*

ME 211. **Descriptive Geometry.** Theory and problems on the projection of points, lines, surfaces, and solids. An effort is made to make the work as practical as possible and to reveal to the student its relation to mechanical drawing and drafting-room problems.

Required in Mechanical Engineering; sophomore year; first term; 2 credits; 1 three-hour laboratory period; 1 recitation. Text: Ferris, Elements of Descriptive Geometry. *M. C. Phillips*

ME 212. **Machine Drawing.** A course following Descriptive Geometry and Elementary Mechanical Drawing, in which the principles of the foregoing are applied to the production of complete working shop drawings.

Required in Mechanical Engineering; sophomore year; second term; 2 credits; 2 three-hour laboratory periods. Fee \$0.50.

M. C. Phillips

ME 213. **Mechanism.** A study of mechanical movements, including velocity ratios, transmission of motion by link work, gearing, cams, and belting.

Required in Mechanical Engineering; sophomore year; third term; 3 credits; 1 recitation; 2 three-hour laboratory periods. Text: Keown, Elements of Mechanism. *M. C. Phillips*

ME 221. **Elements of Heat Engineering.** An introductory course in the fundamental principles of heat engineering, including study of fuels and combustion, properties of steam, steam boilers; practical laboratory work in general construction, operation, and maintenance of boiler-room equipment.

Required in Mechanical Engineering; sophomore year; first term; 3 credits; 2 recitations; 1 two-hour laboratory period. Fee \$3.00. Text: Shealy, Steam Boilers. *A. W. Bechlem*

ME 222. **Steam Engines.** A study of construction and operation of engines and function of engine parts; use of the indicator and prony brake; engine valve gears; practice in adjustment and operation of steam engines.

Required in Mechanical Engineering; sophomore year; second or third term; 3 credits; 2 recitations; 1 two-hour laboratory period. Fee \$3.00. Text: Shealy, Steam Engines. *A. W. Bechlem*

ME 223. Gas Engines. Gas engine fuels; their combustion; construction of the various types of engines; carburetors and ignition systems; practice in the operation of gas engines; their adjustment; diagnosis and correction of engine troubles.

Required in Mechanical Engineering; sophomore year; second or third term; 3 credits; 2 recitations; 1 two-hour laboratory period.
Fee \$1.50. *W. H. Martin*

ME 233. Steam and Gas Machinery. A general course adapted to the needs of Civil Engineering students. Elementary thermodynamics; properties of steam; fuels and combustion; boilers; engines; pumps and other auxiliaries; gas and oil engines; practice in maintenance, operation, and simple tests of steam and gas equipment.

Required in Civil Engineering; sophomore year; first term; 5 credits; 3 recitations; 6 hours laboratory work. Fee \$5.00. Text: Allen and Bursley, Heat Engines. *R. B. Boals*

ME 315. Advanced Mechanical Drawing. A course in elementary machine design dealing with the design of simple installations and parts of machinery by means of standard handbooks and empirical formulas.

Required in Industrial Arts; senior year; second term; 3 credits; 3 laboratory periods. *H. C. Brandon*

ME 321. Heat Engineering. Thermodynamics of steam and gas, properties of steam, Rankine cycle for steam engine and steam turbine, refrigeration cycle, properties of gases, pressure volume changes, mixtures, humidity, air compressor cycle, Otto and Diesel cycles, laboratory practice.

Prerequisites: Mth 353; Ph 111, 112, 113. Required in Mechanical Engineering; junior year; first term; 3 credits; 3 recitations.

W. H. Martin

ME 322. Heat Engineering. Continuation of ME 321.

Required in Mechanical Engineering; junior year; second term; 3 credits; 2 recitations; 1 three-hour laboratory period. Fee \$3.00.

W. H. Martin, A. W. Bechlem

ME 323. Steam Turbines. The theory of the steam turbine; types; construction and design of most important parts; operating characteristics; effect of pressure, superheat, vacuum, and other factors.

Optional in Mechanical Engineering; senior year; third term; 3 credits; 3 recitations. Text: Moyer, The Steam Turbine.

W. H. Martin

ME 331. Heat Power Engineering. An elementary study of the theory of steam, gas, and air machinery; properties of gases, wet,

dry, and superheated steam; pressure, volume, and temperature relations of gases and vapors.

Prerequisite: Mth 243, Ph 113. Required in Electrical Engineering; junior year; first term; 3 credits; 2 recitations; 1 three-hour computation period. Fee \$0.50. Text: Hirshfield and Barnard, Heat Power Engineering. *R. B. Boals*

ME 332. Heat Power Engineering. Continuation of ME 331. Analysis of engine and turbine cycles; comparison of theoretical and actual machines; different types of prime movers and their characteristics; power, efficiency, and performance; valve gears; governing systems. Laboratory practice in operation and testing power plant equipment.

Required in Electrical Engineering; junior year; second term; 3 credits; 2 recitations; 1 three-hour laboratory period. Fee \$3.00. Text: Hirshfield and Barnard, Heat Power Engineering.

R. B. Boals

ME 333. Heat Power Engineering. Continuation of ME 332. A study of the properties of fuels; combustion; furnace design for different fuels; types and characteristics of boilers; condensers; pumps; feed water heaters; gas and oil engines and producers; selection and arrangement of equipment for a power plant.

Required in Electrical Engineering; junior year; third term; 3 credits; 2 recitations, 1 three-hour drafting period. Fee \$0.50. Text: Hirshfield and Barnard, Heat Power Engineering.

R. B. Boals

ME 411. Machine Design. Application of the principles of Mechanism, Mechanics, and Strength of Materials to design of machine elements. Problems involving riveted joints; screws; shafts and shafting; belt and rope drive; pulleys; gearing; bearings; machine frames; analysis of force and energy problems; flywheels; engine balancing; computations and drawings necessary to the design of one or more complete machines.

Required in Mechanical Engineering; senior year; first term; 3 credits; 3 recitations. Text: Kimball and Barr, Machine Design.

J. R. DuPriest

ME 412. Machine Design.

Required in Mechanical Engineering; senior year; second term; 4 credits; 2 recitations; 2 three-hour laboratory periods. Fee \$0.50. Text: Kimball and Barr, Machine Design.

J. R. DuPriest

ME 413. Machine Design.

Required in Mechanical Engineering; senior year; third term; 2 credits; 2 three-hour laboratory periods. Fee \$0.50. Text: Kimball and Barr, Machine Design.

J. R. DuPriest

ME 421. Gas Engineering. Theory of gas and oil engines and gas producers; the Otto and Diesel cycles; liquid fuels; principles of carburetion; ignition and flame propagation; gas manufacture; design characteristics of stationary and automotive engines; trend of development.

Prerequisite: ME 322. Optional in Mechanical Engineering; senior year; third term; 3 credits; 2 recitations; 1 three-hour computation period.
J. R. DuPriest

ME 432, 433. Power-Plant Engineering. A detailed study of the principles involved and the construction and operation of power-plant equipment; engines; turbines; boilers; condensers; heaters; water and vacuum pumps; stokers; furnaces and combustion of fuels. Attention is given to the proper location of plant, selection of equipment for given conditions, and methods of determining fixed charges and operating cost.

Prerequisite: ME 321. Required in Mechanical Engineering; senior year; first and second terms; 3 credits each term; 3 recitations. Text: Gebhardt, Steam Power Plant Engineering.
J. R. DuPriest

ME 442, 443. Power-Plant Design. A course in the quantitative side of design of power-plant equipment. Problems to determine the dimensions of boilers, such as heating surface, gate surface, diameter and thickness of shell, number of tubes, etc.; diameter, height, and stability of chimneys; sizes of condensers and pumps; proportions of cylinders for compound engines; fly-wheel design; construction of load curves; plant layout, etc. Must accompany or follow ME 432, 433.

Required in Mechanical Engineering; senior year; first and second terms; 2 credits each term; 2 three-hour periods. Fee \$1.00 each term.
J. R. DuPriest

ME 451, 452, 453. Engineering Laboratory. A detailed study of mechanical equipment and processes by the method of laboratory tests and analysis of test results. Efficiency and economy tests and operating characteristics of steam, gas, and oil engines; steam turbines; steam pumps; boilers; fans and blowers; heating and ventilating equipment; compressed air and refrigerating machinery. The A. S. M. E. Power Test Code is used as a laboratory manual.

Required in Mechanical Engineering; senior year; three terms; 3 credits each term; 9 hours laboratory work. Fee \$5.00 each term.
W. H. Martin, A. W. Bechlem

ME 461. Heating and Ventilating. Study of modern methods of heating and ventilation; approved systems of heating by means of air, steam, and hot water; methods of computing radiating surface;

effective methods of ventilation; general design; construction and operation of heating plant.

Required in Mechanical Engineering; junior year; third term; 3 credits; 1 recitation; 2 three-hour laboratory periods. Text: Hoffman, Heating and Ventilating. *M. C. Phillips*

ME 483. **Seminar.** Practice in effective writing and speaking on engineering and allied subjects. Preference is given to the discussion of any new developments in the field of mechanical engineering. The work supplements the work of the prescribed courses.

Required in Mechanical Engineering; senior year; third term; 2 credits; 2 recitations. *J. R. DuPriest*

MECHANICS AND MATERIALS

Courses are offered covering statics, dynamics, and the strength and properties of engineering materials. In the last division there are, in addition to the general courses which deal with structural materials, several special courses from which the student may learn the technic belonging to various specialized branches of materials treatment and testing.

The offices, classrooms, and laboratories of the department are located in the east division of the Engineering Laboratory. The floor-space occupied is about 14,000 square feet, and provides separate laboratories for structural materials, cement and concrete, bituminous and non-bituminous highway materials, oils, fuels, and the microscopic examination and heat treatment of metals. The equipment is modern, and is well arranged for the work of instruction and for a limited amount of research.

MM 311. **Materials of Engineering.** A lecture and laboratory course on the materials of engineering construction with special reference to the methods and specifications adopted by the American Society for Testing Materials and other national engineering organizations. The laboratory program is varied somewhat for the students from different departments to include tests on those materials of special interest to them; for example, Civil Engineering students do special work on highway materials, Forestry students on timber, etc.

Required in Civil and in Logging Engineering (junior year, second term), in Electrical and in Chemical Engineering (junior year, first term), and in Industrial Arts (senior year, first term); elective to other suitably prepared students; 3 credits; 1 lecture; 3 hours laboratory work. Fee \$3.00. Text: Moore, Materials of Engineering. *S. H. Graf, C. E. Thomas, I. F. Waterman, J. C. Othus*

MM 312. Materials of Engineering. Similar to MM 311 but including work on fuels, lubricants, bearing metals, belting, and other materials of special interest to the mechanical engineer in addition to work on the structural materials. Assigned readings.

Required in Mechanical Engineering; junior year; third term; 4 credits; 1 lecture; 6 hours laboratory work. Fee \$4.00. Text: Moore, *Materials of Engineering*.

S. H. Graf, C. E. Thomas, I. F. Waterman, J. C. Othus

MM 351. Mechanics (Statics). Applied mechanics for engineering students; forces and force systems with reference to the equilibrium of rigid bodies, including simple framed structures; methods of finding centers of gravity and moments of inertia and their practical applications; numerous problems having engineering application.

Prerequisites: Differential and Integral Calculus. Required in Mechanical, Electrical, and Mining Engineering; junior year; first term; 3 credits; 3 recitations. Text: Boyd, *Mechanics*.

S. H. Graf, C. E. Thomas, J. C. Othus

MM 352. Mechanics (Dynamics). A continuation of MM 351 dealing with principles and problems in Kinetics; force as a factor causing motion; work, energy, friction, and impact studied and illustrated by means of numerous problems.

Prerequisite: MM 351. Required in Mechanical, Electrical, and Mining Engineering; junior year; second term; 3 credits; 3 recitations. Text: Boyd, *Mechanics*.

S. H. Graf, C. E. Thomas, J. C. Othus

MM 353. Strength of Materials. In this course the general principles of mechanics are applied to the elements of engineering structures to determine their strength and fitness. Some of the features are tensile and crushing strength of various engineering materials; stresses in beams and girders under different systems of loading and support; supporting strength of columns; application of tension to shafts in transmission of power. Students are required to work and hand in problems.

Prerequisite: MM 352. Required in Mechanical and Electrical Engineering (third term) and in Civil Engineering (second term); junior year; 3 credits; 3 recitations. Text: Boyd, *Strength of Materials*.

S. H. Graf, C. E. Thomas, I. F. Waterman, J. C. Othus

MM 361. Mechanics (Statics). Similar in content to MM 351 with emphasis on those principles which are fundamental in structural design.

Prerequisites: Differential and Integral Calculus. Required in Civil Engineering; junior year; first term; 4 credits; 2 recitations; 2 two-hour computing periods. Text: Boyd, Mechanics.

I. F. Waterman

MM 362. **Mechanics (Dynamics).** A continuation of MM 361, similar in subject-matter to MM 352, a greater time allowance permitting somewhat more complete treatment.

Prerequisite: MM 361. Required in Civil Engineering; junior year; third term; 4 credits; 2 recitations; 2 two-hour computing periods. Text: Boyd, Mechanics.

I. F. Waterman

MM 426. **Highway Materials Laboratory.** Designed particularly for those specializing in Highway Engineering. Different road and paving materials and binders are tested and their relative values determined. Sheet asphalt mixtures and bituminous mortars are studied to determine the effects of various changes in the grading of the aggregates. Finally, samples of various types of roads and pavements are analyzed for density, composition, and grading, with special reference to their conformity with specifications. Assigned references.

Required in Highway Engineering; senior year; first term; 3 credits; 1 lecture period; 2 laboratory periods. Fee \$3.00. Text: Hubbard, Laboratory Manual of Bituminous Materials.

S. H. Graf

MM 427. **Structural Laboratory.** An advanced laboratory course on plain and reinforced beams and columns to study methods of reinforcing. Stress distribution under unsymmetrical loads. Thermal conductivity of concrete. Study of stresses in structures by strain gauge.

Prerequisite: MM 311. Required in Civil Engineering; senior year; second term; 2 credits; 1 four-hour laboratory period. Fee \$4.00.

S. H. Graf, I. F. Waterman

MM 481. **Metallography and Pyrometry.** Lectures and laboratory work designed to give a working knowledge of the methods of study of structure of metals and alloys; particular attention given to correlation of thermal and mechanical treatment with structure and physical properties of iron and steel; calibration and use of various types of pyrometers; laboratory experiments in heat treatment; preparation of specimens; etching; studying structure under the microscope; making photomicrographs; physical tests, whenever possible, to show the effects on strength, ductility, hardness, or other mechanical properties of the different thermal treatments or other industrial processes.

Required in Chemical Engineering; junior year; second term; 3 credits; 2 lectures; 1 three-hour laboratory period. Fee \$4.00. Text: Hoyt, Metallography. *S. H. Graf*

MM 691, 692, 693. **Experimental Research Problems.** An opportunity is given for suitably prepared students interested in research to work out original problems. These may be either of their own choosing or suggested by the department, and may cover any subject within the scope of the department laboratories.

Prerequisites: Must be approved in each case, and will vary according to the work proposed. Elective to senior and graduate students; three terms; 3 credits each term; 9 hours laboratory work. Fee \$3.00. *S. H. Graf, C. E. Thomas*

School of Forestry

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.

GEORGE WILCOX PEAVY, M.S.F., Dean of the School of Forestry.

FLORENCE KING, Secretary to the Dean.

General Forestry

THURMAN JAMES STARKER, M.S.F., Assistant Professor of Forestry.

HARRY IRA NETTLETON, B.Sc., Instructor in Forestry.

Logging Engineering

HENRY RICHARD PATTERSON, B.Sc., Associate Professor of Logging Engineering.

.....Instructor in Logging Engineering.

The function of the School of Forestry is to train men to be of service to the state and to the Nation in making effective a forestry program which will insure forest products adequate in amount for the needs of all our people for all time to come. The national timber supply is being used four times as fast as it is being produced. Within a comparatively short time the people of this country will be hard pressed for this material so necessary for the general welfare.

Because of the importance of the timber resources of the state and of the magnitude of its lumber industry, the School of Forestry has a peculiar responsibility to the commonwealth. Oregon has one-fifth of all the remaining standing timber in the United States. It has over 450 billion board feet of timber yet uncut. This is being removed at an annual rate of over five and one-half billion feet. Due to the exhaustion of eastern and southern supplies this annual cut will rapidly increase. An area of more than 100,000 acres is each year being added to the cut-over lands of the state. Most of this area is suited for the growing of forest crops. The lumber business produces more wealth and employs more labor than any other single industry in the state. The forest industry is destined, in the near future, to very rapid expansion.

The work of the School of Forestry is divided into two main branches, Technical Forestry and Logging Engineering, with a subordinate department, Lumber Manufacture.

Technical Forestry. Within the past decade the American forester has won notable recognition, and the profession of forestry has

made a wonderful growth. The Federal Government has set aside one hundred and fifty-six million acres of forest land to be permanently devoted to growing timber. In Oregon an area of thirteen million acres lies within the National Forests, while an area of eleven million acres is privately owned. Since it is suited only to growing timber, much of the privately owned land will eventually be brought under some form of management so that it can be made permanently productive. This indicates the field of the technical forester. His business is to see to it that this vast area is brought to its highest degree of productiveness and kept there.

Logging Engineering. The logging engineer is a recent development of the Pacific Northwest. In the past, low prices for standing timber, easy logging, and the high prices for lumber have made profits to the lumberman sure, and these same conditions have not demanded economy in operation. With high-priced stumpage, timber difficult of access, and low prices for lumber, a revolution in the entire lumber industry is being forced. It has become a case of economy in operation or financial failure. Bringing the logs over rough country to the mill involves many engineering problems. Among these are the construction of logging railroads, the installation of efficient sky-line and ground-logging devices, and the operation of special steam and electrical logging equipment. The curriculum in Logging Engineering is designed to equip young men to be of use in this field. The curriculum as outlined in this catalogue was prepared under the direction of able timbermen experienced in the Pacific Northwest, and the strictly technical subjects in the curriculum are taught by men who have had practical experience in some of the most progressive logging operations in the country.

Lumber Manufacture. The manufacture and merchandising of lumber have come to be matters of such importance among the industries of Oregon that many young men are asking for special training for these fields. Following the second year in the School of Forestry, such men will have open to them a carefully selected group of elective subjects which are considered as especially adapted to their needs. Men majoring in Lumber Manufacture will be granted the regular bachelor's degree in Forestry.

Degree Curricula. Two curricula leading to the Bachelor's degree are offered, one in General Forestry and one in Logging Engineering.

Advanced Degrees. The professional degree of Master of Science in Forestry or of Logging Engineering is offered to graduates of the College, or other colleges of equal rank, who have attained the degree of Bachelor of Science in the corresponding forestry curriculum, and met the College requirements for graduate study

(as given on pages 69-70). These requirements specify one full year of resident work amounting to 48 college credits, including an acceptable thesis.

Equipment. The School of Forestry is housed in the Forestry Building, a thoroughly modern three-story structure 80 feet wide by 136 feet long. The building contains roomy laboratories for work in silviculture, dendrology, mensuration, forest protection, wood technology, drafting, lumber grading, and logging devices and equipment. Through the courtesy of the manufacturers of logging equipment much valuable logging machinery has been accumulated for demonstration purposes. Lumber manufacturing concerns have generously supplied the school with wood products made from various species of Oregon trees. A valuable miniature paper manufacturing machine makes possible experimental work in paper making. All available publications dealing with general forestry, logging, or lumber manufacture are provided for the use of students.

Actual field work, so essential in preparing men for work in forestry and logging engineering, is made possible by the fact that large areas of timbered lands are easily accessible from the College. Some of the largest lumber manufacturing plants in the Northwest are located within two or three hours' ride from Corvallis. Located as it is in the heart of the greatest timbered region of the United States, the School of Forestry possesses unique advantages for preparing men for service in professional forestry, logging engineering, and lumber manufacture. Through the generosity of the Spaulding Logging Company, 160 acres of forest land has been given to the School of Forestry for demonstration purposes. Part of this area has been recently logged over, and part is covered with second growth Douglas fir. This affords a fine opportunity to make silvicultural experiments.

DEGREE CURRICULUM IN GENERAL FORESTRY

(B.Sc. Degree)

The following courses are recommended for freshman and sophomore students who desire to work for a degree either in General Forestry or in Logging Engineering. For graduation the College requires the student to complete 207 credits. The student is expected to complete the professional work as outlined below. Other subjects may be substituted only upon the approval of the Dean. Freshman and sophomore requirements are modified only in exceptional cases.

SCHOOL OF FORESTRY

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Freshman Year

	1st	Term 2d	3d
General Forestry (F 111, 112).....	4	3
Elementary Mensuration (F 123).....	4
English Composition (Eng 101, 102, 103).....	3	3	3
Plane Trigonometry (Mth 111), Elementary Analysis (Mth 131, 132).....	4	4	4
General Botany (Bot 101, 102).....	4	3	....
Plane Surveying (CE 125, 126).....	....	3	5
Gymnasium (PEM 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
	<hr/> 17 $\frac{1}{2}$	<hr/> 18 $\frac{1}{2}$	<hr/> 18 $\frac{1}{2}$

Sophomore Year

Mensuration (F 221, 222, 223).....	4	4	4
Tree Identification (F 253).....	....	....	5
Engineering Physics (Ph 111, 112, 113).....	3	3	3
Introduction to Economics (ES 391).....	....	3	....
Labor Problems (ES 301).....	....	....	4
Mechanical Drawing (ME 111).....	2	....	....
Forest Survey and Mapping (F 224, 225).....	5	5	....
Gymnasium (PEM 211, 212, 213).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
	<hr/> 16 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$	<hr/> 18 $\frac{1}{2}$

The following courses are recommended for junior and senior students who are working for a degree in General Forestry.

Junior Year

	1st	Term 2d	3d
Identification of Woods (F 331).....	4	....	....
Silviculture (F 341, 342, 343).....	4	4	4
Advanced Business Law (PS 201, 202).....	....	4	4
Introduction to Accounting (BA 101).....	....	....	3
Forest Administration (F 311).....	3	....	....
Uses of Wood (F 332).....	....	3	....
National Government (PS 301).....	3	....	....
State and Local Government (PS 302).....	....	3	....
Forest Protection (F 212).....	....	....	4
Electives	3	3	3
	<hr/> 17	<hr/> 17	<hr/> 18

Senior Year

Forest Finance (F 411, 412).....	5	5	....
Economics of Lumber Industry (F 413).....	....	....	5
Dendrology (F 451, 452).....	4	4	....
Lumber Manufacture (LE 496).....	....	....	4
Timber Technology (F 431, 432, 433).....	4	4	4
Seminar (F 461, 462, 463).....	1	1	1
Electives	3	3	3
	<hr/> 17	<hr/> 17	<hr/> 17

SUGGESTED ELECTIVES

	General Forestry		
	1st	2d	3d
Materials of Engineering (MM 311).....	---	3	---
Transportation (ES 403).....	---	---	4
Money and Banking (ES 311).....	4	---	---
Wood and Steel Structures (CE 488).....	3	---	---
General Chemistry (Ch 101, 102, 103).....	3	3	3
Range and Pasture Botany (Bot 341).....	---	2	---
Forest Pathology (Bot 314).....	2	---	---
Forest Management (F 416).....	---	---	5
Plant Ecology (Bot 442).....	---	---	3
Business Correspondence (Eng 105).....	---	3	---
American Literature (Eng 431, 432).....	3	3	---
General Geology (G 301c).....	---	---	3
Forest Entomology (Ent 321).....	4	---	---
Practical Public Speaking I (PSp 254).....	---	---	3

DEGREE CURRICULUM IN LOGGING ENGINEERING

(B.Sc. Degree)

Freshman and Sophomore Years

The work for these years is the same as that for the corresponding years in the General Forestry Curriculum.

The following courses are recommended for junior and senior students who are working for a degree in Logging Engineering.

Junior Year

Identification of Woods (F 331).....	4	---	---
Uses of Wood (F 332).....	---	3	---
Machine Shop (IA 363).....	---	---	3
Advanced Business Law (PS 201, 202).....	4	4	---
Logging Machine Design (LE 483).....	---	---	3
Logging Devices and Equipment (LE 481, 482).....	---	3	3
Bridge Design (LE 484).....	3	---	---
National Government (PS 301).....	3	---	---
State and Local Government (PS 302).....	---	3	---
Principles of Accounting (BA 385).....	---	---	3
Materials of Engineering (MM 311).....	---	3	---
Forest Protection (F 212).....	---	---	4
Electives	3	2	2
	17	18	18

Senior Year

Timber Transportation (LE 371, 372, 373).....	5	5	5
Forest Finance (F 411, 412).....	5	5	---
Economics of Lumber Industry (F 413).....	---	---	5
Topographic Logging Plans (LE 471, 472, 473).....	5	5	5
Electives	2	2	2
	17	17	17

SUGGESTED ELECTIVES

Logging Engineering

	1st	Term	
		2d	3d
Differential and Integral Calculus (Mth 251, 252, 253).....	4	4	4
General Chemistry (Ch 101, 102, 103).....	3	3	3
General Geology (G 301c).....	.....	.....	3
Logging Methods (LE 493).....	.....	.....	3
Lumber Manufacture (LE 496).....	.....	.....	4
Business Organization and Management (BA 381).....	.....	3	.....
Cost Accounting (BA 203).....	.....	.....	3
Seminar (F 461, 462, 463).....	1	1	1
Steam and Gas Machinery (ME 233).....	3	.....	.....
Efficiency Systems (F 316).....	.....	.....	5

Lumber Manufacture

Students who expect to enter some branch of the lumber manufacturing industry are advised to elect certain of the following courses during their junior and senior years.

	1st	Term	
		2d	3d
Identification of Woods (F 331).....	4	.....	.....
Uses of Wood (F 332).....	.....	3	.....
Advanced Business Law (PS 201, 202).....	4	4 or	(4)
Forest Finance (F 411, 412).....	5	5	.....
Economics of the Lumber Industry (F 413).....	.....	.....	5
Lumber Manufacture (LE 496).....	.....	.....	4
Timber Technology (F 431, 432, 433).....	4	4	4
Lumber Mill Studies (F 37X) (Field work).....	6	.....	.....
Transportation (ES 403).....	.....	.....	4
Money and Banking (ES 311).....	4	.....	.....
Cost Accounting (BA 203).....	.....	.....	3
Business Organization and Management (BA 381).....	.....	3 or	(3)
Wood and Steel Structures (CE 488).....	3	.....	.....
Strength of Materials (MM 353).....	.....	.....	3
Mechanics (Statics) (MM 351).....	3	.....	.....
Machine Design (ME 411).....	3	.....	.....

GENERAL FORESTRY

COURSES

F 111. General Forestry. Preliminary survey of the whole field of forestry; origin and progress of scientific forestry; economic necessity of forestry; present forest wealth and possibilities of increasing it; forest ownership, private, state, and national; preliminary survey of state and national forest laws and policies; outline of national forest organization.

Required in Forestry and Logging Engineering; freshman year; first term; 4 credits; 4 lectures and recitations. Reference text: Moon and Browne, Elements of Forestry.

F 112. General Forestry. Responsibility of civilized man for the conservation of natural resources; vital interests of this Nation in its timber, coal, iron, oil, water, etc.; methods of insuring longest and best use of natural resources; conservation legislation.

Required in Forestry and Logging Engineering; freshman year; second term; 3 credits; 3 lectures and recitations. Reference text: Van Hise, Conservation of Natural Resources.

F 123. Elementary Mensuration. Federal survey system; identification of corners and lines; methods of covering the ground in timber cruising; pacing; instruments and devices used in measuring diameters and heights of trees; units of timber measurement; contents of felled timber; scale rules; simple plane table work.

Required in Forestry and Logging Engineering; freshman year; third term; 4 credits; 3 recitations; 1 three-hour laboratory period. Fee \$2.00. Reference text: U. S. Manual of Public Land Surveys.

F 212. Forest Protection. Protecting forests from fire; Federal, state, and private agencies; methods and equipment of prevention and control; forest insect control; forest pathology.

Required in Forestry and Logging Engineering; sophomore year; third term; 4 credits; 4 lectures and recitations.

F 221. Mensuration. Topographic surveying of forested areas as basis for timber appraisal; keeping field notes; traversing; practice in surveying with aneroid barometer with the use of barograph as a checking instrument; execution of public land survey; retracing surveyed lines in timber; section subdivisions.

Required in Forestry and Logging Engineering; sophomore year; first term; 4 credits; 3 recitations; 1 three-hour field or laboratory period. Fee \$2.00.

F 222. Mensuration. Volume tables and form factor tables for timber estimating; growth studies; yield tables; complete valuation surveys including application of methods; comparison between values derived in logging and mill cuts and estimates of standing timber; field work at the mills and in the woods; complete valuation survey and report on a given piece of timber; advanced work in the execution of topographic surveys on timbered areas; costs.

Required in Forestry and Logging Engineering; sophomore year; second term; 4 credits; 3 recitations; 1 three-hour field period. Fee \$2.00. Reference text: Chapman, Forest Mensuration.

F 223. Mensuration. Timber-land examinations as made by commercial cruising companies and by United States Forest Service; cruising methods required by purchasers, operators, and bonding companies; complete valuation survey and report on a problem of practical value to some logging outfit.

Required in Forestry and Logging Engineering; sophomore year; third term; 4 credits; 2 recitations; 2 three-hour field periods. Fee \$2.00. Reference text: Chapman, Forest Mensuration.

F 224. Forest Survey and Mapping. A course designed to train students to survey forested areas according to methods approved by foresters and logging engineers, obtaining topographic data by use of engineer's level, stadia, transit, plane table, aneroid, topographic abney, and trail tape. Drill in detail of forest mapping; recording notes.

Required in Forestry and Logging Engineering; sophomore year; first term; 5 credits; 3 recitations; 2 three-hour laboratory periods. Fee \$2.00.

F 253. Tree Identification. Field characteristics and classification of timber trees of United States; their commercial range, local occurrence, size, growth, form, climate, soil, and moisture requirements; resistance; relative tolerance and reproduction. The fundamental purpose is to teach the student to identify commercial timber trees.

Required in Forestry and Logging Engineering; sophomore year; third term; 5 credits; 3 lectures; 2 three-hour laboratory or field periods. Fee \$2.00. Reference text: Sudworth, Trees of the Pacific Slope.

F 311. Forest Administration. Federal forests; Forest Service organization; national supervision; the district; the forest as an administrative unit; administration of state forests; private forests; discussion of fire prevention and control methods.

Required in Forestry; junior year; first term; 3 credits; 3 lectures and recitations.

F 316. Efficiency Systems. General discussion of efficiency systems; special application to lumber industry; cost-keeping systems and their comparative values; organization; cost keeping versus bookkeeping, bonus, merit, profit-sharing, and piece systems; labor problems as applied to logging industry; present-day labor management as practiced in modern logging operations.

Elective in Logging Engineering; junior year; third term; 5 credits; 5 lectures. Fee \$4.00.

F 331. Identification of Woods. Study of wood structure; identification of important commercial woods; physical and structural properties; study of standard commercial grading rules; practical work in grading manufactured lumber.

Required in Forestry and Logging Engineering; junior year; first term; 4 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$2.00. Reference text: Record, Economic Woods.

F 332. **Uses of Wood.** Adaptation to commercial uses; chief wood-using industries and relative amounts of principal commercial species used annually; adaptation of wood to special purposes; substitutes for wood; minor uses of wood, pulp, fiber, board, etc.; by-products.

Required in General Forestry and Logging Engineering; junior year; second term; 3 credits; 2 lectures; 1 two-hour laboratory period. Fee \$2.00. Reference text: Kellogg, Lumber and Its Uses.

F 334. **Commercial Woods.** Designed primarily to meet requirements of the woodworker in choosing species of wood best adapted to his needs, and in identifying woods commonly used; macroscopic and microscopic identification of different species; dendrology and its significance in wood technology; taxonomy, showing how trees are classed.

Required in Industrial Arts; junior year; third term; 3 credits; 2 lectures; 1 two-hour laboratory period. Fee \$2.00.

F 341. **Silviculture.** Art of establishing, developing, and reproducing trees; forest description; silvicultural system of cutting; marking trees for cutting; silvicultural management; improvement of woodlands; protection as related to silviculture; natural and artificial regeneration; nursery practice; planting.

Required in Forestry; junior year; first term; 4 credits; 3 recitations; 1 two-hour laboratory period. Fee \$2.00. Reference texts: Graves, Handling of Woodlands. Toumey, Seeding and Planting.

F 342. **Advanced Silviculture.** Practice of forestry in silvicultural regions of the United States; forest ecology; silvics, including the measure of tolerance, study of sample plots, economic possibilities of species, and reproduction characteristics; detailed silvical study of some definite forest tract.

Required in Forestry; junior year; second term; 4 credits; 3 recitations; 1 two-hour laboratory period. Fee \$2.00. Reference text: Toumey, Seeding and Planting.

F 37X. **Field Work.** Based upon practical work performed by the student between the sophomore and junior years or between the junior and senior years. Work must be done on some modern logging operation or in connection with some technical forestry work carried on by the state or by the Forest Service. A report based upon an approved outline must be submitted.

Elective in Forestry and Logging Engineering; junior or senior year; 1 to 6 credits.

F 411, 412. **Forest Finance.** Investments and costs in forest production; value of forest property for destructive lumbering and for continued timber production; appraisal of damages due to the

destruction of forest property; forest taxation; stumpage values; comparison of forest values with agricultural values; timber bonds; ultimate ownership of forest lands.

Required in Forestry and Logging Engineering; senior year; first and second terms; 5 credits each term; 5 lectures and recitations. Reference text: Chapman, Forest Valuation.

F 413. **Economics of the Lumber Industry.** Brief history of lumbering in the United States; stumpage prices; prices of manufactured lumber; shifting centers of production; transportation; freight rates; the Interstate Commerce Commission and the lumber industry; substitutes and their effects; lumbermen's associations; present rate of consumption and the future supply; function of the Government in the future of the industry.

Required in Forestry and Logging Engineering; senior year; third term; 5 credits; 5 lectures and recitations.

F 416. **Forest Management.** Fundamental principles of mensuration, finance, organization, and administration reviewed and placed in their proper relationship to the whole scheme of forest management; emphasis on the study of sustained yield, regulation of cut, and on working plans.

Elective in Forestry; senior year; third term; 5 credits; 4 lectures; 1 two-hour conference period.

F 431. **Timber Technology.** Fundamental principles underlying seasoning and kiln drying of woods; kiln drying methods and their relative merits; effect of kiln drying upon wood structure; preservative treatment of timber, methods and results; manufacture of alcohol, turpentine, resin, tar, and other chemical products from wood; closer utilization of wood waste.

Required in Forestry; senior year; first term; 4 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$3.00.

F 432. **Timber Technology.** A continuation of F 431.

Required in Forestry; senior year; second term; 4 credits; 3 lectures; 1 two-hour laboratory period. Fee \$2.00.

F 433. **Timber Technology.** A continuation of F 432.

Required in Forestry; senior year; third term; 4 credits; 3 lectures; 1 two-hour laboratory period. Fee \$2.00.

F 451, 452. **Dendrology.** Classification and identification of forest trees, including study of forest ecology and taxonomy; silvical characteristics and commercial species; life-history and requirements of trees.

Required in Forestry; senior year; first, and second terms; 4 credits each term; 2 recitations; 2 two-hour laboratory periods. Fee

\$2.00 each term. Reference texts: Sudworth, Trees of the Pacific Slope. Sargent, Trees of North America.

F 461, 462, 463. **Seminar.** Preparation and discussion of reports of special subjects; current forestry and lumbering literature; labor problems. Each student is required to prepare a thesis on some assigned subject.

Required in Forestry; elective in Logging Engineering; senior year; three terms; 1 credit each term; 1 two-hour conference period.

LOGGING ENGINEERING

COURSES

LE 37X. **Field Work.** Same as F 37X; see page 262.

LE 371. **Timber Transportation.** Horse logging; chute and flume construction; pole roads; railroads adapted to logging operations.

Required in Logging Engineering; senior year; first term; 5 credits; 3 lectures; 2 three-hour laboratory periods. Fee \$4.00.

LE 372. **Timber Transportation.** Distinction between logging railroads and common carrier railroads; grades; alignment; railroad operation as applied to logging railroads; economic theory of location and construction.

Required in Logging Engineering; senior year; second term; 5 credits; 3 lectures; 2 three-hour laboratory periods. Fee \$4.00. Reference text: Wellington, Economic Theory of Railway Location.

LE 373. **Timber Transportation.** Structures and materials used in logging railroads, costs of surveys, construction, operation and maintenance; bridge and tunnel construction. Economics of construction and operation; financing and management; log driving; rafting.

Required in Logging Engineering; senior year; third term; 5 credits; 3 lectures; 2 three-hour laboratory periods. Fee \$4.00.

LE 471, 472, 473. **Topographic Logging Plans.** Plans for logging operations; making topographic map of timbered area; timber cruised and complete set of plans worked out, showing proper location of main-line logging railroads, railroad spurs, rollways or landings, pole roads, swing settings, logging area lines; estimates of costs.

Required in Logging Engineering; senior year; three terms; 5 credits each term; 3 recitations; 2 three-hour field periods. Fee \$5.00 each term.

LE 481. **Logging Devices and Equipment.** Flume and chute construction; rigging; types of railroad locomotives, logging cars,

and trucks; donkey engines; skidding and loading devices; water-supply systems; explosives; construction equipment; aerial tramways; incline railroads; blocks and hooks, wire rope, logging dams, electrical machines used in logging; detailed investigation of costs and makes of equipment; aerial and high lead systems; economic value of using efficient equipment.

Required in Logging Engineering; senior year; second term; 3 credits; 1 lecture; 2 three-hour laboratory periods. Fee \$4.00.

LE 482. Logging Devices and Equipment. A continuation of LE 481.

Required in Logging Engineering; senior year; third term; 3 credits; 1 lecture; 2 two-hour laboratory periods. Fee \$3.00.

LE 483. Logging Machine Design. Designing logging equipment and rigging and tools; instruction in preparation of working plans for machine shop and foundry construction; making drawings of standard woods tools and railroad equipment constructed in mill and camp shops.

Required in Logging Engineering; junior year; third term; 3 credits; 1 lecture; 2 two-hour laboratory periods. Fee \$4.00.

LE 484. Bridge Design. Principles of the design of wood structures as applied to logging railway traffic; a review of stresses in simple trusses and of graphic statics; details, specifications, estimates for through and deck forms of Pratt truss.

Required in Logging Engineering; junior year; first term; 3 credits; 1 recitation; 2 two-hour laboratory periods. Fee \$3.00.

LE 493. Logging Methods. Yarding, skidding, and loading of logs by all known methods; falling and bucking; relative merits of various methods; all known methods of handling timber from the standing tree to the mill.

Elective in Logging Engineering; senior year; third term; 3 credits; 3 lectures.

LE 496. Lumber Manufacture. Discussion of various types of modern mills; manufacture of secondary products; electrical versus steam mills; lumber-handling devices; examinations of up-to-date mills and reports on them.

Required in Forestry; elective in Logging Engineering; senior year; third term; 4 credits; 3 lectures; 1 two-hour laboratory period.

School of Home Economics

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.

*AVA BERTHA MILAM, Ph.B., A.M., Dean of the School of Home Economics.

GENEVA ALICE FEIKE, B.Sc., Secretary to the Dean.

Home Economics Education

HATTY ROSELLE DAHLBERG, B.Sc., A.M., Associate Professor of Home Economics Education.

LURA AMELIA KEISER, B.Sc., Critic Teacher in Home Economics Education.

LOUISE WOOD, B.Sc., Supervisor of Home Economics; Teacher Trainer.

Household Administration

ALMA GRACE JOHNSON, B.Sc., Professor of Household Administration.

KATHERINE BARBARA HAIGHT, R.N., Instructor in Home Nursing.

SARA WATT PRENTISS, B.Sc., Instructor in Household Administration.

EMMA SKINNER WELD, Ph.B., Instructor in Household Administration.

Household Art

HELEN LEE DAVIS, A.B., B.Sc., Professor of Household Art.

LILA MORRIS O'NEALE, A.B., B.Sc., Assistant Professor of Household Art.

MARGARET MOOREHOUSE, B.Sc., Instructor in Household Art.

*JESSIE BILES, A.B., Instructor in Household Art.

MARY STANDERWICK VAN KIRK, Instructor in Household Art.

HELEN McFAUL, A.B., Instructor in Household Art.

LULA MAY BRANDT, B.Sc., Instructor in Household Art.

MARION HODGSON, B.Sc., Instructor in Household Art.

GERTRUDE STRICKLAND, Instructor in Household Art.

BLANCHE WHITTIER STEVENS, B.Sc., Instructor in Household Art.

Household Science

DOROTHY SHANK, B.Sc., Professor of Household Science.

AMELIA EARLE BURNS, B.Sc., Instructor in Household Science.

RUTH HENRIETTA KENNEDY, B.Sc., Instructor in Household Science.

BERNICE CORNELIA WAIT, M.S., Instructor in Household Science.

LILLIAN CATHERINE TAYLOR, B.Sc., Instructor in Household Science.

* On leave of absence.

Institutional Management

SIBYLLA HADWEN, Professor of Institutional Management; Director of Women's Dormitories.

MELISSA HUNTER, A.B., Instructor in Institutional Management; Assistant Director of Women's Dormitories.

ELIZABETH SEYMOUR, B.Sc., Supervisor of Tea-room.

The fundamental purpose of the work in Home Economics is to train for homemaking. To this end, technical courses including all phases of homemaking are required; also such courses as will tend to give the student a broader, more intelligent and sympathetic attitude toward the problems of every-day life. In other words, a liberal as well as a technical education is planned for.

The work is largely prescribed in the first two years, forming the basis for subsequent work. In the junior and senior years the student may specialize in a particular vocation or profession; namely, teaching of Home Economics, institutional work, trade work. Each of these in turn offers a variety of possibilities. Teaching positions include the teaching of homemaking or some phase of it in secondary schools, colleges, universities, or other institutions of higher learning.

The increasing demand for women to serve as executive and administrative leaders calls for mature women especially trained as managers and assistants for tea-rooms, cafeterias, hospitals, dormitories, and similar educational and social institutions. Equally attractive opportunities are available for the expert needlewoman, the tasteful designer of gowns, the competent dressmaker and milliner, the woman interested in trade, the buyer and tester of textile materials, and the woman with artistic resources as a household decorator and furnisher.

Facilities. The Home Economics Building is thoroughly equipped with the most modern facilities for carrying on all phases of Home Economics work. The Household Science department has a number of kitchens, including one dietetic laboratory, and three small apartments where family cookery and table service are taught. The eight sewing rooms are provided with the most modern equipment. A millinery laboratory, an applied design laboratory, and a textile exhibit room for the display of permanent and temporary exhibits are included in the facilities of the Household Art department. In addition to a large housewifery laboratory, a home-nursing room, and a child-care room, the Household Administration department operates a nine-room Practice House on the campus. The Institutional Management department is unusually well provided with space

and equipment. The Tea-room, with a seating capacity of 300, approximates a commercial establishment in its appointments. It is supplied with ample kitchen, storage, and serving space, and is equipped with all modern labor-saving devices. The dormitories provide further means of acquaintance with the problems of institutional work. The supervised teaching is carried on in the public schools of Corvallis, the plant and equipment of the high school being used by the student-teacher group. Besides offices for the various departments, stock and storage rooms, and lecture and recitation rooms, a large attractive room on the first floor is appropriately furnished for a rest and study room for women students.

Curricula. The School of Home Economics offers the following:

I. A four-year Professional Curriculum leading to the degree of Bachelor of Science, including technical courses, art and science, history, economics, and sociology, for those desiring preparation not only for homemaking but also for positions as teachers of home economics, tradespeople, or institutional managers. The first two years work is prescribed and gives the necessary foundation for any of the occupations. During the junior and senior years specialization within limits is possible. This curriculum fulfills the requirements of the State Board for Vocational Education for the Smith-Hughes teacher.

II. A four-year General Curriculum leading to the degree of Bachelor of Science, less technical than the Professional and allowing greater freedom of choice in other fields than Home Economics.

III. A Graduate Curriculum leading to the degree of Master of Science.

IV. A one-year Institutional Management curriculum leading to a certificate. (For outline see page 273.)

V. Homemaking courses for homemakers, special students, and students registered in other schools on the campus. The following courses are planned especially to meet the needs of these groups.

	Term		
	1st	2d	3d
Clothing and Textiles (HA 108, 109, 110).....	4	4	4
Short Course in Dressmaking (HA 118).....	4	....	....
Food Selection and Preparation (HS 203, 204), Elementary Nutrition (HS 205).....	4	4	4
Child Care (HAd 325).....	3	....	....
Millinery (HA 328).....	2	....	....
Home Nursing (HAd 435).....	3	....	....
Home Planning and Furnishing (HA 438).....	3	....	....

Requirements for Graduation. For the Bachelor's degree in Home Economics a minimum of 192 college credits must be completed. The work should be distributed as suggested by the following curricula outlines.

PROFESSIONAL CURRICULUM IN HOME ECONOMICS

(*B.Sc. Degree*)

	Freshman Year		
	1st	2d	3d
General Chemistry (Ch 101, 102, 103).....	3	3	3
Clothing and Textiles (HA 111, 112, 113)	4	4	4
English Composition (Eng 101, 102, 103).....	3	3	3
Drawing and Composition (A 110), Design (A 120), Color Harmony (A 130).....	3	3	3
Social Ethics (PEw 121), Hygiene (PEw 122).....	1	1	....
Introduction to Home Economics (HAd 100).....	1	....	....
Library Practice (Lib 100).....	....	....	1
Gymnasium (PEw 111, 112, 113).....	1	1	1
	16	15	15

Sophomore Year

Organic Chemistry (Ch 221).....	5	....	....
Chemistry of Foods and Digestion (Ch 222, 223).....	....	2½	2½
General Physics (Ph 292, 293).....	....	2½	2½
Principles of Botany, Part II (Bot 203).....	3	....	....
General Bacteriology (Bac 204, 205).....	....	3	3
Food Selection and Preparation (HS 211, 212, 213).....	4	4	4
①English or Modern Language.....	3	3	3
Gymnasium (PEw 211, 212, 213).....	1	1	1
	16	16	16

Junior Year

Elementary Psychology (Psy 301).....	3	....	....
Elements of Physiology (ZP 321).....	5	....	....
Housewifery (HAd 310).....	....	3	....
Costume Design (HA 331).....	3	....	....
Advanced Clothing and Textiles (HA 311).....	....	5	....
Household Sanitation (HAd 300).....	....	3	....
Child Care (HAd 320).....	....	....	3
Nutrition (HS 320).....	....	....	5
Business Management for Women (BA 371).....	....	....	3
Design and Color Use (A 333).....	3	....	....
Electives	3	6	5
	17	17	16

①If a modern language is elected, two years of one language must be completed.

Senior Year

	1st	Term 2d	3d
Introduction to Economics (ES 391).....	3	....	....
Introduction to Sociology (ES 393).....	....	....	3
Home Nursing (HAD 430).....	3	....	....
National Government (PS 301).....	....	3	....
House Decoration (HA 431).....	....	3	....
Electives	10	10	13
	16	16	16

For students preparing to teach Home Economics the following sequence is suggested.

Junior Year

	1st	Term 2d	3d
Elementary Psychology (Psy 301).....	3	....	....
Introduction to Education (Ed 302).....	....	2	....
Educational Psychology (Psy 322).....	....	3	....
Secondary Education (HEd 304).....	....	....	3

Senior Year

Secondary Education (HEd 305).....	3	....	....
Supervised Teaching in Home Economics (HEd 421).....	....	4	....
Electives .....	....	....	4

Students planning to teach in a Smith-Hughes school must have in addition to 6 weeks supervised teaching, 6 weeks field work in a Smith-Hughes school which will include Organization and Management of Smith-Hughes. Practice Housekeeping (HAD 450) and Household Management (HAD 440) are also required.

Note: Students who have not made an average of 85 or over in the freshman and sophomore years should not register for the teacher-training course.

SUGGESTED ELECTIVES**For Junior and Senior Years**

	Credits
Elementary Industrial Journalism (IJ 200).....	3
Practical Public Speaking I (PSP 254).....	3
History of Western Civilization II or III (Hst 212 or 213).....	3
Representative Men and Women (Hst 351).....	3
American Diplomatic History (Hst 421).....	3
English (Eng 431 or 443 or 445).....	3
History of Pacific Ocean Area (Hst 361).....	3
Conservation (ES 211).....	4
Textile Identification (Ch 321).....	2
Physiological Chemistry of Nutrition (Ch 361).....	5
Millinery (HA 321).....	3
Applied Design (HA 435).....	3
Research in Foods (HS 691, 692, 693) Credits to be arranged	
Diet in Disease (HS 420).....	3
Household Management (HAD 440).....	3
Practice Housekeeping (HAD 450).....	4
Tea-room Management (IM 430).....	5
Large-quantity Cookery (IM 310).....	3
Meats (AH 475).....	1
Advanced courses in Art, English, Economics, History and Sociology.	

GENERAL CURRICULUM IN HOME ECONOMICS

(B.Sc. Degree)

For a degree in Home Economics 192 credits are required, not more than $\frac{1}{3}$ of which may be in Home Economics.

Freshman Year

	Term		
	1st	2d	3d
English Composition (Eng 101, 102, 103).....	3	3	3
①Modern Language, Mathematics, Science, or Art.....	3	3	3
Clothing and Texts (HA 108, 109, 110) for students not electing Art	4	4	4
or—			
Clothing and Textiles (HA 111, 112, 113) for students electing Art	(4)	(4)	(4)
Social Ethics (PEw 121), Hygiene (PEw 122).....	1	1	—
Library Practice (Lib 100).....	—	1	—
Introduction to Home Economics (HAd 100).....	1 or	(1)	—
Gymnasium (PEw 111, 112, 113).....	1	1	1
Electives	3	3	3
	16	16	14

Sophomore Year

English	3	3	3
Modern Language, Mathematics, or Science.....	3	3	3
Elements of Physiology (ZP 321).....	—	5	—
Bacteriology	—	—	3
Food Selection and Preparation (HS 203, 204), Elementary Nutrition (HS 205) for students not electing Chemistry	4	4	4
Gymnasium (PEw 121, 122, 123).....	1	1	1
①Electives	6	—	—
	17	16	14

Suggested Electives

	Credits
Sociology	3
Millinery (HA 328).....	2
Applied Design	3
Expression (PSP 264).....	2
Story Telling (PSP 467, 468).....	4

①If a modern language is chosen, at least two consecutive years of that language must be completed.

②Exclusive of the thirty-six credits required in Home Economics a student in choosing electives must complete the equivalent of consecutive study aggregating twenty-four credits in two departments. These may be distributed equally between the two departments or not less than 8 credits in one and the remainder in the other.

Junior Year

	1st	Term 2d	3d
Housewifery (HAD 310).....	3	.....	.....
Child Care (HAD 325).....	.....	3	.....
Economics, Business Administration, and Political Science....	3	3	3
History of Western Civilization II, III (Hst 212, 213), History of South America (Hst 331*).....	3	3	3
Gymnasium	1½	1½	1½
Electives	7	7	10
	16½	16½	16½

Senior Year

Household Management (HAD 445).....	3	.....	.....
Home Nursing (HAD 435).....	.....	3	.....
Gymnasium	1½	1½	1½
Electives	13	13	16
	16½	16½	16½

SUGGESTED ELECTIVES**Junior and Senior Years**

	Credits
Elementary Industrial Journalism (IJ 200).....	3
History of the Pacific Ocean Area (Hst 361).....	3
Elementary Psychology (Psy 301).....	3
Child Mind (Psy 433).....	2
Ethics (Eth 482).....	2
Practice Housekeeping (HAD 450).....	4
Tea-room Management (IM 430).....	5
Large-quantity Cookery (IM 310).....	3
Meats (AH 475).....	1
Home Planning and Furnishing (HA 438).....	3
Home Sanitation	3
Advanced courses in Art, English, History, Modern Language, Economics and Sociology.	

MINOR IN COMMERCE

Students in Home Economics who wish a minor in Commerce should take the following courses as suggested by the Dean of the School of Commerce:

Freshman Year

	1st	Term 2d	3d
Accounting (BA 101, 102, 103).....	3	3	3
or—	.....	.....	.....
Stenography (OT 101, 102, 103), Typing (OT 111, 112, 113)	5	5	5

Sophomore Year

Typing (OT 111, 112, 113).....	2	2	2
or—	.....	.....	.....
Accounting (BA 201, 202, 203).....	3	3	3
or—	.....	.....	.....
Applied Stenography and Typing, Office Training for Steno- graphers (OT 201, 202, 203).....	5	5	5

* Or History of the Pacific Ocean Area (Hst 361)

MINOR IN PHYSICAL EDUCATION

Junior Year

	1st	Term 2d	3d
Elementary Aesthetic Dancing (PEW 131a, 132a, 133a)....	1½	1½	1½
Advanced Outdoor Sports (PEW 241, 242, 243).....	1½	1½	1½
Dancing (PEW 131b, 132b, 133b).....	1½	1½	1½
Apparatus Work (PEW 137, 138, 139).....	1½	1½	1½
Organization and Administration of Physical Education and Recreation (PEW 472).....	---	3	---
Theory and Coaching of Athletic Sports (PEW 376).....	---	---	3
	2	5	5

Senior Year

General Zoology (ZP 101, 102, 103).....	3	3	3
Playground and Gymnastic Games (PEW 375).....	---	3	---
History of Physical Education (PEW 431).....	3	---	---
Principles of Physical Education (PEW 461, 462, 463)....	3	3	3
Advanced Hygiene and Sanitary Science (PEW 423).....	---	---	2
Physical Diagnosis and Anthropometry (PEW 443).....	---	---	3
Advanced Gymnastics (PEW 311, 312, 313).....	1½	1½	1½
Elementary Swimming (PEW 151, 152, 153).....	1½	1½	1½
Electives	---	---	1
	10	10	13

ONE-YEAR INSTITUTIONAL MANAGEMENT
CURRICULUM*

	1st	Term 2d	3d
Physiology and Bacteriology.....	3	3	3
Principles of Foods and Cookery (HS 101).....	4	---	---
Large-quantity Cookery and Marketing (IM 310).....	3	---	---
Business Management for Women (BA 371).....	---	2	---
Meats (AH 475).....	---	1	---
Tea-room Management (IM 430).....	---	5	---
Institutional Management Experience (IM 330).....	---	3	---
Advanced Institutional Management (IM 431).....	---	2	---
Advanced Institutional Management Practice (IM 432)....	---	---	3
English Composition (English 101).....	3	---	---
Home Nursing (HAD 435).....	---	---	3
①Business Correspondence (Eng 105).....	---	---	3
Home Sanitation	3	---	---
Home Planning and Furnishing (HA 438).....	---	---	3
Accounting (BA 101).....	---	---	3
	16	16	18

* Six months of successful field work is required before a certificate is granted.

①Or Typing (OT 111), 2 credits.

HOME ECONOMICS EDUCATION

The function of this department is to give professional training to prospective teachers of Home Economics. Students who have not made an average of 85 or over in the freshman and sophomore years should not register for teacher training work.

COURSES

Hed 304. Secondary Education in Home Economics. A brief history of the development of Home Economics in the elementary and secondary schools; a critical study and preparation of courses of study; organization of a Home Economics department; study of modern plant and equipment.

Required of all students preparing to teach Home Economics; junior year (second or third term) or senior year (first term); 3 credits; 3 recitations.

Hatty R. Dahlberg

Hed 305. Secondary Education in Home Economics. Methods of teaching; daily preparation of lessons; study of textbooks, reference books, and bulletins; preparation of illustrative material; special problems of the Home Economics teacher.

Prerequisites: HEd 304, Psy 301. Required of all students preparing to teach Home Economics; junior year (third term) or senior year (first or second term); 3 credits; 3 recitations.

Hatty R. Dahlberg, Louise Wood

Hed 421. Supervised Teaching in Home Economics. Observation and teaching under supervision.

Prerequisite: HEd 305. Required of all students preparing to teach Home Economics; senior year; any term; 4 credits; 2 recitations; 5 periods teaching.

Hatty R. Dahlberg, Lura Keiser

Hed 422. Supervised Teaching in Home Economics.

Prerequisite: HEd 421 or teaching experience. Elective; senior year; any term; 1 to 3 credits, according to amount of teaching done.

Hatty R. Dahlberg, Lura Keiser, Louise Wood

HOUSEHOLD ADMINISTRATION

Equipment. The department has offices, classrooms and laboratories in the Home Economics Building. A well-equipped and self-supporting Practice House where students may study concrete problems of home management, is located on the campus.

COURSES

HAd 100. Introduction to Home Economics. A course for beginning students. Purpose, value, and scope of Home Economics.

Required in Home Economics; freshman year; first or second term; 1 credit; 1 lecture. *A. Grace Johnson*

HAd 300. Household Sanitation. Investigation of sanitary principles and conditions from the practical and scientific standpoints with special reference to the needs of the household, the school, and the community.

Prerequisites (or parallel): Bac 205, Ph 200. Required in Home Economics Professional Curriculum; junior year; any term; 3 credits: 3 recitations. Fee \$0.50. *Emma S. Weld*

HAd 310. Housewifery. An application of science and economics to the care of the house and its furnishings.

Required in Home Economics; junior year; any term; 3 credits: 3 two-hour laboratory periods. Fee \$2.00. *Emma S. Weld*

HAd 320. Child Care. Development of the child from the time of conception, through infancy, childhood, and adolescence; eugenics; prenatal care; habit formation; proper feeding; child welfare; responsibility of parenthood.

Prerequisites (or parallel): ZP 321, HS 213. Required in Home Economics Professional Curriculum; junior year; any term; 3 credits; 3 lectures. Fee \$0.50. *Mrs. Sarah W. Prentiss*

HAd 325. Child Care. (To meet the needs of students in the General Curriculum in Home Economics. Students in the Professional Curriculum in Home Economics should take HAd 320.) A study of growth and development of child through prenatal period; infancy, childhood, and adolescence; factors influencing.

Required in Home Economics General Curriculum; elective to others; junior year; any term; 3 credits; 3 recitations. Fee \$0.50.

HAd 430. Home Nursing. Care of the patient under home conditions; symptoms; first aid; management of communicable diseases.

Prerequisites: ZP 321, Bac 205. Required in Home Economics Professional Curriculum; senior year; any term; 3 credits; 3 recitations. Fee \$0.50. *Mrs. Katherine B. Haight*

HAd 435. Home Nursing. (To meet the needs of students in the General Curriculum in Home Economics. Students in the Professional Curriculum in Home Economics should take HAd 430.) Care of patient in home; demonstrations of ordinary nursing procedure; home substitutes; bandaging; emergencies; discussion of common diseases.

Required in General Curriculum; elective to others; senior year; any term; 3 credits; 3 recitations. Fee \$0.50.

HAd 440. Household Management. (Parallel or precedes Practice Housekeeping, HAd 450). An application of the principles of scientific management to the home; study of the management of household operations and finances; family and community relationships.

Elective in Home Economics Professional Curriculum; junior or senior year; any term; 3 credits; 3 recitations. Fee \$0.50.

A. Grace Johnson

HAd 445. Household Management. (To meet the needs of students in the General Curriculum in Home Economics and students from other schools, as Commerce, etc. Students in the Professional Curriculum in Home Economics should take HAd 440.) The management of the home; family operations and finances.

Required in Home Economics General Curriculum; elective to others; senior year; any term; 3 credits; 3 recitations. Fee \$0.50.

HAd 450. Practice Housekeeping. (Parallel or follows HAd 440.) A course dealing with the problems of the homemaker. Students live in the College Practice House for six weeks and put into practice the training received in all other Home Economics or related courses. Actual child care. (For students in Professional Curriculum.)

Prerequisites: HAd 310, 320; HS 200 or 213, or equivalent. Elective in Home Economics; junior or senior year; any term; 4 credits; 3 hours work daily. Fee \$6.00 a week for living expenses.

A. Grace Johnson

HAd 691, 692, 693. Modern Problems in Household Administration. Chemical, physiological, bacteriological, economic, or sociological topics, according to the preference and training of the individual students, are investigated under the direction of the instructors in the several departments concerned.

Prerequisite: HAd 440. Elective in Home Economics; senior or graduate year; three terms; credits and hours to be arranged.

HOUSEHOLD ART

Equipment. The department has offices, classrooms, and laboratories in the Home Economics Building. All necessary furnishings and equipment are available for thorough instruction in textiles, dressmaking, tailoring, costume design, applied design, millinery, and house decoration.

COURSES

CLOTHING AND TEXTILES

HA 101. Elementary Clothing and Textiles. Fundamental processes of hand and machine sewing applied to the designing and constructing of undergarments and simple dresses, to repairing, and to decorative needlework; textile discussions.

Required of students in Home Economics who have had no high school sewing; freshman year; first term; 3 credits; 4 two-hour laboratory periods. Fee \$1.50.

HA 108, 109, 110. Clothing and Textiles. (These courses are designed for students registered in the General Curriculum in Home Economics; for those registered in other schools; and for special students. Students with no previous training in clothing are required to take HA 101 as a prerequisite to these courses.) Clothing, textiles, and costume design study to train the judgment and taste of women in the selection, use, and care of clothing and home furnishings, also to give practical experience in designing and constructing different types of garments, children's clothes, remodeled dresses, etc.

Required in Home Economics; elective to others; freshman year; three terms; 4 credits each term; 2 lectures; 6 periods laboratory work; 4 hours preparation. Fee \$1.50 each term.

HA 111. Clothing and Textiles. (For freshmen who have had one year or more of sewing in accredited high schools. Students not able to carry this work successfully are required to take HA 101.) Preparation and use of dress form; adaptation of commercial patterns and practice in flat pattern designing; planning and constructing of cotton and linen skirts, blouses, and dresses with emphasis on proper choice of materials, design, and decoration from standpoint of appropriateness, economy and beauty, textile study.

Required in Home Economics; freshman year; first term; 4 credits; 2 lectures; 2 three-hour laboratory periods. Fee \$1.50.

HA 112. Clothing and Textiles. Design and construction of lingerie and wool dresses, also children's clothes, with emphasis on design, appropriate decoration, and technique; practical study of materials to develop judgment in selection, use and care of clothing and home furnishing.

Prerequisites: HA 111, A 110. Required in Home Economics; freshman year; second term; 4 credits; 2 lectures; 2 three-hour laboratory periods. Fee \$1.50.

HA 113. Clothing and Textiles. Pattern modeling; design and construction of simple silk dresses; art blouses; remodeling in wool

and silk; emphasis on design, proportions, color, and texture. Textile study continued with aim of making more intelligent consumers.

Prerequisites: HA 112, A 120. Required in Home Economics; freshman year; third term; 4 credits; 2 lectures; 2 three-hour laboratory periods. Fee \$1.50.

HA 118. **Short Course in Dressmaking.** (A one-term elective course for young women in School of Commerce and other schools who can devote only this amount of time to clothing and textile study.) Preparation and use of dress form; appropriate designs and principles of construction worked out in planning and making blouses, skirts, lingerie, and wool or silk dresses; principles of art applied to dress; textile discussions.

Elective; any term; 4 credits; 1 lecture; 10 periods laboratory work. Fee \$1.50. *Mary Van Kirk*

HA 311. **Advanced Clothing and Textiles.** This course aims to develop independence, initiative, originality, and art in planning and designing garments for different types of figures, and skill and speed in constructing garments. Design and construction of lingerie dresses, different types of blouses, silk and wool dresses; study of laces, embroideries, tapestries, rugs, furs, leather, etc.

Prerequisites: HA 113, A 130, HA 331, either prerequisite or parallel. Required in Home Economics; junior year; any term; 5 credits; 2 lectures; 3 three-hour laboratory periods. Fee \$1.50.

HA 316. **Advanced Textiles.** Economics of dress; study of composition of materials; microscopic and chemical analysis of textiles; dyeing of fibers; textile legislation, etc.

Prerequisites: HA 113, Ch 103. Elective; senior year; 2 credits; 3 lectures. Fee \$2.00.

MILLINERY

HA 321. **Beginning Millinery.** Designing and constructing frames; methods of covering; trimming and renovating.

Elective; any term; 3 credits; 3 three-hour laboratory periods. Fee \$1.50. *Helen McFaul*

HA 322. **Advanced Millinery.** This course continues the work of HA 321 with the purpose of developing speed, originality, and better technique; increased emphasis on millinery as a creative art; good foundation for trade work.

Prerequisite: HA 321. Elective; any term; 2 credits; 1 lecture; 2 two-hour laboratory periods. Fee \$1.50. *Helen McFaul*

HA 328. **Millinery.** (Brief course for young women in School of Commerce and other schools.) Designing and construction of hats; trimming and renovating.

Elective; any term; 2 credits; 3 two-hour laboratory periods.
Fee \$1.50. *Helen McFaul*

APPLIED DESIGN

HA 331. **Costume Design and Clothing Selection.** Study of human figure; principles of art applied to dress; historic costume and its relation to modern dress; clothing economics; responsibility of consumer.

Prerequisite: A 130. Required in Home Economics; junior year; any term; 3 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$1.50. *Mary Van Kirk*

HA 411. **Dress Design.** Speed problems; designing, modeling, and constructing of afternoon and evening dresses; development of historical costume and its relation to modern fashions with aim of giving practical help and inspiration to students and teachers of dressmaking and costume design.

Prerequisites: HA 311, 331. Elective; senior year; any term; 3 credits; 1 lecture; 6 hours laboratory work. Fee \$1.50.

HA 412. **Trade Course in Dressmaking.** (For students who wish to enter commercial work.) Broader training in selecting, designing, fitting, and constructing garments for different types of figures; organization of work from trade standpoint; emphasis on speed, economy, effectiveness, selling features, etc. Good foundation for specialty shop work.

Prerequisites: HA 311, 331; A 311. Elective; 2 to 4 credits; 1 lecture; 4 to 9 hours laboratory work. Fee \$1.50.

HA 416. **Tailoring.** Development of principles and processes of tailoring; application on suits and coats.

Prerequisites: HA 311, 331. Elective; senior year; 3 credits; 3 three-hour laboratory periods. Fee \$1.50.

HA 431. **House Decoration.** The purpose of this course is to teach students to plan and furnish a moderate-sized home economically and wisely and at the same time apply the art principles of good design and color combinations to choice and arrangement.

Prerequisite: A 130. Required in Home Economics; senior year; any term; 3 credits; 2 recitations; 1 lecture; 1 two-hour laboratory period. Fee \$1.50. *Margaret Morehouse*

HA 435. **Applied Design.** Decorative art involving careful consideration of line, form, proportion, and color; original designs executed in various media for clothing and house-furnishing problems; tie-dying, batik, and stencil decoration for textiles, embroidery, weaving, lamp shade making, etc.

Prerequisite: A 130. Elective; senior year; any term; 3 credits; 3 three-hour laboratory periods. Fee \$2.00.

HA 438. Home Planning and Furnishing. (Brief course planned for students registered in the General Curriculum in Home Economics; for those in schools other than Home Economics, as Commerce, Pharmacy, etc; and for special students; no art requirement.) A one-term course which aims to develop intelligent judgment in the selection of home furnishings from the standpoints of art, economy, and comfort and to further good taste in choice and arrangement.

Elective; any term; 3 credits; 2 recitations; 1 lecture; 1 two-hour laboratory period; 4 hours preparation. Fee \$1.50.

Margaret Morehouse

Note: Students in Household Art courses who do not wish to make garments or hats for themselves may be furnished material through orders given the department.

HOUSEHOLD SCIENCE

Equipment. Two single laboratories accommodating twenty students each, and two double laboratories accommodating forty students each are well equipped with modern equipment. Gas, electric, and wood stoves in each laboratory make it possible to give full instruction in the use of these fuels and also provide opportunity for students to prepare foods in moderately large amounts. Three suites of kitchen, dining-room, and living-rooms are furnished in such a way as to show a wise selection for families on different incomes. These suites are used for class instruction in meal service.

Two complete approved uniforms are required for all students taking laboratory courses in Household Science. Directions for uniforms may be secured from the office of the Dean.

COURSES

HS 101. Principles of Foods and Cookery. This course is a resume of elementary cookery. It gives an opportunity for developing laboratory technique through work planned on the meal basis. The aim is to cover in one term those principles which are included in a high school course in cookery. Not required of those students electing Professional, General, or Institutional curricula who have had 90 hours or more of Household Science in an accredited high school.

Any term; 4 credits; 2 recitations; 2 three-hour laboratory periods. Fee \$4.00.

HS 150. Food Selection and Preparation (for Men). A course for men who are planning and preparing their own meals or who are acting as managers of clubs.

Elective to men; second term; 1 credit; 1 three-hour laboratory period. Fee \$2.50.

HS 201. Food Selection and Preparation. A unit course for students who desire to learn food selection and preparation by meal service. Sections limited to eight.

Elective in Commerce and other departments; sophomore year; any term; 3 credits; 1 recitation; 2 three-hour laboratory periods. Fee \$5.00.

HS 203. Food Selection and Preparation. An introduction to the subject of foods; selection, preparation, and service. Arranged to meet the needs of students taking the General Curriculum in Home Economics.

Prerequisite or parallel: ZP 321, Bac 223, HS 101, or equivalent. First term; 4 credits; 2 recitations; 2 three-hour laboratory periods. Fee \$4.00.

HS 204. Food Selection and Preparation. Continuation of HS 203.

Prerequisite: HS 203. Sophomore year; second term; 4 credits; 2 recitations; 2 three-hour laboratory periods. Fee \$4.00.

HS 205. Elementary Nutrition. A simplified study of food materials in their relations to the daily dietary of families under various conditions of environment.

Prerequisite: HS 204. Junior year; third term; 4 credits; 2 recitations; 2 three-hour laboratory periods. Fee \$4.00.

HS 211. Food Selection and Preparation. Study of foods in their scientific and economic aspects; selection, preparation, and service.

Prerequisites: HS 101 or equivalent; Ch 103; Bot 201 and Ch 221 prerequisites or parallel. Required in Home Economics Professional Curriculum; first or second term; 4 credits; 2 recitations; 2 three-hour laboratory periods. Fee \$4.00.

HS 212. Food Selection and Preparation. A continuation of HS 211.

Prerequisite: HS 211. (Ch 222 must precede or parallel this course.) Required in Home Economics; sophomore year; second or third term; 4 credits; 2 recitations; 2 three-hour laboratory periods. Fee \$4.00.

HS 213. Food Selecton and Preparation. A continuation of HS 212.

Prerequisite: HS 212. Required in Home Economics; sophomore year; any term; 4 credits; 2 recitations; 2 three-hour laboratory periods. Fee \$4.00.

HS 320. Nutrition. Scientific study of food materials in their relation to the daily dietary of families under various conditions of environment; dietary standards of metabolism; comparison of the nutritive values of common foods by computing, preparing, and serving dietaries of specific costs, furnishing specific nutrients.

Prerequisites: HS 213, ZP 321, Ch 222. Required in Home Economics Professional Curriculum; junior year; any term; 5 credits; 3 recitations; 3 two-hour laboratory periods. Fee \$4.00.

HS 350. Camp Cookery (for Men). Preparation of palatable and nutritious products from foods available in camps; outdoor food preparation involving the use of Dutch ovens, reflectors, and improvised camping utensils.

Elective in Forestry, Agriculture, Engineering, and Commerce; junior or senior year; third term; 1 credit; 1 three-hour laboratory period. Fee \$4.00.

HS 420. Diet in Disease.

Prerequisite: HS 320. Elective in Home Economics; second or third term; 3 credits; 2 lectures; 1 three-hour laboratory period. Fee \$2.00.

HS 430. Methods of Demonstration. Public demonstrations in food selection and preparation; illustrative demonstrations by instructors.

Prerequisites: HS 213, 320. Elective in Home Economics; junior or senior year; second or third term; 1 credit; 1 three-hour laboratory period. Fee \$1.50.

HS 435. Experimental Cookery. Individual problems. Each student selects some piece of work concerned with foods or related subjects. Oregon products often furnish material for these experiments.

Prerequisite: HS 213. Elective in Home Economics; senior year; any term; 2 credits; 2 three-hour laboratory periods. Fee \$2.00.

HS 436. Advanced Cookery. This course is intended to acquaint the student with a great variety of food materials, and the more complicated processes of cookery.

Prerequisite: HA 213. Elective; third term; 2 credits; 1 lecture; 1 three-hour laboratory period. Fee \$5.00.

HS 691, 692, 693. Research in Foods. Research problems for which the student is suited by previous training and ability. Assignment of problems by the professor in charge.

Elective; graduate year; three terms; credits and hours to be arranged.

INSTITUTIONAL MANAGEMENT

Equipment. The new dormitory for women, with its modern equipment and conveniences; an attractive tea-room with the latest institutional devices for work; and cafeteria facilities for instruction, permit of offering the highest type of training in institutional management, for which there is an increasingly great demand.

COURSES

IM 310. Large-quantity Cookery and Marketing. Application of the principles of cookery to the preparation of food in large quantities; planning and preparation of meals for dining-hall and cafeteria; calculation of cost and calories in standard servings; the study of the problems involved in the purchase of institutional supplies.

Prerequisite: HS 213 in Professional Curriculum; HS 201 in General Curriculum; (practical experience for students in one-year curriculum). Elective; any term; 3 credits; 1 lecture; 2 three-hour laboratory periods.
Melissa Hunter

IM 330. Institutional Management Experience. Work in office of Director of Dormitories; studies of business methods employed; practice work in bill checking, filing, making requisitions, etc.; inventories including (1) food (stock taking), (2) linen, (3) china and small equipment, (4) furniture and large equipment; studies of all types of form records to be kept and various other phases of dormitory and cafeteria management.

Elective; any term; 3 credits; 1 lecture; 2 three-hour laboratory periods.
Sibylla Hadwen, Melissa Hunter

IM 430. Tea-room Management. Training in various lines of management of tea-rooms, including plans, preparations, and service of luncheons to the public.

Prerequisite: HS 205 or 213 (except for students in one-year curriculum). Elective; any term; 5 credits; 1 lecture; 5 four-hour laboratory periods for six weeks.

IM 431. Advanced Institutional Management. Organization; standardization; scientific management applied to institutions; service and wages; methods of choosing and training employees; welfare work among employees; duties of a manager; institutional work in other universities and colleges.

Prerequisite: IM 330. Elective; any term; 2 credits; 2 lectures.
Sibylla Hadwen, Melissa Hunter

IM 432. Advanced Institutional Management Practice. A continuation of IM 330. Responsibility of management; field work in different types of institutions.

Prerequisite: IM 330. Elective; any term; 3 credits; 3 three-hour laboratory periods.
Sibylla Hadwen

School of Mines

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.

CHARLES EDWARD NEWTON, E.M., Dean of the School of Mines.

MYRTLE BURNAP, B.Sc., Secretary to the Dean.

DOUGLAS CLERMONT LIVINGSTON, B.Sc. (Mining Eng.), Professor of Geology.

JAMES HERVEY BATCHELLER, B.Sc. (Mining Eng.), Associate Professor of Mining Engineering.

The curriculum in Mines is designed to give thorough training in the fundamentals of the science of Geology, and the arts of Mining and Metallurgy, and to prepare for positions of responsibility in the industrial life of the country, particularly in the mining field. The curriculum is of such a comprehensive character that a graduate finds it of aid in varied employments. The opportunities which are open to a graduate of the School of Mines include such positions as assayer, chemist, or metallurgist at mines and smelters; member of staffs of the Government and state geological surveys; member of the staff of the Government Coast and Geodetic Survey; land or deputy mineral surveyor; draftsman and designer in engineering establishments; member of the engineering and geological staffs of mining, oil, and exploration companies and of railroads; and worker in the land-classification work of the Government forest service. Graduates may expect that after having reached the necessary maturity they will be competent to fill responsible positions in any branches of geology, mining, and metallurgy.

Curriculum. A four-year curriculum, leading to the degree of Bachelor of Science in Mining Engineering, is offered by the School of Mines. Students showing ability are offered the opportunity and encouraged to take special work in that branch of the profession that most interests them, such as geology, mining, or metallurgy.

The first two years in the School of Mines are the same for all students. The work is intended to give the student a thorough knowledge of those studies basic to all branches of engineering; namely, Mathematics, Physics, Chemistry, Mechanical Drawing, Plane Surveying, Shop Work, and courses having general cultural value.

Two months or more employment in industrial lines closely allied to the student's major work is a prerequisite to graduation.

Equipment. The School of Mines occupies a commodious, three-story and basement building especially designed for housing the

lecture rooms and laboratories devoted to Mining, Metallurgy, Ore Dressing, Geology, and closely allied subjects. The assaying and metallurgical laboratory occupies a room 30 feet by 60 feet on the first floor of the building, extending across the entire east end. It is amply lighted and is completely equipped with the necessary apparatus for conveniently and scientifically carrying on experimental metallurgical operations. A crushing and grinding laboratory and an ore-testing laboratory, completely equipped, occupy two rooms in the basement. On the second floor is located the mining drafting room, equipped for topographical drafting, mining and metallurgical design. The geology laboratories occupy the third floor of the Mines Building, and comprise the Geologic and Mining Museum, the mineralogic laboratory, and the petrologic laboratory. In the Museum are arranged collections of ores, minerals, and rocks from the important mining camps in Oregon. Besides these collections there are many attractive specimens of minerals, rocks, and fossils from numerous American localities. Geologic products are shown, such as samples of different clay wares and cement goods. In addition there is a large-scale relief map of the state. The geologic laboratories contain over 12,000 specimens of ores, rocks, and minerals; rock slides for microscopic work; and geologic and topographic maps.

Miners' Club. The Miners' Club is a society composed of all students and faculty members of the School of Mines. All members of this organization are also members of a junior branch of the American Institute of Mining and Metallurgical Engineers. At the monthly meetings of the Club, addresses are made by prominent mining engineers, and papers descriptive of the summer work of the students are presented by the student members.

DEGREE CURRICULUM IN MINING ENGINEERING

(*B.Sc. Degree*)

Freshman Year	Term		
	1st	2d	3d
General Chemistry (Ch 104, 105, 106).....	5	5	5
Plane Trigonometry (Mth 111), Elementary Analysis (Mth 131, 132).....	4	4	4
Mechanical Drawing (ME 111, 112).....	2	2	.....
English Composition (Eng 101, 102, 103).....	3	3	3
Drawing and Descriptive Geometry (CE 113).....	.....	.....	2
Elements of Geology (G 101).....	1	.....	.....
Elements of Mining (MiE 142).....	.....	1	.....
Elements of Metallurgy (Met 163).....	.....	.....	1
Physical Education (PEm 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
	17½	17½	17½

Sophomore Year

	1st	2d	3d
Quantitative (Ch 241, 243), Qualitative Analysis (Ch 231)....	3	7	2
Differential Calculus (Mth 251), Integral Calculus (Mth 252)	4	4	....
Physics (Ph 221, 222, 223).....	3	5	3
Plane Surveying (CE 121).....	....	....	5
Crystallography, Blowpipe Analysis, and Determinative Mineralogy (G 211, 212).....	5	3	....
Library Practice (Lib 100).....	....	....	1
Public Speaking, or History, or Modern Language, or English .....	....	....	3
Physical Education (PEm 211, 212, 213).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$

Junior Year

Mechanics (MM 351, 352).....	3	3	....
Lithology or Rock Study (G 311).....	3	....	....
Structural Geology (G 312).....	....	2	....
General Geology (G 301).....	3	....	....
Mining Machinery and General Mining (MiE 343).....	....	....	3
Geologic Surveying and Mapping (G 323).....	....	....	3
Mine Surveying (MiE 353).....	....	....	3
Assaying (Met 362).....	....	4	....
Ore Dressing (Met 381, 382, 383).....	3	3	3
Introduction to Economics (ES 391).....	3	....	....
National Government (PS 301), or State and Local Government (PS 302).....	....	3	....
①Electives	3	3	3
	<hr/> 18	<hr/> 18	<hr/> 15

Senior Year

Mining Methods (MiE 441), Mining Engineering (MiE 442), Mine Management (MiE 443).....	4	4	3
Metallurgy of Gold and Silver (Met 462), Metallurgy of Copper, Lead, and Zinc (Met 463).....	....	4	4
Business Organization and Management (BA 381).....	....	....	3
Metallurgical Laboratory (Met 491, 492).....	3	3	....
Metallurgy of Iron (Met 473).....	....	....	1
General Metallurgy (Met 461).....	4	....	....
Economic Geology (G 431, 432, 433).....	3	3	3
②Electives	3	3	3
	<hr/> 17	<hr/> 17	<hr/> 17

①Suggested electives; Materials of Engineering (MM 311), Hydraulics (CE 444), Steam Machinery (ME 331).

②Suggested electives: Technical Electricity (EE 251), Assaying (Met 651).

PROPOSED ELECTIVES

Public Speaking.
Industrial Journalism.
Money and Banking.
Modern Languages.
History.
Library Practice.
English.
Industrial Arts courses (woodwork, machine work, automobile mechanics, blacksmithing, plumbing).
Steam Power Plants.
Masonry and Foundations.
Industrial Inorganic Chemistry.
Industrial Organic Chemistry.
Electro-chemical Industries.
Forest Mapping.
Contracts and Specifications.
Engineering Location, Earthworks.
Machine Design.
Topographic Surveying.
Advanced Quantitative Analysis.
Metallography and Pyrometry.
Advanced courses offered in the School of Mines.

GEOLOGY

The courses in Geology are designed primarily to give the student of Mining Engineering a sound knowledge of the principles of the many branches of the science, and a thorough training in geologic technique having a direct bearing upon the mining profession. Advanced technical courses in Geology are open to qualified students. Several geologic courses are especially designed for students in Agriculture, Civil Engineering, and Forestry.

COURSES

G 101. Elements of Geology. In order to have the simplest conception of the mining profession, one must have an elementary knowledge of Geology. The aim of this course is to give a general outline of the fundamentals of Geology and to show their correct application to mining engineering.

Required in Mines; elective to others; freshman year; first term; 1 credit; 1 lecture. *C. E. Newton*

G 211. Crystallography, Blowpipe Analysis, and Determinative Mineralogy. The underlying principles of crystal form, chemical and blowpipe methods, physical and optical properties of minerals, and the practical use of these principles in mineral determination.

Required in Mines; sophomore year; first term; 5 credits; 2 recitations; 4 two-hour laboratory periods. Fee \$4.00. Deposit \$1.50. Text: Kraus and Hunt, Mineralogy. *D. C. Livingston*

G 212. Mineralogy. A continuation of G 211, including sight recognition of a large number of important economic and common rock-forming minerals by means of simple physical tests; microscopic mineralogy which involves the recognition of rock-forming minerals by means of their optical characters and includes index of refraction with immersion media. Some time is also spent on the occurrence and origin of minerals.

Prerequisite: G 211. Required in Mines; sophomore year; second term; 3 credits; 1 recitation; 3 two-hour laboratory periods. Fee \$2.00. Deposit \$1.50. Text: Kraus and Hunt, Mineralogy, Crystallography, and Blowpipe Analysis. *D. C. Livingston*

G 214. Crystallography. Briefer course than G 211.

Required in Chemical Engineering; sophomore year; first term; 3 credits; 1 recitation; 3 two-hour laboratory periods. Fee \$2.50. Deposit \$1.50. *J. H. Batcheller*

G 215. Mineralogy. Topics covered in G 212 adapted to needs of Chemical Engineering students.

Required in Chemical Engineering; sophomore year; second term; 3 credits; 1 recitation; 3 two-hour laboratory periods. Fee \$2.00. Deposit \$1.50. *J. H. Batcheller*

G 301. General Geology. Principles of geology, including constitution of the earth, rock-forming minerals; rocks; rock weathering; work of wind, streams, and glaciers; underground water; work of the ocean; lakes; vulcanism and earth movements; brief summary of the historical geology of North America. General Chemistry is recommended as a prerequisite though not required.

Required in Mines; junior year; first term; 3 credits; 3 recitations. Text: Pirsson and Schuchert, Textbook of Geology, Part 1. *D. C. Livingston*

G 301a. General Geology. Similar to G 301. For Civil Engineering students.

Required in Civil Engineering; senior year; first term; 3 credits; 3 recitations; 1 two-hour laboratory period. Fee \$1.00. Text: Pirsson and Schuchert, Textbook of Geology, Part I. *D. C. Livingston*

G 301b. General Geology. Similar to G 301. Elective to all students.

Third term; 3 credits; 3 recitations. Text: Pirsson and Schuchert, Textbook of Geology, Part I. *D. C. Livingston*

G 301c. General Geology. Same as G 301, but especially arranged for students in Agriculture, Landscape Gardening, and Forestry.

Third term; 3 credits; 3 recitations; 1 two-hour laboratory

period. Fee \$1.00. Text: Pirsson and Schuchert, Textbook of Geology, Part I. *D. C. Livingston*

G 302. **Historical Geology.** Origin and history of the earth and the evolution of plants and animals as disclosed by fossils in the rocks; emphasis upon the growth and development of the North American continent and the sequence of events up to the present time.

Elective to all students; second term; 3 credits; 3 lectures. Text: Pirsson and Schuchert, Textbook of Geology, Vol. II.

D. C. Livingston

G 302a. **Historical Geology.** Similar to G 302. Elective to all students. Second term; 3 credits; 3 recitations; 1 two-hour laboratory period. Text: Pirsson and Schuchert, Textbook of Geology, Vol. II.

D. C. Livingston

G 311. **Lithology or Rock Study.** This course is intended to familiarize the student with the characteristics of the commoner rocks so that he may identify them in the field. Microscopic examination of thin sections of rock to bring out the essential features of rocks which a study of hand specimens alone does not effect; origin, occurrence, and alteration of rocks studied in considerable detail.

Prerequisites: G 212 and 301. Required in Mines; junior year; first term; 3 credits; 2 lectures; 2 two-hour laboratory periods. Fee \$1.00. Text: Kemp, Handbook of Rocks.

D. C. Livingston

G 312. **Structural Geology.** This course is a study of the broader features of the earth's surface and underlying structures of the rocks, including topographic forms, the making of structure sections from surface geology, the influence of folding, the solution of fault problems, and the use of structure contours in the location of coal beds and oil-bearing strata.

Prerequisite: G 311. Required in Mines; junior year; second term; 2 credits; 1 lecture; 2 two-hour laboratory periods. Fee \$1.00.

D. C. Livingston

G 323. **Geologic Surveying and Mapping.** A study of the principles and methods of geologic surveying and mapping and their application to field work. The student is assigned a small area and is required to make a geologic map and report, based upon the results of his field work. A two-week trip is made to a mining locality showing a variety of geologic features.

Prerequisite: G 312. Required in Mines; junior year; third term; 3 credits; 1 recitation; 6 hours in field and laboratory. Fee \$2.00.

D. C. Livingston, J. H. Batcheller

G 413. Petrography. A more advanced course in Petrology. The optical properties of the rock-forming minerals and the characteristics of the principal rock types are studied with the aid of thin sections and polarizing microscope. Type collections with their corresponding rock sections are available, and the student has the opportunity to supplement field determinations with the exact knowledge gained through the use of the microscope.

Prerequisites: G 311, 312. Elective; third term; 3 credits; 1 recitation; 3 two-hour laboratory periods. Fee \$3.00.

D. C. Livingston

G 422. Interpretation of Geologic and Topographic Maps. Study of the representation of geologic and topographic data; interpretation of geologic maps and cross-sections of topographic maps; methods of plotting geologic data on engineering maps; a large number of Government and other geologic and topographic maps covering varied regions of the United States studied in detail.

Elective in Mines, Engineering, and Forestry; junior or senior year; second term; 2 credits; 2 laboratory periods. Fee \$1.00.

D. C. Livingston, J. H. Batcheller

G 431. Economic Geology. A study of the many and various factors pertaining to the application of geology to industry. Geologic occurrence of coal, petroleum, gas, clay, building stone, ore deposits, and the like is carefully studied and particular attention is given to those characteristics affecting economic value.

Required in Mines; senior year; first term; 3 credits; 3 recitations. Text: Lindgren, Mineral Deposits.

D. C. Livingston

G 432. Economic Geology. Continuation of G 431. The principles of ore deposition are taken up in detail.

Prerequisite: G 431. Required in Mines; senior year; second term; 3 credits; 3 recitations. Text: Lindgren, Mineral Deposits.

D. C. Livingston

G 433. Economic Geology. Various types of deposits that occur in important mining camps are discussed, and written abstracts are required from literature bearing on the subject. Considerable importance is attached to the laboratory work, which consists of mineralogic and petrologic study of rocks and ores from type deposits. A certain amount of time is devoted to a discussion of field methods, mine examinations, and reports.

Prerequisite: G 432. Required in Mines; senior year; third term; 3 credits; 2 recitations; 1 three-hour laboratory period. Fee \$1.00.

D. C. Livingston

G 611. Geology of Igneous Rocks. A course dealing with the origin of igneous rock bodies and designed for graduate or advanced

students. Such subjects as magmatic differentiation, the mechanism of intrusive and extrusive action, are discussed in detail, and special attention is given to those subjects that have an important technical bearing, such as contact metamorphism, magmatic waters, gaseous emanations, etc.

Prerequisite: G 413. Elective; senior year; first term; 2 credits; 2 recitations. *D. C. Livingston*

G 622. Oil Geology. A course in the geology of petroleum consisting of a study of the origin, geologic occurrence, geologic structure and distribution of deposits of petroleum and natural gas, with special reference to the oil and gas fields of the United States, Mexico, and South America. Methods of exploring for oil, methods of mapping geologic structure, and methods of recording and filing geologic data bearing upon the geology of oil and gas, are studied.

Prerequisite: G 312. Elective; senior year; second term; 2 credits; 2 lectures or recitations; 1 laboratory period.

D. C. Livingston

G 632. Problems in Economic Geology. Problems in mining and field geology are worked out by the student in the laboratory and drafting room. Geologic, topographic, and mine maps are used, and many structural problems are studied, with special regard to their application to the development of mineral deposits.

Prerequisite: G 431. Elective; senior year; second term; 2 credits; 2 laboratory periods. Fee \$1.00. *D. C. Livingston*

METALLURGY

The aim of the various courses in Metallurgy is to give the student a broad and general knowledge of the methods of treating ores, metals, and other products of the mineral industry, including the processes of assaying, amalgamation, cyanidation; general milling methods, such as crushing, grinding, and concentration; and the smelting of ores for iron, copper, lead, and zinc, and the minor metals, and their refining.

COURSES

Met 163. Elements of Metallurgy. An introductory course in Metallurgy; various phases of the treatment of ores; use of fuels; the production of metals.

Required in Mines; elective to others; freshman year; third term; 1 credit; 1 lecture. *C. E. Newton*

Met 362. Assaying. The quantitative determination of the constituents of reagents; crushing, sampling and assaying of ores; fluxes and general metallurgical products.

Required in Mines; junior year; second term; 4 credits; 1 recitation; 3 four-hour laboratory periods. Deposit \$15.00. Text: Fulton, Manual of Fire Assaying. *C. E. Newton*

Met 381, 382, 383. **Ore Dressing.** The principles of breaking, grinding, concentrating; general treatment of ores by various processes.

Required in Mines; junior year; three terms; 3 credits each term; 3 recitations. Texts: Richards, Textbook of Ore Dressing. Taggart, Manual of Flotation Process. *C. E. Newton*

Met 461. **General Metallurgy.** Application of the laws of Chemistry and Physics to metals and alloys; study of fuels, refractory materials, metals and alloys; furnaces and the principles of smelting.

Required in Mines; senior year; first term; 4 credits; 4 recitations. Text: Hofman, General Metallurgy. *C. E. Newton*

Met 462. **Metallurgy of Gold and Silver.** Study of the smelting, amalgamation, cyanidation, and other processes for the production of gold and silver from their ores.

Required in Mines; senior year; second term; 4 credits; 4 recitations. *C. E. Newton*

Met 463. **Metallurgy of Copper, Lead, and Zinc.** Study of the method of producing and refining; the economic conditions affecting the production of common non-ferrous metals.

Required in Mines; senior year; third term; 4 credits; 4 recitations. *C. E. Newton*

Met 473. **Metallurgy of Iron.** Study of the smelting of iron from its ores; the production of cast iron and wrought iron and the general varieties of steel.

Required in Mines; senior year; third term; 1 credit; 1 recitation. Text: Bradley Stoughton, Metallurgy of Iron and Steel.

C. E. Newton

Met 491, 492. **Metallurgical Laboratory.** Laboratory testing in connection with Met 462, Metallurgy of Gold and Silver; Met 463, Metallurgy of Copper, Lead, and Zinc; and Met 381, 382, 383, Ore Dressing.

Required in Mines; senior year; first and second terms; 3 credits each term; 3 three-hour laboratory periods. Fee \$5.00. Deposit \$5.00 each term. *C. E. Newton, J. H. Batcheller*

Met 651. **Assaying.** The quantitative determination of the constituents of ores, metallurgical products, and fuels.

Elective in Mines; junior year; third term; 3 credits; 1 recitation; 2 three-hour laboratory periods. Fee \$5.00. Deposit \$5.00. Text: White, Methods in Metallurgical Analysis. *C. E. Newton*

Met 661. **Metallurgy of the Minor Metals.** The metallurgy of mercury, tin, aluminum, nickel, arsenic, and antimony; study of the methods of production and the uses in the arts.

Elective; senior year; first term; 2 credits; 2 recitations.

C. E. Newton

Met 662. **Metallurgical Design.** Study of plant flow sheets; designing of apparatus for metallurgical operations; working up of flow sheets for milling, smelting, and leaching operations.

Elective; senior year; second term; 2 credits; 2 laboratory periods. Fee \$2.00.

C. E. Newton

Met 663. **Electrometallurgy.** The principles, processes, and apparatus involved in using electrical energy for the smelting and refining of ores and metals.

Elective; senior year; third term; 2 credits; 2 recitations.

C. E. Newton

MINING ENGINEERING

The courses in Mining Engineering are intended to equip the student with thorough knowledge of the basic principles of the art of mining which are essential in development of mineral properties, design and construction of mine plants, and management of mines.

COURSES

MiE 142. **Elements of Mining.** An introductory course designed to give the main features of mining, the aim being to summarize the phases that the student takes up in detail later in his work, to acquaint him early in his course with the life, the work, and the field of the profession.

Required in Mines; elective to others; freshman year; second term; 1 credit; 1 lecture.

C. E. Newton

MiE 143. **Explosives: Their Properties and Use.** This course offers an opportunity to students in Agriculture, Forestry, Civil Engineering, or others, to learn the principles of explosive action and to study the properties of explosives. Proper use of common high explosives; waste and danger of improper use; emphasis upon the various methods of using explosives as applied to farming, road building, etc.; actual field practice in loading and firing; blasting with the aid of electricity.

Prerequisite: General Chemistry. Elective; junior year; third term; 2 credits; 1 lecture each week; 4 three-hour laboratory periods during the term. Fee \$1.00.

J. H. Batcheller

MiE 243. Excavation, Explosives, and Blasting. Methods and cost of earth and rock excavation, tunneling, and shaft sinking; study of explosives used in mining and excavation work; methods of handling and storing explosives; methods of blasting.

Elective; sophomore year; third term; 3 credits; 3 lectures.

J. H. Batcheller

MiE 343. Mining Machinery and General Mining. A study of mining machinery and equipment used in general mining and prospecting work; brief discussions and illustrations of general mining operations, including metal, coal, and oil.

Required in Mines; junior year; third term; 3 credits; 3 recitations. Text: Young, Elements of Mining.

J. H. Batcheller

MiE 353. Mine Surveying. Study of the methods of surveying as used on surface and underground in connection with mining operations; United States land subdivision and mining laws; claim surveys and locations; patent work; topographic surveys and maps; underground methods of traversing; stope measurement; connections; a field trip during the last two weeks of the term to some mine in the vicinity of the College.

Required in Mines; junior year; third term; 3 credits; 2 recitations; 1 laboratory period. Fee \$2.00. Text: Peele, Mining Engineers Hand Book.

J. H. Batcheller

MiE 441. Mining Methods. A comprehensive study and comparison of all systems of mining; a detailed study of the advantages and disadvantages of various stoping methods, methods of development, and of carrying on simultaneously developing and producing.

Required in Mines; senior year; first term; 4 credits; 4 recitations. Texts: Young, Elements of Mining. Peele, Mining Engineers Hand Book.

J. H. Batcheller

MiE 442. Mining Engineering. A study of the control and coordination of all the major activities of mine operations (developing, mining, transportation of ore, milling, production of power, and marketing of products), by cost accounting and technical records, supplemented by design of general mine plant layout and special features.

Prerequisite: MiE 441. Required in Mines; senior year; second term; 4 credits; 2 recitations; 2 three-hour laboratory periods. Fee \$2.00. Text: Hoover, Principles of Mining.

J. H. Batcheller

MiE 443. Mine Management. A study of the economic factors affecting mining enterprises, the restrictions imposed by the mining laws of the United States, Canada, and Mexico, the methods of handling employees, the examination and appraisal of prospects and

mines, methods of keeping abreast of progress in the profession through abstracts of current technical journals and mining institute publications.

Required in Mines; senior year; third term; 3 credits; 3 recitations.
J. H. Batcheller

MiE 641. Mine Economics and Mining Law. Study of the costs of mining; methods of mine accounting and cost keeping; mining laws of the United States, Canada, and Mexico.

Elective; senior year; first term; 3 credits; 3 recitations.
J. H. Batcheller

MiE 642. Mine and Power Equipment. Study of surface and underground equipment for mines, including haulage systems, hoists, compressors, drills, pumps, etc.; discussion of the sources of power, water, hydroelectric, steam, gas, and compressed air; problems illustrating their application to mining methods.

Elective; senior year; second term; 3 credits; 3 recitations.
J. H. Batcheller

MiE 643. Mine Plant Design. The student designs and details plans and specifications for mine equipment to meet the requirements of a hypothetical mine.

Elective; senior year; third term; 2 credits; 2 three-hour laboratory periods. Fee \$2.00.
J. H. Batcheller

School of Pharmacy

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.

ADOLPH ZIEFLE, Ph.C., M.S., Dean of the School of Pharmacy.

MERRILL OLIVER RAWSON, Ph.C., B.Sc., Assistant Professor of Pharmacy.

FRANCOIS ARCHIBALD GILFILLAN, Ph.D., Assistant Professor of Pharmacy.

RAY LEONARD ABRAHAM, Ph.C., Teaching Fellow in Pharmacy.

The School of Pharmacy was established in 1898 by the Board of Regents of the College upon petition of the druggists of the state to meet the growing demand for thorough practical and theoretical training in Pharmacy and related branches. From its inception, it has grown steadily and has always had a place in the front rank of the profession.

It is the aim of the School of Pharmacy to prepare students for the intelligent practice of all branches of Pharmacy. Its equipment, methods of instruction, courses of study, and other resources are arranged to meet the demands of the present day. Requirements for entrance and graduation exceed those of the Oregon State Pharmacy Law.

Class instruction, entrance requirements, and scientific standards are the same as in the other schools of the College, as well as in other Class A schools and colleges of pharmacy. Students share all of the advantages and enjoy the spirit of a great educational institution.

Curricula. Two degree curricula are offered: a four-year curriculum, leading to the degree of Bachelor of Science in Pharmacy and a three-year curriculum leading to the degree of Pharmaceutical Chemist. In addition, the School of Pharmacy offers a pre-medical course and a pre-dental course. Since the three and four-year curricula in Pharmacy contain many subjects required by medical schools for entrance, it is possible for students to register in either of these curricula and take a combined pharmacy and pre-medical course. The requirement for entrance to degree curricula is fifteen Carnegie units or equivalent. Students 21 years of age or over who have had practical drug-store experience, and who have been unable to complete a four-year high school course, may register as "special" students, not candidates for a degree. Such students must fill out an application blank showing their previous training and experience.

Purpose of Training. Consistent endeavor has been made to provide well-balanced courses that will prepare students not only for practical drug-store work but for a variety of positions in pharmaceutical, analytical, and medical chemistry. Students are trained not only in technique, power of observation, and the principles of pharmacy, but also in resourcefulness, initiative, and individual responsibility.

Standard of Work. All work offered in the School of Pharmacy meets the highest requirements of pharmaceutical instruction in this country. The School is a member of the American Conference of Pharmaceutical Faculties, and its curricula are registered by the New York Board of Higher Education. The facilities for theoretical and practical instruction are all that could be desired. Realizing the broad training that students receive from laboratory work, this has been made a special feature of the School. Diplomas, as well as the work of students in this School, are recognized by all state boards of pharmacy requiring attendance in a school of pharmacy as a prerequisite for examination and registration.

American Conference of Pharmaceutical Faculties. The purpose of this Conference is to promote the interest of pharmaceutical instruction in the United States. Institutions holding membership must maintain certain minimum requirements for entrance and graduation. The influence of the Conference has been so great that many states either by law or by ruling of the state board of pharmacy recognize its standards.

Methods of Instruction. Lecture periods are fifty minutes each, laboratory periods two or three hours, depending upon the character of the work. Courses continue through the regular college year of nine months. As the schedule of study is prepared at the beginning of each term, it is impossible until that time to state definitely the hours when certain courses will be given. As a rule, students spend approximately three-fourths of their time in lecture and laboratory work.

Requirements of the Pharmaceutical Profession. Public sentiment demands high requirements for the practice of Pharmacy through the enactment of stringent state and Federal laws. It is now a necessity that pharmacists have a scientific training such as cannot be obtained by merely working in a drug store. The Oregon State Board of Pharmacy, recognizing the importance of supervised theoretical and practical instruction as a means of insuring accurate preparation and dispensing of medicines, now requires college training as a prerequisite for examination and registration.

Oregon Law Relating to the Practice of Pharmacy. The Oregon Pharmacy Law is enforced by the Oregon State Board of Pharmacy. This Board recognizes two classes of pharmacists; namely, registered pharmacists and assistant registered pharmacists. The state law outlines the scope and duties of each class with regard to the dispensing of prescriptions, sale of poisons, and the manufacture of medicines. Before a candidate is eligible to take the state pharmacy examination either as registered pharmacist or assistant registered pharmacist he must be over eighteen years of age, and have had a definite amount of theoretical and practical training. A registered pharmacist can operate a drug store, compound medicinal preparations, dispense prescriptions, sell poisons, and train assistant registered pharmacists. An assistant registered pharmacist must meet certain requirements of the State Board, including the passing of an examination. His duties are to assist the registered pharmacist, but he cannot compound medicines, operate a drug store, sell poisons, or dispense prescriptions. A resume of the Oregon Pharmacy Law passed by the 1921 session of the state legislature is as follows:

Requirements For Registered Pharmacists: Beginning January 1, 1922, all candidates for examination as registered pharmacists must have attended a recognized school or college of pharmacy for two years, during which time they must have been registered in a degree course. In addition, the applicant must present evidence of having had two years' practical drug-store experience under the supervision of a registered pharmacist. Not more than twenty-four months of attendance in a recognized school or college of pharmacy may be used as practical experience.

Assistant Registered Pharmacists: Candidates must be over eighteen years of age, and must show evidence of having had three years of practical drug-store experience. Two years of this time may have been spent in a recognized school or college of pharmacy. An assistant registered pharmacist is eligible to take the examination for full registration as soon as he can meet the requirements.

Reciprocity. Since the Oregon Board of Pharmacy is a member of the National Association of State Boards of Pharmacy, students who are registered by this Board are privileged to reciprocate with forty-four other states in the Union, without further examination.

Demand For Graduates. The demand for the thoroughly trained pharmacist was never so great as at the present time. The demand, however, is for those having business ability, industry, integrity, and a thorough pharmaceutical education. Because of the great responsibility of the profession of pharmacy, in no line of work is expert knowledge so necessary.

Opportunity For Graduates. The degree curriculum in Pharmacy provides for such varied and extensive training that graduates can take up several different lines of work. They can matriculate in

any standard school or college of medicine without condition; they can qualify as analytical chemists, prescription dispensers, bacteriologists, traveling salesmen, manufacturing pharmacists and chemists, science instructors in high schools and colleges, food and drug chemists and inspectors, physicians' assistants, and in other positions requiring a knowledge of chemistry, medicine, and pharmacy. Those graduates who have had good experience in practical drug-store work are in demand as managers of drug stores.

Pharmacy as a Profession for Women. There is no field of work which offers more desirable opportunities for women than Pharmacy. The work is clean, pleasant, agreeable, and women are peculiarly adapted to it. The technical work of manufacturing and dispensing drugs involves the traits of neatness and accuracy that, generally speaking, are more predominant in women than in men. In store arrangement, window trimming, and other work requiring a knowledge of color harmony and display, a woman is naturally more adept than a man. Over seventy-five percent of all drugs and druggists' sundries are purchased by women, and it is natural that those patrons would prefer to deal with women.

Pre-medical Course. Students desiring to prepare for entrance into medical or dental schools will find that the fundamental courses required are given to advantage in the School of Pharmacy. In order to be eligible to clear entrance into any Class A medical school, students must present evidence of graduation from an accredited four-year high school, or the equivalent of fifteen high school units, and the completion of from two to three years of college work made up of courses in Chemistry, Zoology, Physiology, Physics, Modern Languages, Economics, Political Science, English, and other cultural subjects. The length of the course is regulated by each medical school. Many schools of medicine are requiring three years of pre-medical training; therefore, a student beginning his pre-medical course in the college year 1923-24 should plan on a three-year course.

It is not necessary that a student graduate from a degree course to be eligible to enter a medical school. All that is required is a transcript showing the completion of certain courses which are outlined by the Council on Medical Education and published annually in the August number of the Journal of the American Medical Association.

The following is a list of the subjects required for students desiring to enter a medical school beginning with the fall of

1922-23. Students may learn of the requirements of any medical school through the Dean of the School of Pharmacy.

PRE-MEDICAL SUBJECTS. SIXTY SEMESTER HOURS REQUIRED

Required Subjects

	<i>Semester hours</i>
Chemistry (a)	12
Physics (b)	8
Biology (c)	8
English Composition and Literature (d)	6
Other non-science subjects (e)	12

Subjects strongly urged:

French or German (f)	6-12
Advanced Botany or Advanced Zoology	3-6
Psychology	3-6
Advanced Mathematics, including Algebra and Trigonometry	3-6
Additional courses in Chemistry	3-6

Other suggested electives:

English (additional), Economics, History, Sociology, Political Science, Logic, Mathematics, Latin, Greek, Drawing.

A semester hour is the credit value of sixteen weeks of work consisting of one lecture or recitation period a week, each period to be not less than fifty minutes net, at least two hours of laboratory work to be considered as the equivalent of one lecture or recitation period.

The Oregon State Agricultural College offers instruction in all sciences and maintains the largest scientific laboratories in the state. These laboratories, together with the adequate facilities for thorough instruction, make the institution an ideal place for pre-medical training.

In addition to the regular instruction in pre-medical subjects, the School of Pharmacy offers to pre-medical students training in the compounding and dispensing of drugs. This is an advantage to students in medicine, as they become more or less familiar with remedies before beginning their medical courses.

All courses in Pharmacy may be applied toward graduation. Students who complete the four-year curriculum have clear entrance into any Class A medical school; they are eligible as well to take the examinations of any state board of pharmacy. It is an advantage to a medical student to have acquired a pharmaceutical training, as this aids him in selecting the best remedies and in writing good prescriptions. In addition, he can work a part of his way through the medical course by doing relief work in a drug store, and at the same time acquire valuable experience through contact with prescriptions and with practicing physicians.

The following is recommended as an ideal high school course as preparation for pre-medical work:

	Units
English	4
Algebra	1½
Geometry	1
Physics	1
Chemistry	1
History	1
Latin	2
Foreign language	2
Electives	1½
Total	15

Correspondence. Inquiries regarding the School of Pharmacy may be addressed to the Dean or to the Registrar of the College. Students desiring to enter will be provided with proper blanks for filing credentials. These may be obtained from the Registrar's office.

Equipment. The School of Pharmacy has its lecture rooms and laboratories in Science Hall. All laboratories and lecture rooms are excellently equipped with all apparatus necessary for practical pharmaceutical instruction. Students have individual desks which are supplied with the materials necessary for the specific course. Students can borrow as much additional apparatus as they may need from the Pharmacy stock-room. In order to conserve students' time in laboratory courses, all stock is placed on side shelves. By this means students can repeat an experiment as many times as are necessary to get accurate results.

In addition to the usual permanent fixtures and apparatus for individual students, the School is supplied with a number of pieces of special apparatus such as pharmaceutical stills, tablet and pill machines, filter presses, hand and power drug mills, special percolators, gas and electric drying ovens, and such other apparatus as is necessary for modern pharmaceutical instruction. The pharmacognosy room contains several hundred samples of crude drugs, official and unofficial preparations, and active principles of drugs used for study and identification purposes. There is also a collection of authentic crude drugs and their preparation donated by Eli Lilly Company. This collection is used as a standard for all new supplies of drugs received. The special laboratory for commercial pharmacy is very well equipped for sign-card painting and display material. In addition to brushes, pens, paints, and other apparatus used in show-card work, each desk is provided with an air-brush outfit useful in shading of letters and drawings.

Four-year Curriculum. This curriculum is academic and professional in nature and is therefore the most satisfactory one to elect. Upon completion of the required subjects, students are granted the degree of Bachelor of Science in Pharmacy. This curriculum includes all professional work of the three-year curriculum as well as all pre-medical subjects. Graduates of this curriculum are prepared for any position requiring a knowledge of drugs and chemicals. Aside from a thorough training in Pharmacy and Chemistry, students in this curriculum are also instructed in Bacteriology, Physiology and Zoology, Physics, English, Modern Languages, Pharmaceutical Botany, Business Law, Economics, Business Administration, and Military Science and Tactics.

Three-year Curriculum. This curriculum leads to the degree of Pharmaceutical Chemist and is offered to meet the demand of many students desiring to prepare for special lines of work, such as commercial chemists, food and drug inspectors and analysts, clinical chemists for physicians. Pre-medical students find this curriculum a satisfactory one to elect, as they can complete many pre-medical subjects as well as all professional Pharmacy subjects in from three to four years. This is dependent upon whether the student desires to qualify for the examination of a state board of pharmacy.

Two-year Curriculum to be Discontinued. Beginning with the school-year 1923-24, the two-year curriculum for which the degree of Graduate in Pharmacy was granted will be discontinued. Arrangements will be made whereby students who originally registered in this curriculum may complete the work and win the Ph.G. degree.

Entrance Without Drug-Store Experience. Students are not required to have had drug-store experience upon entering the College. Such experience is very desirable, however, and students are advised to acquire one or preferably two years before taking up the courses in Pharmacy. No secondary or advanced credits are allowed for drug-store experience, but the State Board of Pharmacy requires a definite amount of practical experience before registration can be granted.

Requirements for Graduation. The degree of Bachelor of Science in Pharmacy is conferred upon those who have satisfactorily completed the subjects as outlined in the four-year curriculum. This in the aggregate comprises 192 credits of collegiate work in the case of women, and 207 in the case of men, of which latter 12 are taken in Military Science and Tactics.

The degree of Pharmaceutical Chemist is conferred upon those who have satisfactorily completed as outlined the subjects of the

three-year curriculum. This in the aggregate comprises 144 credits of collegiate work in the case of women, and 155 in the case of men, of which latter 12 are in Military Science and Tactics.

FOUR-YEAR CURRICULUM IN PHARMACY

(*B.Sc. Degree*)

Freshman Year*

	Term		
	1st	2d	3d
English Composition (Eng 101, 102, 103).....	3	3	3
General Chemistry (Ch 104, 105, 106).....	5	5	5
General Zoology (ZP 101, 102, 103).....	3	3	3
Pharmaceutic Botany (Bot 107, 108, 109).....	3	3	3
Theoretical Pharmacy (Phr 111, 112, 113).....	1	1	2
Gymnasium (Men) (PEm 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Gymnasium (Women) (PEw 111, 112, 113).....	(1)	(1)	(1)
Social Ethics (PEw 121), Hygiene for Women (PEw 122)	(1)	(1)	---
Military Science and Tactics	2	2	2
	17 $\frac{1}{2}$	17 $\frac{1}{2}$	18 $\frac{1}{2}$

Sophomore Year

Organic Chemistry (Ch 226, 227).....	5	5	---
Quantitative Analysis (Ch 244).....	---	---	5
Mammalian Anatomy (ZP 211, 212, 213).....	3	3	3
Sign-card Painting (Phr 221).....	2	---	---
Modern Language	3	3	3
Introduction to Economics (ES 391).....	---	3	---
Business and Rural Law (PS 163).....	---	---	3
Gymnasium (Men) (PEm 211, 212, 213).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Gymnasium (Women) (PEw 211, 212, 213).....	(1)	(1)	(1)
Military Science and Tactics	2	2	2
Elective	1	---	---
	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$

Junior Year

Retail Selling (BA 141).....	3	---	---
General Bacteriology (Bac 204), Pharmacy Bacteriology (Bac 332), Immunity and Serum Therapy (Bac 333)....	3	3	3
Modern Language	3	3	3
Practical Pharmacy (Phr 333).....	---	3	---
Pharmaceutical Preparations (Phr 343).....	---	3	---
Pharmacognosy (Phr 351, 532).....	2	4	---
Inorganic Pharmacy (Phr 353).....	---	---	3
Alkaloidal Testing (Ch 371).....	3	---	---
Drug Assaying (Ch 374).....	---	---	3
Pharmaceutical Calculations (Phr 321).....	---	---	2
Electives	3	2	3
	17	18	17

* As one year of college Physics is required by all medical schools for entrance, it is suggested that all students pursuing this curriculum arrange to elect Physics during their freshman year.

Senior Year

	1st	2d	3d
Materia Medica (Phr 451, 452, 453).....	3	3	3
U. S. Pharmacopoeia and National Formulary (Phr 431, 432, 433).....	3	3	3
Food and Drug Analysis (Ch 377).....	.....	3	.....
Prescription Lectures (Phr 461).....	4	.....	.....
Prescription Incompatibilities (Phr 462).....	.....	4	.....
Prescription Compounding (Phr 463).....	.....	.....	3
Manufacturing Pharmacy (Phr 441).....	3	.....	.....
Physiological Chemistry (Ch 461).....	.....	.....	5
Business Organization (BA 331).....	3	.....	.....
Electives.....	2	4	3
	18	17	17

THREE-YEAR CURRICULUM IN PHARMACY

(Ph.C. Degree)

First Year

General Chemistry (Ch 104, 105, 106).....	5	5	5
General Zoology (ZP 101, 102, 103).....	3	3	3
*General Physics (Ph 121, 122, 123).....	4	4	4
English Composition (Eng 101, 102, 103).....	3	3	3
Theoretical Pharmacy (Phr 111, 112, 113).....	1	1	2
Gymnasium (PEm 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics.....	2	2	2
	18½	18½	19½

Second Year

Organic Chemistry (Ch 226, 227).....	5	5	.....
Mammalian Anatomy (ZP 211, 212, 213).....	3	3	3
Practical Pharmacy (Phr 333).....	3	.....	.....
Pharmacognosy (Phr 351, 352).....	2	4	.....
Inorganic Pharmacy (Phr 353).....	.....	.....	3
French or German.....	3	3	3
Pharmaceutical Preparations (Phr 343).....	.....	.....	3
Pharmaceutical Calculations (Phr 321).....	.....	.....	2
Economics, Sociology, Psychology, or Political Science.....	.....	.....	3
Gymnasium (PEm 211, 212, 213).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics.....	2	2	2
	18½	17½	19½

* Pharmaceutic Botany (Bot 107, 198, 109) may be substituted for General Physics.

Third Year			
	1st	Term 2d	3d
General Bacteriology (Bac 204), Pharmacy Bacteriology (Bac 332), Immunity and Serum Therapy (Bac 333).....	3	3	3
Materia Medica (Phr 451, 452, 453).....	3	3	3
U. S. Pharmacopoeia and National Formulary (Phr 431, 432, 433)	3	3	3
Prescription Lectures (Phr 461).....	4	....	....
Prescription Incompatibilities (Phr 462).....	....	4	....
Prescription Compounding (Phr 463).....	....	....	3
Manufacturing Pharmacy (Phr 441).....	3	....	....
Alkaloidal Testing (Ch 371).....	....	3	....
Drug Assaying (Ch 374).....	....	....	3
Electives .....	....	2	2
	16	18	17

The foregoing outline provides for a thorough course in Pharmacy and includes many of the pre-medical subjects required by medical schools for entrance. Upon completion of the work of this curriculum students are granted the degree of Ph.C., and after completing a medical course will be recommended for the degree of Bachelor of Science in Pharmacy (B.Sc.). Students not contemplating a medical course may elect in place of the strictly pre-medical subjects courses in Botany, Quantitative Analysis, Food and Drug Analysis, Advanced Organic Chemistry, business courses, etc. All elections must be approved by the Dean.

COURSES IN PHARMACY

Phr 111. **Theoretical Pharmacy.** A systematic study of the apparatus and processes of operative pharmacy, including nomenclature of the United States Pharmacopoeia and National Formulary; metrology, including balances, weights, and measures, specific gravity; the generation, uses, and measurement of heat; distillation; sublimation; precipitation processes; extraction in its various forms, and all other processes used in the manufacture of medicinal preparations. Part I of Arny's Principles of Pharmacy together with lecture notes are used as the text.

Required in Pharmacy; freshman year; first term; 1 credit; 1 lecture; 1 recitation. Text: Arny, Principles of Pharmacy.

A. Ziefle

Phr 112. **Theoretical Pharmacy.** A continuation of Phr 111.

Required in Pharmacy; freshman year; second term; 1 credit; 1 lecture; 1 recitation. Text: Arny, Principles of Pharmacy.

A. Ziefle

Phr 113. Theoretical Pharmacy. A continuation of Phr 112.

Required in Pharmacy; freshman year; third term; 2 credits; 2 lectures; 1 recitation. Text: Army, Principles of Pharmacy.

A. Ziefle

Phr 221. Sign-card Painting. Simple lettering of several alphabets with brush constitutes the work of the first part of the course. As soon as students can print one or more alphabets with a reasonable degree of accuracy, instruction is given in the designing of sign-cards.

Required in Pharmacy; first term; 2 credits; 3 two-hour laboratory periods. Fee \$3.50. Deposit \$0.50.

M. O. Rawson

Phr 222. Sign-card Painting. A continuation of Phr 221, with the addition of designing sign-cards in colors, painting on cloth and canvas, and color harmony.

Elective in Pharmacy; any term; 2 credits; 3 two-hour laboratory periods. Fee \$3.50. Deposit \$0.50.

M. O. Rawson

Phr 223. Sign-card Painting. A continuation of Phr 222, with instruction in the use of air-brush, enlarging by use of pantograph and other methods of display advertising.

Elective in Pharmacy; third term; 2 credits; 3 two-hour laboratory periods. Fee \$3.50. Deposit \$0.50.

M. O. Rawson

Phr 224. Advertising Display. The principles of art and decoration applied to the arrangement of retail stores and display of merchandise; lettering; sign and card painting; lettering in colors on cloth, canvas, and glass; shading with use of the air-brush. (Especially adapted to students in Commerce.)

Elective; any term; 3 credits; 3 three-hour laboratory periods. Fee \$4.50. Deposit \$0.50.

M. O. Rawson

Phr 321. Pharmaceutical Calculations. Study of calculations common to pharmacy; weights and measures; percentage solutions; alligations; specific gravity; thermometers; etc.

Prerequisites: Phr 111, Ch 104. Required in Pharmacy; junior year; third term; 2 credits; 1 lecture; 1 recitation. Text: Stevens, Pharmaceutical Arithmetic.

M. O. Rawson

Phr 333. Practical Pharmacy. Natural products used in pharmacy explained and demonstrated; study of the various types of galenical preparations as outlined in Part II of Army's Principles of Pharmacy.

Prerequisites: Phr 113, Ch 105. Required in Pharmacy; junior year; first or second term; 3 credits; 2 lectures; 1 recitation. Texts: Army, Principles of Pharmacy. Ruddiman, Whys in Pharmacy.

M. O. Rawson

Phr 343. Pharmaceutical Preparations. Laboratory work in the preparation of simple galenicals, such as waters, pills, emulsions, suppositories, ointments, troches. Frequent identification examinations are held to familiarize students with the characteristics of the drugs they use, as well as of the preparations they make.

Prerequisites: Registration in Phr 133, Ch 105. Required in Pharmacy; junior year; second or third term; 3 credits; 3 three-hour laboratory periods. Fee \$8.50. Deposit \$1.50. Texts: U. S. Pharmacopoeia. National Formulary. *M. O. Rawson*

Phr 351. Pharmacognosy. Study of animal and vegetable drugs with reference to their habitat, botanical classification, official titles, synonyms, constituents, uses, identification, and standardization.

Prerequisites or parallel: Phr 113; Ch 106, 131. Required in Pharmacy; junior year; first term; 2 credits; 2 lectures; 1 recitation; Fee \$2.50. Text: Culbreth, *Materia Medica*. *F. A. Gilfillan*

Phr 352. Pharmacognosy. A continuation of Phr 351.

Required in Pharmacy; junior year; second term; 4 credits; 3 lectures; 2 recitations. Fee \$2.50. Text: Culbreth, *Materia Medica*. *F. A. Gilfillan*

Phr 353. Inorganic Pharmacy. Inorganic chemicals and their preparations used in medicine. Part III of Arny's *Principles of Pharmacy* is used as a lecture outline. In the laboratory students make representative samples of certain types of chemicals, as well as tests for impurities, such as arsenic, lead, antimony, etc.

Prerequisites: Phr 333, 343; Ch 105. Required in Pharmacy; junior year; third term; 3 credits; 1 lecture; 1 recitation; 1 three-hour laboratory period. Fee \$5.00. Deposit \$1.00. Text: Arny, *Principles of Pharmacy*. *M. O. Rawson*

Phr 431. U. S. Pharmacopoeia and National Formulary. All drugs listed in the United States Pharmacopoeia and National Formulary, as well as all important unofficial drugs and preparations in the dispensaries are studied. Emphasis is placed on composition, uses, methods of manufacture, reasons for each step in the process of manufacture, and all other important data concerning the drug.

Prerequisites: Phr 343, 352; Ch 227. Required in Pharmacy; senior year; first term; 3 credits; 2 lectures; 2 recitations. Texts: U. S. Pharmacopoeia. National Formulary. Ruddiman, *Whys in Pharmacy*. *A. Ziefle*

Phr 432. U. S. Pharmacopoeia and National Formulary. A continuation of Phr 431, with frequent reports on all pharmaceutical literature especially with regard to the newer remedies.

Prerequisites: Phr 351, Ch 227. Required in Pharmacy; senior year; second term; 3 credits; 2 lectures; 2 recitations. Texts: U. S. Pharmacopoeia. National Formulary. *A. Ziefle*

Phr 433. U. S. Pharmacopoeia and National Formulary. A continuation of Phr 432 with the added feature of preparing students for state pharmacy examinations. In addition to a complete review of all pharmacy subjects and the study of typical state board questions, students are grounded in pharmaceutical legislation, identification of drugs and preparations, as well as in other subjects which will prepare them not only for state pharmacy examinations but for efficient service in practical drug-store work.

Prerequisites: Phr 432. Required in Pharmacy; senior year; third term; 3 credits; 2 lectures; 2 recitations. Texts: U. S. Pharmacopoeia. National Formulary. *A. Ziefle*

Phr 441. Manufacturing Pharmacy. This course deals with the manufacture of the more complex pharmaceuticals involving chemical reactions in their preparation. The aim of the course is to familiarize students with the accepted methods of manufacture of drugs in order that they may compound small amounts of chemicals often required in compounding special prescriptions.

Prerequisites: Phr 333, 343; Ch 106, 231. Required in Pharmacy; senior year; first term; 3 credits; 3 three-hour laboratory periods. Fee \$8.50. Deposit \$1.50. Texts: U. S. Pharmacopoeia. National Formulary. *F. A. Gilfillan*

Phr 451. Materia Medica. A study of the physiological action and medicinal uses of drugs on the human organism. Drugs are classified according to the arrangement in Cushny's Pharmacology, and the subject is treated in the following order: factors influencing the use of remedies; definitions of medical terms; dose and action; official definitions and constituents. The toxicology of each drug is considered at the time a poisonous drug is studied and special attention is given to action in intended and accidental administration, identification, and antidotes.

Prerequisites: Phr 343, 352; Ch 106, 131. Required in Pharmacy; senior year; first term; 3 credits; 1 lecture; 2 recitations. Text: Cushny, Pharmacology. *F. A. Gilfillan*

Phr 452. Materia Medica. A continuation of Phr 451.

Prerequisites: Phr 451, Ch 226. Required in Pharmacy; senior year; second term; 3 credits; 1 lecture; 2 recitations. Text: Cushny, Pharmacology. *F. A. Gilfillan*

Phr 453. Materia Medica. A continuation of Phr 452 with preparation for state board examinations in this subject. State and

national laws regarding the sale of poisons and narcotics receive special attention.

Prerequisite: Phr 452. Required in Pharmacy; senior year; third term; 3 credits; 1 lecture; 2 recitations. Text: Cushny, Pharmacology. *F. A. Gilfillan*

Phr 461. **Prescription Lectures.** The theory of prescription compounding as outlined in Scoville, Art of Compounding, is made the basis of the course. The aim is to familiarize students with the approved methods of compounding prescriptions containing ordinary remedies, as well as proprietaries and the newer remedies.

Prerequisites: Phr 343, 352, 353; Ch 106, 131. Required in Pharmacy; senior year; first term; 4 credits; 2 lectures; 2 recitations. Text: Scoville, Art of Compounding. *M. O. Rawson*

Phr 462. **Prescription Incompatibilities.** Several hundred incompatibilities in prescriptions studied from the point of view of the cause of the incompatibility, and the best method of overcoming it. Practical druggists throughout the state send in incompatible prescriptions for advice as to the best method of compounding, and these together with the regular type prescriptions as outlined in Ruddiman's Incompatibilities in Prescriptions are made the basis of the course.

Prerequisites: Phr 461, Ch 226. Required in Pharmacy; senior year; second term; 4 credits; 2 lectures; 2 recitations. Text: Ruddiman, Incompatibilities in Prescriptions. *M. O. Rawson*

Phr 463. **Prescription Compounding.** In this course the students apply the principles learned in Phr 462 to the actual compounding of prescriptions. Over one hundred prescriptions are compounded, representing the general types met with in actual practice. The latter part of the course deals with the management of a prescription department, the compounding of toilet and domestic preparations, as well as many other methods common to a pharmacy. In preparation for the state pharmacy examination students study the physical characteristics of all common drugs, chemicals, preparations, and synthetics, and are examined in identification.

Prerequisites: Phr 462, Ch 227. Required in Pharmacy; senior year; third term; 3 credits; 3 three-hour laboratory periods. Fee \$8.50. Deposit \$1.50. Text: Scoville, Art of Compounding.

A. Ziefle, M. O. Rawson

School of Vocational Education

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.

EDWIN DEVORE RESSLER, A.M., Dean of the School of Vocational Education; Professor of Education.

CLYTIE MAY WORKINGER, Secretary to the Dean.

Agricultural Education

HEBER HOWARD GIBSON, A.M., Professor of Agricultural Education.

EARL DEWITT DOXSEE, B.Sc., Assistant Professor of Agricultural Education.

Commercial Education

HERBERT TOWNSEND VANCE, Professor of Office Training and Stenography.

BERTHA TALLMADGE HALL, Critic Teacher in Commercial Education.

Education

EDWIN DEVORE RESSLER, A.M., Professor of Education.

FRANK HENRY SHEPHERD, Pd.B., A.M., Professor of Industrial Education.

Home Economics Education

HATTY ROSELLE DAHLBERG, B.Sc., A.M., Associate Professor of Home Economics Education.

LURA AMELIA KEISER, B.Sc., Critic Teacher in Home Economics Education.

LOUISE WOOD, B.Sc., Field Supervisor of Home Economics; Teacher Trainer.

Industrial Education

AMBROSE REUBEN NICHOLS, B.Sc., Assistant Professor of Industrial Education.

ORVILLE GREENLEAF REEVES, B.Sc., Instructor in Industrial Education; Critic Teacher.

Psychology

JESSE FRANKLIN BRUMBAUGH, LL.B., A.M., Professor of Psychology.

Systematic teacher-training was begun in the Oregon Agricultural College in 1909 with the establishment of a department of Industrial Pedagogy. This was in response to a demand by the public schools for qualified teachers of agriculture, commercial subjects, home economics, and manual training. The growth of the department, requiring specialists in methods and supervised teaching, made advisable a school organization, which was effected in 1918, with six departments. From the beginning and since the organization of the School, students preparing to teach have been registered in the schools in which their technical subjects are taught. Thus the prospective teacher of (a) agriculture receives his degree in the School of Agriculture, (b) commercial subjects in the School of Commerce, and likewise in other lines.

Curriculum. The School of Vocational Education offers a four-year curriculum leading to the degree of Bachelor of Science. Students preparing to teach Agriculture, Commerce, Home Economics, or Industrial Arts, who enter the College as freshmen, however, are advised to register in the degree curriculum in the school offering the technical work desired. The Oregon School Law grants a high-school teaching certificate to graduates of any degree curriculum offered in the College to students who have taken 23 term credits (15 semester credits) in Education. Students should consult the Dean of the School of Vocational Education in scheduling Education credits. The new degree curriculum is planned especially for students who desire to major in Vocational Education. Thirty-six credits in Education are prescribed and provision is made for additional Education credits under electives. In addition to the subjects prescribed by College regulations, general or cultural courses are recommended in recognition of the need of a broad training by the teacher, whose duties call for leadership outside the walls of the classroom. Several classes of students should profit by the new degree curriculum.

(1) In increasing number, graduates of two-year standard normal-school courses and transfers from colleges and other higher educational institutions are coming to the College with one or more years of college credit on entrance. Some of these students desire a more general course in vocational subjects than the degree curricula prescribed in the technical schools. The degree curriculum in Vocational Education, with its electives, makes possible the acceptance of college credits from other institutions and thus enables such students to enroll in the technical courses for which they come to the institution and still graduate within the four years generally allotted to an undergraduate course.

(2) Some students desire to prepare for supervisory and administrative vocational positions calling for more general courses than can be secured in any one of the technical schools. The large cities have such supervisors and smaller cities offering a variety of vocational courses are beginning to appoint them. There is a good field for specialization in this line. Such students desire to take technical courses in several schools and a larger number of courses in the pedagogical phases of vocational education.

(3) There are other students who wish to prepare to teach a combination of vocational branches, such as agriculture and manual training, commerce and home economics; or a combination of vocational branches with "related subjects," such as home economics and natural science, manual training and mathematics. There is, and will continue to be for many years, a considerable demand for such teachers in the smaller high schools of Oregon.

(4) A demand has recently arisen for instructors who are prepared to teach in vocational schools in the so-called "related subjects," including mechanical drawing, designing, shop mathematics, industrial chemistry, physics, business English, commercial geography, commercial law, etc. The Federal and State Boards for Vocational Education make provision for the employment of such teachers under the Smith-Hughes Act. The Oregon Board of Vocational Education has assigned to this institution such teacher-training.

Opportunities. For the past several years, from fifty to seventy-five graduates annually have prepared to teach vocational subjects. Appointments exceeding one hundred, including previous graduates, are made each year to positions in Oregon, other Pacific Slope states, and also in the Middle West and the East. The principal field of service is in high schools, but the number receiving appointments in normal schools, colleges, and universities is increasing annually.

The School is called on to supply vocational teachers who are able to meet the standards set by the State Board of Vocational Education in accordance with the requirements of the Smith-Hughes Act. Teachers meeting these requirements, and securing positions under direction of the State Board, receive part of their salaries from Federal and state funds. The School of Vocational Education has been designated by the State Board to train such teachers.

The School of Vocational Education makes provision for giving further professional training to teachers of experience and pedagogical training to men and women who already have technical knowledge and skill in a particular trade and desire training in

teaching in that field. The College offers special opportunities to graduates of normal schools and schools of education, with teaching experience, for technical training in some line of vocational education or for special training in teaching and supervising vocational subjects.

Students are advised to consider carefully the selection of teaching as a vocation. Thorough scholarship and fair command of spoken and written English are fundamental essentials for success in the vocation of teaching. Personality, character, and professional aptitude are also demanded. Students with scholarship average below B should confer with the Dean of the School of Vocational Education before registering in any educational course. Only capable candidates will be recommended for teaching positions.

Appointment Office. The College maintains an office for the registration of alumni who wish to secure teaching positions, and the recommendation of teachers is recognized as an important function of the institution. Full information regarding preparation and experience of candidates is kept on file and is furnished those desiring to secure teachers. Forms for registration may be obtained upon request. The Appointment Secretary investigates certification requirements in other states, school laws, etc., so that accurate information may be given upon request. Alumni elected to teach in other states are recommended for certificates by this office. There is no registration fee and no commission is charged those who receive appointment through this office. All communications should be addressed to the Appointment Secretary, Oregon Agricultural College, Corvallis, Oregon.

Equipment. The technical courses of the School of Vocational Education are given in the Schools of Agriculture, Commerce, Engineering, Home Economics, and Basic Arts and Sciences, making available all their equipment to the students and instructors in the School of Vocational Education. The instructors in the professional courses in Education also use this equipment. For the courses in supervised teaching, there is available, in addition, the equipment of the Corvallis public schools through a joint arrangement between the Corvallis Board of Education and the Board of Regents of the College.

Required Education Courses. The sequence of courses in Education is shown in the degree curriculum. For those students planning to complete the 23 credits in Education, who are registered in the technical schools, the following courses are required: Elementary or Vocational Psychology (Psy 301 or 312), Principles of Teaching (Ed 313), Vocational Education (Ed 323), Secondary

Education (according to major), Supervised Teaching (according to major). Other courses in Education, to make up the total of 23 credits, are subject to election. Students are advised to consult with the Dean.

DEGREE CURRICULUM IN VOCATIONAL EDUCATION*

(B.Sc. Degree)

Freshman Year

	1st	2d	3d
English Composition (Eng 101, 102, 103).....	3	3	3
General Chemistry (Ch 101, 102, 103).....	3	3	3
Library Practice (Lib 100).....	.....	.....	1
Gymnasium (PEW 111, 112, 113) (Women).....	1	1	1
Social Ethics (PEW 121), Hygiene (PEW 122) (Women)....	1	1	.....
Gymnasium (PEM 111, 112, 113) (Men).....	($\frac{1}{2}$)	($\frac{1}{2}$)	($\frac{1}{2}$)
Military Science and Tactics (Men).....	(2)	(2)	(2)
①Technical electives	8	8	8
	16	16	16

Sophomore Year

Introduction to Education (Ed 302).....	.....	2	.....
History of Education (Ed 341).....	3	.....	.....
Vocational Education (Ed 323).....	.....	.....	2
Practical Public Speaking I (PSP 254).....	3	.....	.....
English Drama (Eng 445).....	.....	3	.....
Contemporary English Literature (Eng 323).....	.....	.....	3
General Zoology (ZP 101, 102, 103).....	3	3	3
Gymnasium (PEW 211, 212, 213) (Women).....	1	1	1
Gymnasium (PEM 211, 212, 213) (Men).....	($\frac{1}{2}$)	($\frac{1}{2}$)	($\frac{1}{2}$)
Military Science and Tactics (Men).....	(2)	(2)	(2)
①Technical electives	6	7	7
	16	16	16

Junior Year

Introduction to Accounting (BA 101).....	3	.....	.....
Introduction to Economics (ES 391).....	.....	3	.....
Elementary Psychology (Psy 301).....	3	.....	.....
Principles of Teaching (Ed 313).....	.....	2	.....
Educational Psychology (Psy 322).....	.....	.....	3
②Courses in Secondary Education.....	.....	3	3
Introduction to Sociology (ES 393).....	.....	.....	3
Elementary Industrial Journalism (IJ 200, 310).....	3	3	.....
①Technical and other electives	7	5	7
	16	16	16

* As in other curricula of the College, men must complete 207 credits, including Physical Education and Military Science and Tactics.

①Subject to approval of the Dean.

	Senior Year		
	1st	Term 2d	3d
① Courses in Vocational Education.....	5	5	5
National Government (PS 301).....	3	.....	.....
Comparative Governments (PS 402).....	.....	3	.....
International Relations (PS 401).....	.....	.....	4
② Technical and other electives	8	8	7
	16	16	16

AGRICULTURAL EDUCATION

This department is responsible for the training of teachers and supervisors of Agriculture in elementary and secondary schools, and the development of leadership in rural life and education. Special attention is given to the training of directors, supervisors, and teachers of Agriculture as provided for by the Federal law for vocational education known as the Smith-Hughes Act. Certain field studies and extension activities are included within the scope of this department's work.

Requirements in Agriculture. Teachers of vocational agriculture are required to have a degree in Agriculture with a minor in Agricultural Education. Credits in Agriculture and related sciences should include the basic sciences, and courses in Farm Mechanics, Animal Husbandry and Dairying, Poultry Husbandry, Soils and Crops, Horticulture, and Farm Management. The prescribed curriculum for prospective teachers of agriculture is given in the School of Agriculture.

Requirements in Education. Not less than twenty-three term credits shall be in Education of which sixteen are prescribed as follows: Elementary and Vocational Psychology (Psy 301 and 312), 6 credits; principles of Teaching (Ed 313), 2 credits; Vocational Education (Ed 323), 2 credits; Secondary Education in Agriculture (AEd 401, 402), 6 credits; Supervised Teaching in Secondary Agriculture (AEd 412 or AEd 413), 3 credits. Not later than the beginning of the junior year and during the junior and senior years the prospective teacher of Agriculture should confer with the department of Agricultural Education in planning his entire curriculum.

Graduate Curriculum in Agricultural Education. Several states now require teachers of vocational agriculture to have some graduate training, California requiring a full year. In Oregon, and many other states, students who have completed the work prescribed in this catalogue for teachers of vocational agriculture can meet the

① Selected according to major, subject to approval of the Dean.

② Subject to approval of the Dean.

requirements for state certification. Since the demands upon such teachers the country over, however, are becoming more exacting each year, graduate work in the fields of agriculture and education is desirable, and usually necessary for those who desire to enter the fields of supervision or teacher training. A program of work leading to the degree of Master of Science will be outlined by this department for students and teachers with approved standing.

COURSES

AEd 401. Secondary Education in Agriculture. Aims, problems, materials, and methods relating to the teaching of vocational agriculture in the secondary schools; problems of curriculum building; selection, organization, presentation of the subject-matter; the use of local farms and community resources; the home project and other forms of supervised practice; community and extension activities.

Prerequisites: Psy 301; Ed 313, 323, either prerequisite or parallel. Required in Vocational Education; junior or senior year; first or third term; 3 credits; 3 recitations.

H. H. Gibson, E. D. Dorse

AEd 402. Secondary Education in Agriculture. Continuation of AEd 401, including a comparative study of the various methods of teaching with reference to their value, use, and adaptation in the field of agricultural teaching.

Prerequisite: AEd 401, or approval of the head of the department. Required in Vocational Education: senior year; second term; 3 credits.

H. H. Gibson

AEd 412. Supervised Teaching of Secondary Agriculture. Observation and teaching of vocational agriculture conducted according to the Oregon state plan for vocational education under supervision of this department. The departments of agriculture of the local high schools are used for this teaching. Supervision of projects and assistance in community activities are an important phase of this course. To be preceded or accompanied by AEd 401, 402.

Required in Vocational Education; senior year; any term; time and credits to be arranged.

E. D. Dorse

AEd 413. Supervised Teaching in Secondary Agriculture. Continuation of AEd 412. Apprentice teaching in agriculture department of Smith-Hughes high schools throughout the state under the supervision of the department.

Elective in Agricultural Education; senior year; any term; credits to be arranged.

E. D. Dorse

AEed 431. Rural Education. The social and community elements of rural and agricultural education in relation to the school program; the place of the school in relation to other educational agencies; organization of a community program in relation to social and community activities, and adapted to the needs of both elementary schools and high schools.

Elective; junior or senior year; second term; 3 credits; 3 recitations.
E. D. Dorsee

AEed 432. Club Work and Agriculture in the Elementary School. Aims, materials, and methods of teaching and supervising elementary agriculture in upper elementary grades and junior high school. Stress is given to club work, covering its history, scope, organization, supervision, and administration. For prospective agriculture teachers, county agents, and club leaders.

Elective; junior year; first or second term; 3 credits; 3 recitations.
E. D. Dorsee

AEed 482, 483. Seminar in Agricultural Education. A discussion of special problems in the teaching of agriculture and in the administration of agricultural education.

Required of graduate students and elective for seniors in Agricultural Education; second and third terms; time and credits to be arranged.
H. H. Gibson

AEed 533. Rural School Surveys. Principles and practice of making agricultural and rural education surveys as a basis for organizing programs for Agricultural Education. The technique of making such surveys and methods of analyzing, interpreting, and using the material and results of surveys already made will be emphasized. Individual practice in making a survey is required as a part of the course. Open to graduates with teaching experience and seniors by special permission.

Elective in Vocational Education; third term; 2 credits.

AEed 534. Extension Course in Teacher Training. This course is designed primarily for teachers of vocational agriculture in service who cannot be relieved of their professional duties to pursue courses that are offered in the Summer Session, but who wish to continue their professional improvement. Personal conferences, follow-up instruction, and supervision, supplemented by correspondence and reports.

Elective; any term; credits to be arranged.

COMMERCIAL EDUCATION

The department of Commercial Education has been organized to meet the steadily growing demand for well-equipped teachers of commercial branches in secondary schools. Such teachers are prepared in cooperation with the School of Commerce. The curriculum in the School of Commerce leading to the degree of Bachelor of Science makes possible reasonable preparation for commercial teaching. In the selection of their collegiate courses in both Commerce and Education, students should advise with the head of the department of Commercial Education. This department provides an equiptment for teachers of commercial science in secondary schools that will place them and their work on a parity with those of other longer established and more fully developed departments of the high school.

The 23 credits in Education required for a certificate to teach in four-year high schools, issued without examination, may be earned during the college course, preferably in the junior and senior years. Vocational Psychology and Principles of Teaching should be taken before any methods course. The required Education courses must include one course in Secondary Education in Commerce and one course in Supervised Teaching in Commerce, the latter in the senior year. Supervised teaching is done in a public high school where conditions are normal and the experience real.

COURSES

CEd 451. Secondary Education in Commerce. Principles of education as applied to the teaching of shorthand, typewriting, business English, and bookkeeping in high schools; rapid review of subject-matter with model lessons in each subject; lectures covering aims, materials, methods of presentation, organization of courses, and arrangement of curriculum.

Prerequisites: OT 203, BA 103; Psy 301 or 312; Ed 313. Required of students preparing to teach stenographic subjects; junior year (third term) or senior year (first term); 3 credits; 3 lectures.

J. A. Bexell, H. T. Vance

CEd 452. Secondary Education in Commerce. Same as CEd 451, with special methods in teaching Accounting, Business Law, Economics, and Commercial Geography.

Prerequisites: BA 203; PS 202; ES 203; Psy 301 or 312; Ed 313. Required of students preparing to teach accounting subjects; senior year; first or second term; 3 credits; 3 lectures.

J. A. Bexell

Ced 461. Supervised Teaching in Commerce. Facilities are afforded students in Commercial Education to secure experience in teaching classes in stenographic subjects both at the College and at the Corvallis High School.

Prerequisite: CED 451. Elective; senior year; any term; 5 credits; 1 lecture; 5 double periods. *J. A. Bexell*

Ced 462. Supervised Teaching in Commerce. Same as CED 461, with supervised teaching in subjects of accounting group.

Prerequisite: CED 452. Elective; senior year; any term; 5 credits; 1 lecture; 5 double periods. *J. A. Bexell*

Ced 470. Organization and Administration of Commercial Education. This course is planned for individuals who aspire to attain administrative positions in the field of commercial education.

Prerequisites: CED 451, 452. Elective; senior year; any term; 3 credits; 3 lectures. (Not given in 1923-24.) *H. T. Vance*

EDUCATION

This department gives general courses in Education upon which courses in special methods are based. The courses are open to all students prepared to take them.

COURSES

Ed 302. Introduction to Education. Brief discussion of the meaning, function, and scope of education; organization and function of each division of the American system; school and class management; general method; all with particular reference to the vocational teacher.

Required in Vocational Education; sophomore year; any term; 2 credits; 2 recitations. *E. D. Ressler*

Ed 313. Principles of Teaching. Application of the laws of psychology to teaching; type lessons, lesson plans, supervised study, measuring results; application of general principles to the teaching of vocational subjects.

Required in Vocational Education; junior year; any term; 2 credits; 2 recitations. *H. H. Gibson*

Ed 323. Vocational Education. Arranged to meet the needs of those preparing to teach any phase of vocational education. History and function of vocational education; development in the United States; requirements of Federal-aided schools and departments under the Smith-Hughes Act.

Required in Vocational Education (sophomore year, third term); elective for students in other schools (junior year, third term, or senior year, first or second term); 2 credits; 2 recitations.

E. D. Ressler

Ed 341. **History of Education.** A general review of the growth and development of education and its relation to the civilization of the times; particular attention given to the rise of industrial education in Europe and America, and its place in the social and political life of the country.

Elective; sophomore or junior year; first term; 3 credits; 3 recitations.

J. F. Brumbaugh

Ed 431. **Vocational Guidance.** An investigation of the means and methods of assisting pupils of upper grammar grades and high school in studying the problems of their future vocations; studies of occupations with essential qualifications for success in leading types; value of "life career" motive in education; survey of state and local resources as guides to choice, etc.

Elective; junior or senior year; second term; 2 credits; 2 recitations.

A. R. Nichols

Ed 452. **School Administration.** A discussion and analysis of the American system of education, with an interpretation of the purpose and spirit of each division; problems of administration and teaching; correlation of the vocational branches with other subjects in the curriculum.

Elective; advanced or graduate students; second term; 2 credits; 2 recitations.

E. D. Ressler

Ed 461. **School Hygiene.** A course in the health provisions requisite for the hygienic conduct of education. Oregon laws, regulations of the State Board of Health, and other state and local authorities explained in detail.

Elective; advanced or graduate students; third term; 2 credits; 2 recitations.

Ed 491, 492, 493. **Investigation.** Advanced or graduate students qualified by previous training or experience may register for extended investigation of some specific problem in vocational education. These studies are assigned and outlined by the instructor and stated reports are made from time to time by the student.

Elective; advanced or graduate students; three terms; credits to be arranged.

HOME ECONOMICS EDUCATION

The function of this department is to give professional training to prospective teachers and extension workers in Home Economics. Students who have not made an average of 85 or over in the freshman and sophomore years should not register for teacher training work.

(For the four-year curricula leading to the bachelor's degree in Home Economics see pages 269-273.)

COURSES

Hed 304. Secondary Education in Home Economics. A brief history of the development of Home Economics in the elementary and secondary schools; a critical study and preparation of courses of study; organization of a Home Economics department; study of modern plant and equipment.

Required of all students preparing to teach Home Economics; junior year (second or third term) or senior year (first term); 3 credits; 3 recitations.

Hatty R. Dahlberg

Hed 305. Secondary Education in Home Economics. Methods of teaching; daily preparation of lessons; study of textbooks, reference books, and bulletins; preparation of illustrative material; special problems of the Home Economics teacher.

Prerequisites: Hed 304, Psy 301. Required of all students preparing to teach Home Economics; junior year (third term) or senior year (first or second term); 3 credits; 3 recitations.

Hatty R. Dahlberg, Louise Wood

Hed 421. Supervised Teaching in Home Economics. Observation and teaching under supervision.

Prerequisite: Hed 305. Required of all students preparing to teach Home Economics; senior year; any term; 4 credits; 2 recitations; 5 periods teaching.

Hatty R. Dahlberg, Lura Keiser

Hed 422. Supervised Teaching in Home Economics.

Prerequisite: Hed 421 or teaching experience. Elective; senior year; any term; 1 to 3 credits, according to amount of teaching done.

Hatty R. Dahlberg, Lura Keiser, Louise Wood

INDUSTRIAL EDUCATION

A strong demand for college-trained teachers of trades and industries has been created by the Smith-Hughes Act, which provides Federal aid for secondary schools giving approved courses in these subjects. The College has made special provision for training

students for the teaching of vocations in secondary schools, night schools, and trade extension schools, which fulfil the requirements for Federal aid under the Smith-Hughes Act. Students desiring to prepare to teach Manual Training or Industrial Arts will find professional courses especially adapted to their needs. Courses are offered in Portland as well as in Corvallis.

COURSES

IEd 302. Special Methods in Trades and Industries. Organization of material into definite lessons, taking into consideration the subject of learning difficulties, making out lesson plans for at least twenty-four type lessons.

Prerequisites: Ed 302, Psy 301 or 312.* Required of students preparing to teach a trade or industry in trade extension, day, part-time or night classes; junior year; second term; 3 credits; 3 recitations. *A. R. Nichols*

IEd 342. Special Methods in Manual Training. A study of the methods of organization and planning of lessons for public school teaching. The working out of at least twenty-four type lessons to serve as a guide in teaching in the public schools.

Prerequisites: Psy 301 or 312, Ed 302.* Required in Industrial Arts; junior or senior year; second term; 3 credits; 3 recitations. *A. R. Nichols*

IEd 382. Theory and Practice of Elementary Manual Arts. For supervisors of industrial arts in the lower grades. Investigation of the present trend of the manual arts movement; arrangement of a suggestive course of study; plan of equipment; ordering of supplies, etc.; lectures; assigned readings, reports, and practical shop work.

Required in Industrial Arts; elective to others; junior or senior year; second term; 3 credits; 2 recitations; 1 two-hour laboratory period. *A. R. Nichols*

IEd 421. Supervised Teaching in Trades and Industries. The student is required to arrange and submit definite plans and outlines of the subject, job, or lesson to be taught. Reports to the director, supervisor, or critic teacher are made for the purpose of perfecting the student teacher in the technique of the trade of teaching.

Prerequisite: IEd 302. Required of students preparing to teach a trade or industry; senior year; first or third term; 5 credits; 1 recitation; 5 double periods. *A. R. Nichols, O. G. Reeves*

*Students should consult with department before registering.

IED 461. Supervised Teaching in Manual Training. The student submits definite plans for lessons in actual teaching. He takes complete charge of a class in either drawing or shop work through the term. Reports to the instructor are required.

Prerequisite: IED 343. Required in Industrial Arts; senior year; any term; 5 credits; 1 recitation; 5 double periods.

A. R. Nichols, O. G. Reeves

PSYCHOLOGY

This department gives the courses in Psychology upon which the studies in education are built and such other courses as directly affect human behavior. All courses are elective to students prepared to take them.

COURSES

Psy 301. Elementary Psychology. A preparatory course in the fundamentals of mental life from the functional standpoint; emphasis upon the application of psychical laws to the ordinary affairs of life.

Required; junior year; any term; 3 credits; 3 lectures.

J. F. Brumbaugh

Psy 312. Vocational Psychology. Application of psychological laws to the active pursuits of life; especially the psychology of commerce as it develops in the relation of man to man, of trust and faith in human affairs, modes of activity, etc.

Prerequisite: Psy 301. Required for prospective Smith-Hughes teachers; junior or senior year; first or third term; 3 credits; 3 lectures.

J. F. Brumbaugh

Psy 322. Educational Psychology. Follows Psy 301. Principles and laws of mental life and development as applied to the teaching process; psychological value of the various methods and paraphernalia of school life.

Required; junior year; second or third term; 3 credits; 3 lectures.

J. F. Brumbaugh

Psy 433. The Child Mind. Consideration of the physical and mental development of the child in the various stages; aspects and inter-relations, hygienic and moral sides receiving special attention.

Prerequisite: Psy 301. Elective; junior or senior year; second term; 2 credits; 2 lectures.

J. F. Brumbaugh

Psy 473. Principles of Education. This course expounds the general problems of education and the merits and demerits of the

various theories of education as they have succeeded each other, together with the numerous principles which have sprung from such doctrines and the modern reinterpretations of aims and practices connected therewith.

Elective; junior or senior year; second term; 2 credits; 2 lectures.

J. F. Brumbaugh

Eth 482. **Ethics.** Meaning of our moral conceptions and principles; why they are binding; whence they are derived; a consideration of every-day customs and practices in the light of these principles; study of professional codes.

Elective; junior or senior year; second or third term; 3 credits; 3 lectures.

J. F. Brumbaugh

Chemical Engineering

FLOYD ELBA ROWLAND, Ph.D., Professor of Industrial Chemistry.

Chemical Engineering has become a necessary science in the economic management of many of the industries of life. The present need in this country to create new industries to supply products of manufacture formerly imported from abroad, has emphasized the demands upon chemistry and chemical engineering.

The curriculum in Chemical Engineering is arranged so that attention is given to the fundamental principles of science. Thorough courses are given in General, Analytical, Organic, and Physical Chemistry, Modern Languages, Physics, and Mathematics. During the course specialized work in Applied Chemistry is offered.

The courses in Industrial or Applied Chemistry given in connection with Chemical Engineering are arranged as follows: (1) Engineering Chemistry (one course); (2) Industrial Inorganic Chemistry (two courses); (3) Industrial Organic Chemistry (two courses); (4) Electrochemical Industries (one course). After performing a limited number of standard experiments in Industrial Chemistry, the student is permitted to select special problems, pertaining, for the most part, to the Northwest, thus enabling him to follow a given line more fully. Problems are studied as to (1) Raw Materials; their valuation and treatment. (2) Process; chemical control and types of apparatus employed in chemical work. (3) Products of Manufacture; their purity and uses. Methods of analysis and the processes involved in large-scale manufacture are studied as described in current literature. In the senior year students are permitted to elect research which permits them to investigate problems and aids in developing their ability for original investigations.

Local chemical industries are visited for the purpose of observing operation on a practical scale. Companies engaged in this work have been most generous in their cooperation.

There is a great need in the West for chemical engineers to help develop the vast resources. For this reason graduates are strongly advised to take advanced work and to extend their knowledge along chosen lines of research so that they may be better fitted to attack problems on their own responsibility.

DEGREE CURRICULUM IN CHEMICAL ENGINEERING

(B.Sc. Degree)

Freshman Year

	1st	Term 2d	3d
Chemical Engineering Survey (ChE 101, 102, 103).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
General Chemistry (Ch 104, 105, 106).....	5	5	5
Plane Trigonometry (Mth 111), Elementary Analysis (Mth 131, 132).....	4	4	4
English Composition (Eng 101, 102, 103).....	3	3	3
Elementary German (ML 131, 132, 133).....	3	3	3
Gymnasium (PEm 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics.....	2	2	2
	18	18	18

Sophomore Year

Qualitative (Ch 232), Quantitative Analysis (Ch 244, 245)....	5	5	5
Differential (Mth 251), Integral Calculus (Mth 252, 253)....	4	4	4
Intermediate German (ML 231, 232, 233).....	3	3	3
Engineering Physics (Ph 111, 112, 113).....	3	3	3
Gymnasium (PEm 211, 212, 213).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics.....	2	2	2
	17½	17½	17½

Junior Year

Engineering Chemistry (ChE 311).....	3	---	---
Industrial Inorganic Chemistry (ChE 321, 322).....	---	3	3
Organic Chemistry (Ch 322, 323), Organic Analysis (Ch 328).....	5	5	5
Advanced German (ML 331, 332, 333).....	3	3	3
Engineering Physics (Ph 311, 312).....	3	3	---
National Government (PS 301).....	---	---	3
①Electives	3	3	3
	17	17	17

Senior Year

Industrial Organic Chemistry (ChE 431, 432).....	3	3	---
Electrochemical Industries (ChE 441).....	---	---	3
Physical Chemistry (Ch 481, 482, 483).....	3	3	3
Elementary French (ML 111, 112, 113).....	3	3	3
Introduction to Economics (ES 391).....	3	---	---
Business Organization and Management (BA 381).....	---	3	---
①Electives	4½	4½	7½
	16½	16½	16½

①Suggested Electives: General Bacteriology (Bac 204, 205), Materials of Engineering (MM 311), Metallography and Pyrometry (MM 481), Elementary Psychology (Psy 301), Crystallography, Blowpipe Analysis, and Determinative Mineralogy (G 211), Mineralogy (G 212), Advanced Organic Chemistry (Ch 421, 422, 423), Research (ChE 451, 452, 453).

COURSES IN CHEMICAL ENGINEERING

ChE 101, 102, 103. **Chemical Engineering Survey.** A course of lectures for freshmen in Chemical Engineering. The course is designed to broaden the point of view of students and to bring them into closer relation with the department. The lectures include a study of great chemists, and the important chemical industries.

Required in Chemical Engineering; freshman year; three terms; 1 lecture; $\frac{1}{2}$ credit each term. *F. E. Rowland*

ChE 311. **Engineering Chemistry.** A course of lectures and laboratory work on the subjects of fuel, combustion, refractories, lubricants, boiler feed waters, iron, steel, alloys, cements.

Required in Chemical Engineering; junior year; first term; 3 credits; 2 lectures; 2 three-hour laboratory periods. Fee \$5.00. Deposit \$2.50. *F. E. Rowland*

ChE 321, 322. **Industrial Inorganic Chemistry.** The principal inorganic industries studied in lectures and in the laboratory from the standpoint of modern scientific and applied Chemistry. The laboratory instruction is arranged to develop ability on the part of the student to carry on independent work with confidence. The principles involved in the problems are carefully studied before the laboratory manipulation is attempted.

Required in Chemical Engineering; junior year; second and third terms; 3 credits each term; 2 lecture periods; 2 three-hour laboratory periods. Fee \$5.00 each term. Deposit \$2.50 each term.

F. E. Rowland

ChE 431, 432. **Industrial Organic Chemistry.** Lectures and laboratory work covering the chief organic branches of industrial chemistry. Emphasis is given to the fundamental principles involved in the various processes studied. The topics studied include: mineral, vegetable, and animal oils; soap; glycerine; rubber, leather; explosives; sugar; starch; destructive distillation of coal and wood.

Required in Chemical Engineering; senior year; first and second terms; 3 credits each term; 2 lectures; 2 three-hour laboratory periods. Fee \$5.00 each term. Deposits \$2.50 each term.

F. E. Rowland

ChE 441. **Electrochemical Industries.** Application of the electric current to the manufacture of chemical materials by electrolytic and electrothermal methods. In the lectures and laboratory work the following topics are treated: sodium hydroxide and chlorine, hypochlorites; chlorates, perchlorates, oxygen, hydrogen, carbide, graphite, carbon disulfide, phosphorus, sodium, magnesium, aluminum.

Required in Chemical Engineering; senior year; third term; 3 credits; 2 lectures; 2 three-hour laboratory periods. Fee \$5.00. Deposit \$2.50.

ChE 451, 452, 453. **Research.** Consultation, library, and laboratory work. A course in which the student is permitted to investigate problems independently of others. The preparation of a thesis will be required as evidence of the student's ability.

Elective; senior year; credits to be arranged. Fee \$1.50 each credit. Deposit \$2.50. *F. E. Rowland*

Industrial Journalism

FRANCIS LAWRENCE SNOW, Professor of Industrial Journalism.

CHARLES JARVIS MCINTOSH, B.S.D., B.Sc., Associate Professor of Industrial Journalism.

JOHN MARVIN RICHARDSON, Assistant in Industrial Journalism.

Courses in Industrial Journalism are offered to train students to write and edit material on various subjects embraced within the distinctive field of the College, such as Agriculture, Engineering, Forestry, Mining, Home Economics, and the like; to enable them to take positions on farm and trade papers, and other publications, especially where writing on industrial subjects is required; to conduct campus publications and other publications of a technical nature; and to furnish scientific material in popular form to the papers.

These courses are intended to meet the needs of a large group of persons—farmers, county agricultural agents, home demonstration agents, field specialists in the agricultural extension service, research specialists at the agricultural experiment stations, teachers of industrial subjects, and others who may have occasion to prepare material for the press on industrial subjects.

The courses taught are thoroughly practical and form a valuable asset for those who aim to become leaders of community enterprises through the press and in any other capacity for which their technical training fits them. Industrial Journalism does not displace fundamental work in English but supplements it by giving the technique of journalistic writing.

COURSES

IJ 200. Elementary Industrial Journalism. Intended primarily to give students the fundamental principles of news writing. Prepares them for writing technical articles on subjects pertaining to Agriculture, Home Economics, Engineering, etc. Required as a condition of eligibility for leading positions on the staffs of student publications.

Elective; sophomore, junior, or senior year; any term; 3 credits. Fee \$1.00. Text: Spencer, News Writing. *F. L. Snow*

IJ 204. Journalism Practice I. IJ 204, 314, and 334 constitute laboratory practice for courses IJ 200, 310, 330 respectively. Opportunity is given to put the fundamental principles of journalism into practice. In IJ 204 and 314, "beats" are assigned and students receive practical experience in reporting. Special assignments are also

given. Students are expected to write for publication. These courses offer students the advantages of training and experience in connection with instruction in corresponding courses.

Elective; 2 credits. Fee \$1.00.

F. L. Snow

IJ 310. Industrial Journalism. Continuation of work in course IJ 200. Principles of journalism are applied to the treatment of industrial subjects. Types of news stories are studied, feature stories being given special consideration.

Prerequisite: IJ 200. Elective; junior or senior year; second term; 3 credits; 3 lecture periods. Fee \$1.00.

F. L. Snow

IJ 314. Journalism Practice II. See IJ 204. Accompanies IJ 310.

Elective; junior or senior year; second term; 2 credits. Fee \$1.00.

F. L. Snow

IJ 320. Editing. Copy reading, head writing, proof reading, and make-up. Actual experience is given in editing copy for publication. Training is offered that fits students for the work of putting out campus publications.

Prerequisites: IJ 200, 310. Elective; junior or senior year; first term; 3 credits; 3 lecture periods. Fee \$1.00.

C. J. McIntosh

IJ 330. Technical Journalism. Students are required to prepare copy on subjects pertaining to Agriculture, Engineering, Commerce, Home Economics, etc., and to submit it for publication in farm journals, trade journals, and other periodicals. A study is made of the demands of these publications for material of a more or less technical nature. Attention is given to illustration. Preparation of publicity matter is considered.

Prerequisites: IJ 200, 310. Elective; junior or senior year; third term; 3 credits; 3 lecture periods. Fee \$1.00.

F. L. Snow

IJ 334. Journalism Practice III. See IJ 204. Accompanies IJ 330.

Elective; junior or senior year; third term; 2 credits. Fee \$1.00.

F. L. Snow

IJ 440. Editorial Writing. Materials, style, and arrangement of periodical editorials are considered. Training is given in writing editorials. Principles of policy and ethics are studied and applied. The make-up of the editorial page of farm and trade journals is given attention.

Prerequisite: IJ 320. Elective; senior year; second term; 3 credits; 3 lecture periods. Fee \$1.00.

C. J. McIntosh

Library

LUCY MAY LEWIS, A.B., B.L.S., Librarian.

LUCIA HALEY, A.B., Continuations Assistant.

NELLE UREE BRANCH, A.B., B.L.S., Reference Librarian.

ELIZABETH PROPHET RITCHIE, A.B., B.L.S., Cataloguer.

*BERTHA HERSE, B.Sc., in charge of Periodicals and Binding.

ELIZABETH MYRTILLA PALM, B.Sc., Head of Circulation Department.

JOSEPHINE MORTON, A.B., Continuations Assistant.

*ETHEL ALLEN, B.Sc., Periodicals Assistant.

MARY KENNEDY LOGAN, Circulation Assistant.

RUBY ROBERTS LOEHR, A.B., Circulation Assistant.

EVANGELINE THURBER, B.A., Reference Assistant.

MARY ERNESTINE BROWN, A.B., Periodicals Assistant.

*ELIZABETH ANN CHAPMAN, A.B., B.Sc., Periodicals Assistant.

ELZIE VANCE HERBERT, Order Clerk and Stenographer.

Equipment. The library has an excellent building, with provision for expansion, erected for its use in 1918. At present some of the rooms designed for seminar use are occupied as offices by other departments.

The public service rooms include a Reference and Reading room, 150 by 41 feet extending the entire length of the building, a Continuations Reference room, and a Technical Periodical Reference room, providing a total seating capacity of 406 readers.

The Reference and Reading room contains a collection of encyclopedias, dictionaries, standard reference books in the different departments of study, and current and bound files of general, literary and economic periodicals. The "Culture collection" of books for general reading is also shelved in this room.

The Continuations Reference room contains a collection of the publications of the United States and foreign governments, and the states of the United States, of colleges, and learned societies, and other material appearing in numbered series at irregular intervals. Duplicates of the most-used material are kept for circulation and for class reserve work.

* On leave of absence.

The Technical Periodical Reference room, on the first floor, includes bound sets of technical periodicals and the current numbers of technical periodicals.

Catalogues. The library maintains in the reading room a general catalogue of all library books on the campus. This is arranged alphabetically by author, title, and subject. There is also a card catalogue of the publications of the United States Department of Agriculture arranged in the same manner, and a card index to the publications of the state experiment stations, which is a subject catalogue.

Collections. The main working collection of the library is housed in the Library Building, and includes the books provided for the activities of the various schools of the College and the Experiment Station; a good collection of the publications of other colleges and experiment stations; and publications of the departments of Agriculture of the United States and many foreign countries. The library is a designated depository for the publications of the United States Government and the Carnegie Institution of Washington. It owns a collection of over 2,000 documents received as a gift from the late United States Senator Dolph.

The collection of books on the history of Horticulture is notably fine, and that on Home Economics is unusually complete for the size of the library.

Practical use of the books has led to the establishment of small laboratory collections kept in the rooms of the following departments: General Chemistry, Agricultural Chemistry, Animal Husbandry, Agronomy, Horticulture, Botany, Forestry, Bacteriology, Zoology, Pharmacy, Commerce, and Civil, Chemical, Mechanical, Electrical, and Mining Engineering. Each department library is in charge of the head of the department, to whom application must be made for use of the books.

All books are classified and catalogued according to the Dewey decimal system.

Books may be drawn for home use by all officers and students of the College. Books may be kept by the students for two weeks with the privilege of a renewal, and by officers for as long a time as best service to all will permit.

Seniors and graduate students may have access to the stacks for special study if recommended to the Librarian by the department head under whom they are studying.

COURSE

Lib 100. **Library Practice.** This course is designed to give instruction in practical use of the library catalogues and reference books, by lectures and practical problems requiring the students to use the various indexes, statistical books, encyclopedias, and special reference books. Each student is required to prepare a bibliography of at least twenty-five references on some practical subject.

Required; freshman year; any term; 1 credit; 1 lecture; 1 recitation; 1 one-hour laboratory period.

Lucy M. Lewis, Nelle U. Branch, Lucia Haley.

Military Science and Tactics

COLONEL GEORGE WILLIAMS MOSES, United States Army, Retired, Professor of Military Science and Tactics; Commandant of Cadets, Reserve Officers' Training Corps.

MAJOR WALTER FERRELL WINTON, Field Artillery, United States Army. Associate Professor of Military Science and Tactics. In charge of Field Artillery Unit, Reserve Officers' Training Corps.

MAJOR HENRY TERRELL, Jr., Infantry, United States Army, Assistant Professor of Military Science and Tactics. In charge of Infantry Unit, Reserve Officers' Training Corps.

CAPTAIN GEORGE FRIDJHOF BLOOMQUIST, Infantry, United States Army, Assistant Professor of Military Science and Tactics. Instructor Infantry Unit, Reserve Officers' Training Corps.

CAPTAIN GLENN SMITH FINLEY, Cavalry, United States Army, Assistant Professor of Military Science and Tactics. Instructor Cavalry Unit, Reserve Officers' Training Corps.

CAPTAIN LEE CARD, Quartermaster Corps, United States Army, Assistant Professor of Military Science and Tactics. In charge of Motor Transport Unit, Reserve Officers' Training Corps.

CAPTAIN HOLMES PAULLIN, Cavalry, United States Army, Assistant Professor of Military Science and Tactics. In charge of Cavalry Unit, Reserve Officers Training Corps.

FIRST LIEUTENANT PATRICK HENRY TANSEY, Corps of Engineers, United States Army, Assistant Professor of Military Science and Tactics. In charge of Engineer Unit, Reserve Officers' Training Corps.

FIRST LIEUTENANT LEO LEFTWICH PARTLOW, Field Artillery, United States Army, Assistant Professor of Military Science and Tactics. Instructor Field Artillery Unit, Reserve Officers' Training Corps.

FIRST LIEUTENANT MAYLON EDWARD SCOTT, Field Artillery, United States Army, Professor of Military Science and Tactics. Instructor Field Artillery Unit, Reserve Officers' Training Corps.

FIRST LIEUTENANT ARNOLD R. C. SANDER, Infantry, United States Army, Assistant Professor of Military Science and Tactics. Instructor Infantry Unit, Reserve Officers' Training Corps.

FIRST LIEUTENANT LEO GEORGE CLARK, Infantry, United States Army, Assistant Professor of Military Science and Tactics. Instructor Infantry Unit, Reserve Officers' Training Corps.

FIRST LIEUTENANT JAMES GEORGE CHRISTIANSON, Corps of Engineers, United States Army, Assistant Professor of Military Science and Tactics. Instructor Engineer Unit, Reserve Officers' Training Corps.

FIRST LIEUTENANT ALBIN NACE CALDWELL, Quartermaster Corps, United States Army, Assistant Professor of Military Science and Tactics. Instructor Motor Transport Unit, Reserve Officers' Training Corps.

MASTER SERGEANT HERBERT CLARENCE SPEAR, D. E. M. L., (Captain Engineer Section, Officers' Reserve Corps, United States Army), Assistant to Professor of Military Science and Tactics. Assistant Instructor Engineer Unit, Reserve Officers' Training Corps.

MASTER SERGEANT FRANK GEORGE HUNTER, D. E. M. L., United States Army, Assistant to Professor of Military Science and Tactics. Supply Sergeant, Reserve Officers' Training Corps.

FIRST SERGEANT ANTHONY SCHMITZ, D. E. M. L., United States Army, (Captain, Cavalry Section, Officers' Reserve Corps, United States Army), Assistant to Professor of Military Science and Tactics. Assistant Instructor Cavalry Unit, Reserve Officers' Training Corps.

FIRST SERGEANT JOHN HARSCH, Jr., D. E. M. L., United States Army, Assistant to Professor of Military Science and Tactics. Assistant Instructor Field Artillery Unit, Reserve Officers' Training Corps.

STAFF SERGEANT CLYDE LAFAYETTE FALLS, D. E. M. L., United States Army, (Second Lieutenant, Infantry Section, Officers' Reserve Corps, United States Army), Assistant to Professor of Military Science and Tactics. Assistant Instructor Motor Transport Unit, Reserve Officers' Training Corps.

SERGEANT THOMAS ROSS JARBOE, D. E. M. L., United States Army, (Captain, Infantry Section, Officers' Reserve Corps, United States Army), Assistant to Professor of Military Science and Tactics. Assistant to Personnel Adjutant, Reserve Officers' Training Corps.

SERGEANT BERT LORING DUNHAM, D. E. M. L., United States Army, Assistant to Professor of Military Science and Tactics. Assistant Instructor Field Artillery Unit, Reserve Officers' Training Corps.

SERGEANT HERBERT GEORGE CROCKER, D. E. M. L., United States Army, (Captain, Cavalry Section, Officers' Reserve Corps, United States Army), Assistant to Professor of Military Science and Tactics. Assistant Instructor Cavalry Unit, Reserve Officers' Training Corps.

SERGEANT EUGENE EDWARD LOSSETT, D. E. M. L., United States Army, Assistant to Professor of Military Science and Tactics. Assistant Instructor Infantry Unit, Reserve Officers' Training Corps.

SERGEANT MORRIS LOUIS WELSON, D. E. M. L., United States Army, Assistant to Professor of Military Science and Tactics. Assistant to Acting Quartermaster, Reserve Officers' Training Corps.

SERGEANT CLARENCE CALVIN WOODBURY, D. E. M. L., United States Army, Assistant to Professor of Military Science and Tactics, (Second Lieutenant, Infantry Section, Officers' Reserve Corps, United States Army), Assistant Instructor Infantry Unit, Reserve Officers' Training Corps.

SERGEANT EDWARD MACMANUS, D. E. M. L., United States Army, Assistant to Professor of Military Science and Tactics. Assistant Instructor Field Artillery Unit, Reserve Officers' Training Corps.

The Act of Congress establishing the Agricultural and Mechanical colleges was passed in the midst of the Civil War; it inaugurated the cadet corps and required military training of all able-bodied male students. The object of this requirement was to provide well-trained officers for citizen soldiers. The Act was supplemented on June 3, 1916, by another Act of Congress, passed in the midst of the World War, establishing the Reserve Officers Training Corps. The object of the Corps is "to qualify students, by systematic and standard training methods, to be commissioned in the Officers' Reserve Corps so that in time of national emergency, trained men, graduates of the College, may lead the units of the large armies on which the safety of the country will depend."

A Distinguished Institution. By order of the War Department, as a result of comparative inspection, the Oregon Agricultural College has been designated a Distinguished Institution in respect to its military training.

R. O. T. C. Basic and Advanced Courses. In the fall of 1917 the War Department established at the Oregon Agricultural College both a Basic Course and an Advanced Course, Senior Division; in the Reserve Officers' Training Corps. The Basic Course covers the first two years of the college military training, enrolling physically fit men of the freshman and sophomore years except those who may be excused for cause by the College authorities. The Advanced Course comprises the third and fourth years of college military training, enrolling those men who have completed the Basic Course and who have shown proper interest and aptitude for the training and who are specially selected for further training in advanced work. Once enrolled in the Advanced Course, students are required to continue it throughout the remaining period of their undergraduate course. This obligation does not prevent them from severing their connection with the College, however, if their interests or desires prompt them to leave the institution either temporarily or permanently.

Five Branches of Training. Five branches of military training are offered at the College to qualified students of the R. O. T. C.: Infantry, Cavalry, Motor Transport, Engineers, and Field Artillery. In addition an excellent R. O. T. C. cadet band offers instruction in band practice. In so far as is possible students are permitted to elect the particular branch of training they desire to take up.

Uniforms Provided by the Government. All members of R. O. T. C. units at this institution are provided by the United States Government with military uniforms including coat, breeches, cap, leggins, flannel shirt, and belt. These articles are issued to students free of charge and must be returned at the end of the college year or whenever a student severs his connection with the Military department of the College. To protect the College against financial loss from failure to return uniforms, a deposit in a sum to be determined will be required from each student enrolled in the R. O. T. C., this deposit to be returned to the student when uniform and equipment are returned to the Military department.

Commutation of Subsistence. Selected members of the Advanced Course (junior and senior years) of the R. O. T. C., who sign a special contract agreeing to certain conditions, including attendance at summer camps, are paid a cash commutation of subsistence (board) by the National Government throughout the entire period during which they are pursuing the Advanced Course in the R. O. T. C. This amount varies according to the Government standard ration.

Benefits to Students Enrolling in the R. O. T. C. (a) A thorough military education which will fit students upon completion of the four-year course to render patriotic service to the nation in time of war as troop leaders and officers.

(b) A maximum of thirty (30) college credits which count toward a degree on graduation.

(c) The free use of the latest model and very finest equipment of Infantry, Cavalry, Field Artillery, Engineers, and Motor Transport issued to this institution by the Government. The value of the Government equipment now on hand at the College is approximately a half million dollars.

(d) Generous and free allowance of both indoor and outdoor rifle ammunition for target practice, with expert instructors and the free use of rifles, target equipment, ranges, etc.

(e) Commutation of subsistence to all students who have completed the two-year basic course of the R. O. T. C. at a certain prescribed rate, including months of the summer vacation.

(f) The privilege of attending summer camps (in the nature of a vacation) without expense of any kind. Students attending these camps, in addition to contact with college men from all over the United States, have their entire expenses paid, including transportation, sleeping car accommodations, and an allowance of approximately \$3.00 a day for meals while enroute both ways, an additional complete uniform upon arrival at camp; board, lodging, medical and dental treatment while at camp; 70 cents a day in cash to those students pursuing the advanced camp course of instruction; a thorough physical examination; an abundance of healthy, recreational amusement and diversion; excellent social attractions carefully supervised; and last, but not least a course in military instruction of the very highest type and given by specially selected officers who are experts in their particular lines.

(g) A commission as a Second Lieutenant in the Officers' Reserve Corps of the United States Army upon successful completion of the four-year course.

(h) The selection of several honor graduates each year (distinguished colleges only, such as is O. A. C. this year) for permanent appointment in the Regular Army of the United States, no further mental examination being required.*

(i) A bachelor's degree in Military Science and Tactics to those students successfully completing the Degree Curriculum in Military Science and Tactics.

The Reserve Officers' Training Corps is organized under authority of the Act of Congress of June 3, 1916, as amended by the acts of September 8, 1916, and July 9, 1918.

The primary object of the R. O. T. C. is to provide systematic military training at civil educational institutions for the purpose of qualifying selected students of such institutions as officers in the military forces of the United States. It is believed that such military training will aid greatly in the development of better citizens.

Requirements. In addition to usual home study, four hours of military instruction each week are required for all men students in the two years of the Basic Course, and five hours each week in the two years of the Advanced Course to those students electing to take the Advanced Course.

Military Credits for Graduation. A minimum of 12 credits in Military Science is required of all men for graduation. This comprises 6 credits for each of the first two years' basic work. Nine credits are given for the work of both senior and junior years, which is

entirely voluntary. This makes a total of 30 credits for the entire R. O. T. C. work. If a student does not secure 12 credits in his first two years, he must continue his military work until this has been accomplished.

Adjustment of Credits. Students transferring to the Oregon Agricultural College with advanced credits from other educational institutions of equal rank will not be exempt from the military requirement but will be required to offer an equivalent of credits for the back military credits represented and accumulated. Students presenting credentials for military work taken at other educational institutions or for service in the U. S. Army, Navy, or Marine Corps may be given credit for such work in so far as it is deemed equivalent to the requirements of this institution. If for any reason a student is relieved from the military requirements, other credits must be substituted for the military credits.

Cadet Officers. The cadet officers and non-commissioned officers are selected at the beginning of each college year by the Commandant with the approval of the President of the College. Their relative rank and standard in each grade are determined on a basis of individual efficiency and merit. Cadet commissioned officers usually are selected from the senior class, sergeants and higher non-commissioned officers from the junior class, and corporals from the sophomore class. The traditions of the College have made it a high honor to stand well in the Military department and the student commanders of the different R. O. T. C. units have invariably been men of superior attainments and character.

Equipment. The department of Military Science and Tactics has thoroughly modern equipment, furnished by the National Government and valued considerably in excess of half a million dollars. The Armory is one of the largest and finest in the country and affords ample space for the military staff, arms room, assembly hall, and for military instruction in rainy weather. The War Department has detailed to the College sixteen Army officers of the regular service, sixteen non-commissioned officers, and thirty-one privates. In addition, eighty-eight artillery and cavalry horses and four mules are supplied; together with motor transportation; Field Artillery big guns; motorized repair shop; ammunition wagons; Infantry, Field Artillery, Engineering, Motor Transport, and Cavalry equipment.

Military Fraternity. A chapter of the national military fraternity, "Scabbard and Blade," was installed on the campus during the spring of 1920. Membership is limited to those members of the Military department who have exhibited particular qualities of excellence in manhood, scholarship, military attainment, and academic

standing, and in the prerequisites of a gentleman and of a patriotic citizen.

Degree Curriculum. Besides the Basic Course, which is compulsory, and the Advanced Course, which is elective, there is offered a degree curriculum in Military Science and Tactics, with majors in Infantry, Field Artillery, Motor Transport, Cavalry, and Military Engineering, and leading to the degree of Bachelor of Science.

DEGREE CURRICULUM IN MILITARY SCIENCE AND TACTICS

(*B.Sc. Degree*)

INFANTRY, FIELD ARTILLERY, MOTOR TRANSPORT, CAVALRY

Freshman Year

	1st	Term 2d	3d
Military Science and Tactics (MS 111, 112, 113, or 121, 122, 123, or 131, 132, 133, or 151, 152, 153).....	2	2	2
English Composition (Eng 101, 102, 103).....	3	3	3
French, Spanish, or German.....	3	3	3
General Chemistry (Ch 101, 102, 103).....	3	3	3
Plane Trigonometry (Mth 111), Elementary Analysis (Mth 131, 132).....	4	4	4
Library Practice (Lib 100).....	1		
Gymnasium (PEm 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Approved electives	1	2	2
	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$

Sophomore Year

Military Science and Tactics (MS 211, 212, 213, or 221, 222, 223, or 231, 232, 233, or 251, 252, 253).....	2	2	2
Modern Language (continued from freshman year).....	3	3	3
History of Western Civilization (Hst 212, 213), Recent His- tory of the United States (Hst 126).....	3	3	3
Engineering Physics (Ph 111, 112, 113).....	3	3	3
Plane Surveying (CE 121, 122, 123).....	5	4	5
Gymnasium (PEm 211, 212, 213).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Approved electives	1	2	1
	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$

Junior Year

Military Science and Tactics (MS 311, 312, 313, or 321, 322, 323, or 331, 332, 333, or 351, 352, 353).....	3	3	3
Thesis (on approved Military subjects).....	1	1	1
English Literature (Eng 321, 322, 323).....	3	3	3
Elementary Commercial Geography.....		3	
Practice Teaching, Methods of Coaching Athletic Teams.....	2	2	2
Approved electives	8	5	8
	17	17	17

Senior Year

	1st	Term 2d	3d
Military Science and Tactics (MS 411, 412, 413, or 421, 422, 423, or 431, 432, 433, or 451, 452, 453).....	3	3	3
Thesis (on approved Military subjects).....	1	1	1
History of British Empire (Hst 411), History of South America (Hst 331), American Diplomatic History (Hst 421).....	3	3	3
Electric Signaling (EE 433).....	.....	.....	2
Comparative Governments (PS 402).....	3	.....	.....
International Relations (PS 401).....	.....	4	.....
Army Paper Work (BA 391).....	.....	2	.....
Introduction to Accounting (BA 101).....	.....	.....	3
Approved electives	7	4	5
	17	17	17

MILITARY ENGINEERING

Freshman Year

Military Science and Tactics (MS 141, 142, 143).....	2	2	2
Plane Surveying (CE 121, 122, 123).....	5	4	5
Engineering Physics (Ph 111, 112, 113).....	3	3	3
Engineering Drawing (CE 111, 112, 113).....	3	3	3
Library Practice (Lib 100).....	.....	1	.....
Plane Trigonometry (Mth 111), Elementary Analysis (Mth 131, 132).....	4	4	4
Gymnasium (PEm 111, 112, 113).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$

Sophomore Year

Military Science and Tactics (MS 241, 242, 243).....	2	2	2
General Chemistry (Ch 101, 102, 103).....	3	3	3
Direct Currents (EE 251).....	3	.....	.....
Alternating Currents (EE 252).....	.....	3	.....
English Composition (Eng 101, 102, 103).....	3	3	3
Differential Calculus (Mth 251), Integral Calculus (Mth 252, 253).....	4	4	4
Gymnasium (PEm 211, 212, 213).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Approved electives	2	2	5
	17 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$

Junior Year

Military Science and Tactics (MS 341, 342, 343).....	3	3	3
Hydrology (CE 341), Hydraulics (CE 342, 343).....	3	3	3
Thesis (on approved Military subjects).....	1	1	1
Mechanics (MM 351, 352).....	3	3	.....
Strength of Materials (MM 353).....	.....	.....	3
Roads and Pavements (HE 313).....	5	.....	.....
Masonry and Foundations (CE 372).....	.....	3	.....
Structural Analysis (CE 387).....	.....	.....	2
Army Paper Work (BA 391).....	.....	2	.....
Approved electives	2	2	5
	17	17	17

Senior Year

	1st	Term 2d	3d
Military Science and Tactics (MS 441, 442, 443).....	3	3	3
Structural Engineering (CE 482), Structural Design (CE 483, 484)	4	4	5
Economics of Highway Construction (HE 416).....	3	....	....
Thesis (on approved Military subjects).....	1	1	1
National Government (PS 301).....	....	3	....
Seminar (CE 491, 492, 493).....	1	1	1
Water Supply and Sewerage (CE 451).....	4	....	....
Contracts and Specifications (HE 427).....	....	....	3
Reclamation Engineering (CE 461).....	....	....	4
Elementary Commercial Geography.....	....	3	....
Approved electives	1	2	....
	17	17	17

COURSES IN MILITARY SCIENCE AND TACTICS

The periods indicated in each course are exclusive of the time required for outside study.

INFANTRY

MS 111, 112, 113. Infantry. First Year Basic Course. An elementary course covering the fundamentals of military training; instruction in the duties of a private of Infantry. Military courtesy; discipline; guard duty; infantry drill, and equipment; small arms instruction; physical training; scouting; patrolling.

Freshman year; three terms; 2 credits each term; 4 periods.

MS 211, 212, 213. Infantry. Second Year Basic Course. A more extensive course than first basic course of Infantry, in military fundamentals and calculated to turn out well-trained corporals of Infantry. This course covers the same subjects as taught in the first basic Infantry course, and in addition, musketry, automatic rifle, grenades, topography, military hygiene, bayonet.

Sophomore year; three terms; 2 credits each term; 4 periods.

MS 311, 312, 313. Infantry. First Year Advanced Course. This course includes practical work as instructors, machine guns, one pounder, light mortar, field engineering, rifle marksmanship, and infantry drill; training for duties of higher non-commissioned officers and junior officers; minor tactics.

Junior year; three terms; 3 credits each term; 5 periods.

MS 411, 412, 413. Infantry. Second Year Advanced Course. A course contemplated to round out the military course for infantrymen and turn out well-trained infantry officers. Military history; administration; minor tactics; military policy; military law; tactical

walks; pistol and rifle practice; and practical work as drill instructors.

Senior year; third term; 3 credits each term; 5 periods.

FIELD ARTILLERY

MS 121, 122, 123. **Field Artillery.** First Year Basic Course. The aim of this course is to instruct the student in the duties of a cannoneer of Field Artillery. Dismounted drill; military courtesy and discipline; first aid; interior guard duty; drill of a gun squad; care and use of the pistol; gunners examination; ordnance and material; equitation.

Freshman year; three terms; 2 credits each term; 4 periods.

MS 221, 222, 223. **Field Artillery.** Second Year Basic Course. This course consists principally of the instruction given to the drivers and the technical specialists and the non-commissioned officers of Field Artillery. Military ceremonies; topography; orientation; motors and motor vehicles; reconnaissance; mounted drill and draft; sub-caliber practice; pistol practice.

Sophomore year; three terms; 2 credits each term; 4 periods.

MS 321, 322, 323. **Field Artillery.** First Year Advanced Course. The object of this course is to ground the student thoroughly in the technical duties of a junior officer of Field Artillery. The theoretical work includes computation of firing data; exterior ballistics, the laws of dispersion, meteorological data and corrections of the moment, action and effects of projectiles and fuzes, terrain board exercises, smoke bomb practice, equitation and hippology, communication and liaison, battery emplacement and camouflage, functions of the various calibers of Field Artillery.

Junior year; three terms; 3 credits each term; 5 periods.

MS 421, 422, 423. **Field Artillery.** Second Year Advanced Course. The work of this year comprises those general subjects which round out the instruction of an officer of Field Artillery. Military law; rules of land warfare; administration and army paper work; property accountability and records; military history and policy of the United States; minor tactics and map problems; field service regulations; current technical publications; mounted instruction, including polo and cross-country riding. The students of this course are required, from time to time, to act as instructors in the basic courses.

Senior year; three terms; 3 credits each term; 5 periods.

MOTOR TRANSPORT

MS 131, 132, 133. **Motor Transport.** First Year Basic Course. An elementary course in the military fundamentals. Motor transportation convoys; infantry drill; military courtesy and discipline; rifle marksmanship; organization; care of arms and equipment; patrolling and interior guard duty, training for duties of private, Motor Transport Division, Quartermaster Corps.

Freshman year; three terms; 2 credits each term; 4 periods.

MS 231, 232, 233. **Motor Transport.** Second Year Basic Course. Infantry drill; rifle marksmanship; camp sanitation; topography; vehicle engineering and convoy preliminary driving work; training for corporal, Motor Transport Division, Quartermaster Corps.

Sophomore year; three terms; 2 credits each term; 4 periods.

MS 331, 332, 333. **Motor Transport.** First Year Advanced Course. Duties of a Motor Transport sergeant, including operations of convoys; convoy problems; topography; field engineering; camp sanitation, minor tactics, and advanced motor vehicle engineering.

Junior year; three terms; 3 credits each term; 5 periods.

MS 431, 432, 433. **Motor Transport.** Second Year Advanced Course. A course of training calculated to produce competent and efficient Motor Transport lieutenants. Administration and operation; military law; tactics and strategy; pistol marksmanship; advanced motor vehicle engineering; and maintenance of motor trucks.

Senior year; three terms; 3 credits each term; 5 periods.

ENGINEERS CORPS

MS 141, 142, 143. **Engineers Corps.** First Year Basic Course. An elementary course calculated to produce a well-trained private of Engineers, including Infantry drill, military courtesy, discipline, personal hygiene, guard duty, rifle practice, cordage and rigging, pontoon work, and simple bridges.

Freshman year; three terms; 2 credits each term; 4 periods.

MS 241, 242, 243. **Engineers Corps.** Second Year Basic Course. A course including further extension in military fundamentals and such technical education as an intelligent corporal of Engineers should possess; Infantry drill; military courtesy and discipline; military bridges and river crossing; demolitions and mine warfare; minor tactics; pistol and rifle practice; cordage and rigging; guard duty.

Sophomore year; three terms; 2 credits each term; 4 periods.

MS 341, 342, 343. **Engineers Corps.** First Year Advanced Course. A course of instruction in the duties of a master sergeant of Engineers, including practical work as drill masters in engineer work and Infantry drill; minor tactics; topography; camp sanitation; pontoon and land bridges; fortifications; military railways; military road construction; engineer map problems.

Junior year; three terms; 3 credits each term; 5 periods.

MS 441, 442, 443. **Engineers Corps.** Second Year Advanced Course. A course of instruction in the field and garrison duties of a lieutenant of Engineers, including practical work as drill masters; military construction; engineer organization; castramentation; application of all branches of engineering to the art of war; wharves and docks; administration; tactics and strategy; gasoline engines; electrical equipment for military use; hippology; equitation; engineer map problems; military history and policy; topography; military law.

Senior year; three terms; 3 credits each term; 5 periods.

CAVALRY

MS 151, 152, 153. **Cavalry.** First Year Basic Course. A course in the fundamentals of military science and in the duties of a private of Cavalry. Military courtesy and discipline; physical training; cavalry drill; use of cavalry weapons; care and handling of arms and equipment; personal hygiene; guard duty and equitation.

Freshman year; three terms; 2 credits each term; 4 periods.

MS 251, 252, 253. **Cavalry.** Second Year Basic Course. A course of instruction in the duties of a corporal of Cavalry. Organization, military courtesy and discipline; care and handling of arms and equipment; cavalry drill; small arms firing; musketry; camp sanitation; guard duty; physical training; topography; development and employment of Cavalry equitation.

Sophomore year; three terms; 2 credits each term; 4 periods.

MS 351, 352, 353. **Cavalry.** First Year Advanced Course. A course in military science and tactics calculated to produce well-trained and efficient Cavalry sergeants. Cavalry drill; Cavalry tactics; care of animals; use of cavalry weapons; field engineering; use of accompanying weapons; musketry.

Junior year; three terms; 3 credits each term; 5 periods.

MS 451, 452, 453. **Cavalry.** Second Year Advanced Course. A course of instruction for the preparation of a lieutenant of Cavalry. Hippology, minor tactics, cavalry drill and equitation; use of cavalry weapons; packing; employment of Cavalry in war; administration; military policy; military history of United States; military law; Command and Leadership.

Senior year; three terms; 3 credits each term; 5 periods.

Physical Education for Men

RICHARD BURR RUTHERFORD, A.B., B.P.E., Professor of Physical Education for Men; Director of Intercollegiate Athletics.

GUY LESLIE RATHBUN, M.P.E., Assistant Professor of Physical Education and Athletics.

RALPH ORVAL COLEMAN, B.Sc., Instructor in Physical Education for Men.

MICHAEL HENRY BUTLER, Coach of Track; Trainer of Athletic Teams.

ROBERT HENRY HAGER, Instructor in Physical Education for Men.

CLYDE WESLEY HUBBARD, B.Sc., Instructor in Physical Education for Men.

Because physical health determines capacity for efficiently carrying out the work which a student prepares for in college, Physical Education in modern educational institutions is being emphasized more and more every year.

Physical Education for men in the Oregon Agricultural College includes courses in: (1) Elementary Gymnastics; (2) Swimming; (3) Intercollegiate Athletics; (4) Intramural Athletics; (5) Teachers' course in Physical Education. Comprehensive work is being done with corrective exercises.

Individual Instruction. This is given in the form of advice based upon the health examination of the student. Health examinations are given during the freshman and sophomore years. The examinations are utilized for the purpose of finding defects whose proper treatment may add to the health efficiency of the student. Advice given at this time is recorded and when a student reports for conference the advice on file is followed up. Students found with remediable physical defects are given special corrective work.

Physical Training. Students may devote themselves to any one of the three following phases of physical training: intercollegiate athletics, intramural athletics, and gymnasium.

Intercollegiate Athletics. All intercollegiate athletics is under the jurisdiction of the Board of Control, composed of three members of the faculty; five members of the student body, and one alumnus. Representative teams are organized for baseball, basket-ball, cross-country running, football, soccer, tennis, track, wrestling, and swimming. Participation during the whole season of sport is accepted for one term credit in Physical Education.

Intramural Athletics. The work in intramural athletics is supervised by a council consisting of the Director of Physical Education, Colonel of the Cadet Regiments, President of the Student Body, Editor of the O. A. C. Barometer, and a representative elected by each of the following groups: Fraternities, Clubs, and Independents.

The department has organized the work in intramural athletics so that every student who is physically fit to take part in athletic contests has the opportunity to participate in scheduled competitive sports. "Every O. A. C. man an athlete" is the slogan of the College.

For credit, attendance of two hours each week is required of all freshmen and sophomores who elect this work. The activities include: **fall sports** (football, soccer, cross-country running, field events, swimming, tennis, indoor baseball); **winter sports** (basket-ball, track and field events, wrestling, boxing, handball, volley ball, swimming, and advanced gymnastics); **spring sports** (baseball, track and field events, tennis, swimming, and cross-country running).

Gymnasium Classes. Individual and class instruction. Students who are unsuited (determined by examination and tests) or who do not desire to work in intercollegiate or intramural athletics are assigned to gymnasium classes, in which the students are given work for correcting defects and for developing physical efficiency and muscular power.

Attendance of two hours each week is required of all freshmen and sophomores carrying gymnasium work.

Teachers' Course in Physical Education. The Oregon law requiring physical education in all public schools went into effect September 1, 1919. This law has created a demand for training in physical education on the part of teachers in both elementary and high schools. Many teachers of the vocations are able to render competent service in giving instruction in physical education in addition to their regular work. Community leaders everywhere require training for leadership in recreation and physical education. Students of the College who plan to teach after graduation will find distinct professional advantage in the training included, not only in the required Physical Education work, but also in many of the elective courses.

Summary of Oregon Physical Education Law. The new law requiring physical education in the public schools of Oregon provides for a minimum of one hundred minutes a week, or an average of twenty minutes daily, for physical training activities in elementary schools. The State Superintendent of Public Instruction has published a special syllabus prepared by a committee of experts, giving

the requirements of the law. The law requires the work to consist of activities promoting physical vigor, physical posture, bearing, and mental and physical alertness, self control, disciplined initiative, sense of patriotic duty, and spirit of cooperation under leadership.

Equipment. The third and fourth units of the Men's Gymnasium are now completed, thereby doubling the size of the building. The west unit provides boxing and wrestling rooms, bowling alleys, and handball and squash courts. The south unit contains the natatorium, one of the finest on the Coast, with a white-tile pool one hundred by fifty feet in size and with a surrounding gallery capable of seating 1,500 spectators. Modern diving boards, electric lights for the bottom of the pool, and refiltration and ultra-violet ray process for keeping the water sterile, are part of the equipment. The east wing has an auxiliary gymnasium for apparatus work, three handball courts, two wrestling rooms, and one large room for volley ball. The main, central unit contains locker and shower rooms, lobby and offices, and the great gymnasium hall with a floor ninety by one hundred and fifty feet in dimensions, with three regulation basket-ball courts. The equipment includes all modern gymnasium apparatus and facilities for physical education and recreation.

The Athletic Field. The Oregon Agricultural College field for athletics comprises a new quarter-mile track; varsity football field, with a new steel-covered grandstand seating five thousand people and covered bleachers bringing the total seating capacity up to thirteen thousand; six practice football fields; and soccer and baseball fields for intramural athletics.

Eight tennis courts have been constructed which afford facilities for tennis.

The Armory, one of the largest of its kind in the United States, provides fine facilities for winter training during inclement weather in football, track, baseball, and various other sports. An indoor clay track, banked at the turns, which is but eight laps to the mile, and the extension clay floor space and high dome roof furnish facilities for conducting large winter track and field meets.

Fee. The official receipt for the gymnasium fee of \$1.75 a term entitles the holder to full privileges of the department, including: health examination, strength tests, locker, use of shower rooms, athletic fields, gymnasiums, etc. A deposit fee of 75c is required for towel.

COURSES

PEm 111, 112, 113. **Elementary Gymnastics.**

Required in all degree curricula; freshman year; three terms; $\frac{1}{2}$ credit each term; 2 periods.

PEm 121, 122, 123. **Hygiene.** These courses consist of a series of lectures on personal and impersonal hygiene, sources and modes of infectious diseases, immunity, industrial and occupational diseases, and the like. One term required of all freshman and first year students.

Three terms; 1 credit each term; 1 period.

PEm 141. **First Aid to the Injured.** Course designed to cover requirements for Red Cross Certificate.

Third term; 2 credits; 2 lectures.

PEm 151, 152, 153. **Elementary Swimming.** Course for beginners in swimming, including the theory of teaching beginners, together with elementary diving, and the various strokes. Required of all male students who have not passed swimming examination.

Three terms; $\frac{1}{2}$ credit each term; 2 periods.

PEm 172. **Playground and Gymnastic Games, Including Community Recreation.** Philosophy of play, aims and purposes of playground activities, organization, administration, and management, including sports and various games used on playgrounds. Also a consideration of community recreation, organization, and development.

Second term; 3 credits; 3 periods.

PEm. 211, 212, 213. **Gymnastics.**

Required in all degree curricula; sophomore year; three terms; $\frac{1}{2}$ credit each term; 2 periods.

PEm 231. **Elementary Football and Theory.** Practical and fundamental football so taught that each student will become acquainted with positions on team. Emphasis on punting, kicking, tackling, blocking and passing, defensive and offensive tactics predominating.

First term; 2 credits; 2 lectures; 2 two-hour laboratory periods.

PEm 232. **Basket-ball.** A course for coaches, taking up fundamentals of passing, goal throwing, dribbling, pivoting, different styles of defense used by leading coaches. Actual experience in coaching.

Second term; 2 credits; 2 lectures; 2 two-hour laboratory periods.

PEm 233. **Track and Baseball Combined.** Track instruction and practical demonstration in starting, sprinting, and various other track events; talks on methods of preparing contestants for events; rules of competition and the organizing of dual and conference meets. Baseball, theory and practice in batting, fielding, base-running, and pitching; fundamentals in coaching methods.

Third term; 2 credits; 2 lectures; 2 two-hour laboratory periods.

PEm 234, 235, 236. **Wrestling.** Fundamentals for class and individual work; personal proficiency.

Elective; three terms; $\frac{1}{2}$ credit each term; 2 periods.

PEm 237, 238, 239. **Boxing.** Fundamentals for class and individual work.

Elective; 3 terms; $\frac{1}{2}$ credit each term; 2 periods.

PEm 241, 242. **Therapeutic Exercise and Massage.** Theory and practice of body massage including treatment for conditions arising from athletic strain and prescriptive exercises used for corrective and therapeutic purposes.

Prerequisite: PEm 141*. First and second terms; 3 credits each term; 3 periods; 1 period laboratory work.

PEm 243. **Kinesiology.** Essentials of anatomy as related to physical education; muscles and their action; analysis of the movements of the body and their mechanisms as a working basis for the selection of gymnastic exercises; lectures and demonstrations on skeleton and human body.

Prerequisite: PEm 141*. Second term; 3 credits; 3 lectures.

PEm 317, 318, 319. **Advanced Apparatus Work.** This course is arranged not only for proficiency in this work but will include nomenclature and methods of teaching the advanced work.

Elective; 3 terms; $\frac{1}{2}$ credit each term; 3 periods.

PEm 374. **Physical Diagnosis.** Normal and abnormal physical signs of thoracic organs, with laboratory practice. Anthropometry.

Prerequisites: PEm 243, ZP 321*. Third term; 2 credits; 2 periods; 1 laboratory period.

*Consult department before registering.

Physical Education for Women

EDNA AGNES COCKS, A.M., Professor of Physical Education for Women.

ETTA GABLE LUNT, Secretary of the Department.

DORIS MABEL THORNELY, Assistant Professor of Physical Education for Women.

LEONA HERTHA FETTE, B.A., Instructor in Physical Education for Women.

RUTH HJERTAAS, Instructor in Physical Education for Women.

LOIS JOHNSON RANKIN, A.B., Instructor in Physical Education for Women.

RUTH THAYER, A.B., Instructor in Physical Education for Women.

The aim of this department is to bring each student to her best possible physical condition, and by careful training to correct faulty posture, to aid in the formation of habits of hygienic living, to establish a normal condition in the circulatory and respiratory systems, to secure bodily vigor, and to attain a healthy and symmetrical development.

Special Corrective and Medical Gymnastics. Students who are shown by physical examination to be unfit for the work of the regular classes in gymnastics and sports, are assigned to corrective classes where the work is light and emphasis is laid on correct breathing and posture, relaxation, and rest; or, whenever necessary, students are given private work in medical gymnastics according to individual needs. The physical condition of each student is carefully diagnosed and supervised. The instructors encourage conferences concerning matters of health and personal hygiene and cooperate with the resident physician in all cases.

Courses for Students Preparing to Teach. Students preparing to teach Physical Education should register in the School of Vocational Education. The assignment of courses in Physical Education is made by the head of the department of Physical Education for Women, whom such students should consult before completing registration. Many teachers of Home Economics, Agriculture, Manual Training, and Commerce in elementary and high schools are expected also to give instruction in Physical Education, and all teachers who are trained in this field are able to render valuable service in the schools and communities where they work. A brief summary of the Oregon law requiring physical education in all public

schools of the state is given on pages 347-348. Prospective teachers of the vocations, extension workers, and community leaders will find the required and elective courses in Physical Education valuable as part of their professional equipment.

Requirements. Work in Physical Education is required of all freshmen and sophomores four periods a week, and of all juniors and seniors two periods a week, unless deferment has been granted by the head of the department or unless excuse is granted for physical reasons.

Examinations. All students are required to take a medical examination by the Medical Adviser, and a physical examination by the Professor of Physical Education for Women.

Uniforms. The gymnasium uniform consists of an all-black suit, black hose, and black gymnasium shoes. The shoes can be purchased in Corvallis, but the suits must be ordered at the gymnasium office at the time of registration. The uniforms for out-of-doors consist of a short, full, white wash skirt, white middy, and sport shoes or tennis shoes. Ballet shoes are used in the aesthetic dancing classes. A regulation swimming suit is used and must be ordered at the gymnasium office.

Fee. A gymnasium fee of \$1.50 a term is charged for use of showers, lockers, towels, medical supplies for injuries, etc. Those registered in swimming pay \$0.50 extra.

Equipment. The Women's Gymnasium has floor space for regular gymnasium work, a balcony running-track and playing space for basket-ball and other games. On the main floor are found horizontal bars, vaulting horses and bucks, parallel bars, swinging rings, traveling rings, Swedish box, stall bars, climbing ropes, ladders, dumb bells, Indian clubs, and wands. There are lockers and dressing rooms for all needs, and shower-bath rooms where hot and cold water is available throughout the year. The women's athletic field provides for such games as basket-ball, field hockey, soccer, tennis, baseball, and crossball. The swimming pool in Shepard Hall is under the direction of the department of Physical Education for Women and is supervised by an instructor.

COURSES

PEw 111, 112, 113. **Practical Gymnastics.** Swedish gymnastics, combining floor and apparatus work with training in correct posture and breathing. Required of all freshmen; the other two required periods may be selected from elective courses.

Required of all women; freshman year; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Leona Fette, Ruth Hjertaas

PEw 114, 115, 116. **Corrective Gymnastics.** Gymnastic work adapted to the needs of women not suited to the regular gymnasium work.

Required of women not taking PEw 111, 112, 113; freshman year; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Leona Fette, Doris Thornely

PEw 121. **Social Ethics.** This course is designed to help as a transition between the social life of the home and high school and that of the college. It consists of a series of lectures during the fall term, together with a limited amount of reading. The lectures fall under four heads: college etiquette; the meaning of social ethics; the place of religion in the student's life; and the history of customs which affect women in their social life, such as, courtship, marriage, divorce, family responsibility, etc.

Required of all women; freshman year; first term; 1 credit; 2 periods.

PEw 122. **Hygiene.** Lectures covering personal and general hygiene, including care of the skin, hair, teeth, nails; care of the special senses, as eye, ear, nose, and throat; study of rest, exercise, and recreation.

Required of women; freshman year; second term; 1 credit; 1 period.

Edna A. Cocks

PEw 123. **Sanitary Science.** Public and private sanitation as related to infections, diseases, care of foods, water supply, and sewage; care of public and private buildings; general health supervision.

Required of all women, except in Home Economics; freshman year; third term; 1 credit; 1 period.

Edna A. Cocks

PEw 131, 132, 133. **Dancing.** (a) Elementary Aesthetic Dancing. Aesthetic technique and practice of rhythmic movements; simple aesthetic dances, based on both the Chalif and Russian methods. (b) Elementary Folk Dancing. The simple national folk dances of all nations.

Elective; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Ruth Hjertaas

PEw 134, 135, 136. **Gymnastic Dancing.** Steps progressing from the simple to complex movements.

Elective; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Ruth Hjertaas

PEw 137, 138, 139. **Apparatus Work.** This course consists of work with both light and heavy apparatus, such as rings, ladders, stall bars, vaulting box, and mats.

Elective; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Ruth Hjertaas

PEw 141, 142, 143. **Elementary Outdoor Sports.** (a) Tennis. (b) Hockey. (c) Basket-ball. (d) Baseball. (e) Soccer. (f) Cricket. (g) Track Athletics. The work includes various sports to give recreation and to form a basis for the habit of open-air work.

Elective; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Lois Rankin, Ruth Thayer

PEw 151, 152, 153. **Elementary Swimming.** A course in which the students are helped to overcome timidity of being in the water and are taught the ordinary back stroke, side stroke, and simple diving.

Elective; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Lois Rankin, Ruth Thayer

PEw 211, 212, 213. **Practical Gymnastics.** A continuation of PEw 111, 112, 113. These courses are required; the other two required hours may be selected from the elective courses.

Required of all women; sophomore year; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Leona Fette, Ruth Hjertaas

PEw 214, 215, 216. **Corrective Gymnastics.** A continuation of PEw 114, 115, 116.

Required of women not taking PEw 211, 212, 213; sophomore year; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Leona Fette, Doris Thornely

PEw 231, 232, 233. **Dancing.** (a) Intermediate Aesthetic Dancing. (b) Intermediate Folk Dancing. A continuation of courses PEw 131, 132, 133.

Elective; three terms; 1 credit each term; 2 periods.

Ruth Hjertaas

PEw 237. **Hand Apparatus.** Work with Indian clubs, dumb bells, wands, balls, and reeds.

Elective; first term; $\frac{1}{2}$ credit; 2 periods.

Lois Rankin

PEw 238. **Fencing.** Includes individual and class instruction in foil and saber fencing; methods of single and double rank formations; salutes and fencing bouts.

Elective; second term; $\frac{1}{2}$ credit; 2 periods.

Lois Rankin

PEW 239. **Archery.** A course in the principles and fundamentals of archery.

Elective; third term; $\frac{1}{2}$ credit; 2 periods. *Lois Rankin*

PEW 241, 242, 243. **Advanced Outdoor Sports.** (a) Tennis. (b) Hockey. (c) Basket-ball. (d) Baseball. (e) Soccer. (f) Cricket. (g) Track Athletics. A continuation of courses PEW 141, 142, 143.

Elective; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Lois Rankin

PEW 245. **First Aid to the Injured.** This course covers emergency treatment of wounds, shocks, fainting, hemorrhage, burns, sunstroke, sprains, fractures, and poisons; the use of bandages; care of the wounded.

Elective; third term; 2 credits; 2 periods. *Edna A. Cocks*

PEW 251, 252, 253. **Advanced Swimming.** A continuation of PEW 151, 152, 153, adding more intricate strokes, fancy diving, ornamental swimming, and life-saving.

Elective; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Lois Rankin, Ruth Thayer

PEW 311, 312, 313. **Advanced Gymnastics.** A more advanced course in general gymnastics for students who have completed courses PEW 111, 112, 113 and PEW 211, 212, 213.

Three terms; $\frac{1}{2}$ credit each term; 2 periods. *Ruth Hjertaas*

PEW 331, 332, 333. **Dancing.** (a) Advanced Aesthetic Dancing. (b) Advanced Folk Dancing. A continuation of courses PEW 131, 132, 133, and 231, 232, 233.

Elective; three terms; $\frac{1}{2}$ credit each term; 2 periods.

Ruth Hjertaas

PEW 344, 345. **Kinesiology.** A study of the anatomy of the motor organs with special reference to joint and muscular mechanism; the relation of various sets of movements to muscular development.

Prerequisite: Anatomy and Physiology. Elective; first and second terms; 3 credits each term; 3 periods. *Doris Thornely*

PEW 346. **Physiology of Exercise.** A study of the effect of exercise on health, considering heat, fatigue, exhaustion, overwork, breathlessness, and amount of training.

Elective; third term; 3 credits; 3 periods. *Doris Thornely*

PEW 375. **Playground and Gymnastic Games.** A study and analysis of games for the playground and gymnasium; lectures on the

theory of games; reference reading and reports; practical working of games.

Elective; second term; 3 credits; 3 periods.

Leona Fette

PEW 376. Theory and Coaching of Athletic Sports. This course covers the theory and coaching of all organized sports and track athletics, including lectures, reference reading, and the handling of squads and teams.

Elective; third term; 3 credits; 3 periods.

Lois Rankin

PEW 423. Advanced Hygiene and Sanitary Science. This course takes up the vital points in hygiene and sanitation and includes the theory of teaching the subject in the elementary and the high schools.

Elective; third term; 2 credits; 2 periods.

Edna A. Cocks

PEW 431. History of Physical Education. A course covering the origin and development of physical education including mention of leading educators.

Elective; first term; 3 credits; 3 periods.

Edna A. Cocks

PEW 441. Massage. Theory and practice of body massage, including treatment for conditions arising from athletic strain.

Prerequisites; Anatomy and Kinesiology. Elective; first term; 3 credits; 2 lectures; 3 laboratory periods.

Doris Thornely

PEW 442. Therapeutic Gymnastics. Corrective gymnastics as applied to abnormal health conditions; prescription of exercises; medical gymnastics.

Prerequisites: Anatomy and Kinesiology. Elective; second term; 3 credits; 2 lectures; 3 laboratory periods.

Doris Thornely

PEW 443. Physical Diagnosis and Anthropometry. Theory and practice in detecting normal and abnormal physical signs; history; laws of human proportion; measurements; practice in taking and recording measurements; practice in school clinic.

Prerequisites: Anatomy and Kinesiology. Elective; third term; 3 credits; 2 lectures; 3 laboratory periods.

Doris Thornely

PEW 451, 452, 453. Physical Education Seminar. An advanced course for students taking special work in physical education. Discussions of vital problems in physical education; reviews and reports of books and magazine articles. Each student is required to write a term thesis.

Elective; three terms; 1 credit each term; 1 period.

Edna A. Cocks

PEw 461, 462, 463. **Principles and Theory of Physical Education.** This course takes up the organization, leadership, and administration of physical training; preparation for teaching Physical Education; the theory of handling classes; reference reading.

Elective; three terms; 3 credits each term; 3 periods.

Edna A. Cocks

PEw 464, 465, 466. **Practice Teaching.** The course consists in the actual handling of classes, using the fundamentals and methods of the course in Principles and Theory of Physical Education (PEw 461, 462, 463) with lesson plans. These courses must be taken together.

Elective; three terms; 1 credit each term; 4 periods.

Edna A. Cocks

PEw 471. **Theory of Play.** A study of the nature of the child; the nature and function of play; the value of play; aims and spirit in the conduct of play.

Elective; first term; 3 credits; 3 periods.

Edna A. Cocks

PEw 472. **Organization and Administration of Physical Education and Recreation.** Development, organization, and management of Physical Education; the playground movement; construction and equipment; use of apparatus; government and discipline.

Elective; second term; 3 credits; 3 periods.

Edna A. Cocks

School of Music

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.

WILLIAM FREDERIC GASKINS, B.Mus., Director of the School of Music; Professor of Music; Master teacher of Voice Culture and Singing.

Graduate student Hillsdale College Conservatory; graduate student American Conservatory; graduate student of Karlton Hackett, Chicago; J. D. Mehan, New York; F. X. Arens, New York; Percy Rector Stephens, New York.

GENEVIEVE BAUM-GASKINS, Instructor in Organ and Pianoforte.

Leschetizky Method. The Dunning System for Beginners. Graduate of American Conservatory, Chicago; student of William Nelson Burritt, New York; Karlton Hackett, Chicago; John Dennis Mehan, New York; John J. Hattstaedt, Chicago; and Wilhelm Middleschulte, Chicago.

GUSTAV DUNKELBERGER, B.Mus., Instructor in Pianoforte and Theory of Music.

Graduate of Bethel College Conservatory; graduate student American Conservatory, Chicago, and Institute of Musical Art, New York; pianoforte pupil of Henriot Levy, and Richard Buhlig—a pupil of Leschetizky; ensemble under Adolf Weidig, Chicago; theory pupil of Arthur Olaf Andersen—a pupil of d'Indy and Sgambati; theory pupil of Dr. Percy Goetschius, and Louis Victor Saar—a pupil of Rheinberger and Brahms.

CARL GRISSIN, Instructor in String Instruments and Orchestration.

Student of Edmund Singer, Stuttgart; Gustav Hollaender, Berlin; Carl Halir, Berlin; Samuel de Lange, Berlin; Joseph Mayer, Berlin.

HARRY LINDEN BEARD, B.Sc., Instructor in Band Instruments and Band Conducting.

Student of Herbert L. Clark, of Sousa's Band; Frank X. Heric, of New York; Herman Trutner, U. S. Army; Glen Wood, Oakland, Cal.; Paul Steindorff, San Francisco; Adolph Rosenbecker, and Daniel Protheroe, Chicago; A. F. Welden, Chicago.

STEWART WENDELL TULLEY, Instructor in Harmony; Assistant Instructor in Voice Culture and Singing.

Student of William Frederic Gaskins, Percy Rector Stephens; Graduate of O. A. C. School of Music.

GENERAL STATEMENT

Recognizing the value of musical education and experience to the college community, the Board of Regents in 1908 authorized the organization and establishment of the School of Music under the present direction, and made provision for ample room, instruments, and other necessary facilities for instruction of the highest standard.

Individual and class instruction involve the payment by students of tuition in accordance with an authorized schedule. The School of Music is thus a self-supporting department of the Oregon Agricultural College.

Members of the faculty of the School of Music give gratuitous instruction to certain student musical organizations of the College. In this manner and through other College functions, the School of Music contributes in a large way to the educational, artistic, and social life of the institution.

MUSICAL ORGANIZATIONS AND CONCERTS

The musical organizations of the College, including qualifications for membership, are discussed briefly on pages 56-57. The following additional facts concerning the Orchestra, the Band, and the various concerts held each year, will be of interest to prospective students in Music.

The Orchestra. Students of string instruments in attendance at the College, who are sufficiently advanced are admitted to membership in the College Orchestra by the Conductor on terms approved by the Director. Every reasonable encouragement is given to the development and maintenance of a good orchestra under competent, progressive leadership. Students are invited to investigate these opportunities for excellent training in orchestra routine and solo playing.

The Orchestra library consists of works by the following composers: Dvorak, Brahms, Tschaikowsky, Greig, Gounod, Verdi, Mendelssohn, Beethoven, Elgar, Wagner, Offenbach, Strauss, and others.

Sonatas for violin and piano; string trios, quartettes for two violins, viola, and 'cello, and for four violins are available for study. All students in string instruments must perform from memory in public when requested by the instructor and approved by the Director. Membership in the ensemble classes is free, and instruction is given by the principal violin instructor.

The College Band. Instruction in the use of brass, wood-wind, and percussion instruments is given by the regular College band leader. Members are required to attend daily rehearsals, and a reasonable amount of individual practice is expected.

Concerts. In addition to the public recitals of the students of the School of Music which are given periodically throughout the college year the annual concerts of the various student musical clubs are attractive events in the student calendar. The Glee and Madrigal concerts are artistic presentations of the first magnitude. The Orchestra and Band concerts are occasions that bring out the largest and most enthusiastic audiences of the year. Every two years the Glee and Madrigal clubs, assisted by the College Orchestra, produce

a classic light opera. The Mikado, The Bohemian Girl, The Lass of Limerick Town, and the Pirates of Penzance were charming examples of amateur performance.

Coupled with such services to the college community as these is the effort of the Director of the School of Music to bring to the College some of the celebrated musical artists of the country whose concerts have been events of real moment in the aesthetic life of the college community.

ADMISSION

Entrance requirements for major students in Music are the same as for students in other major curricula throughout the College as explained on pages 70-73. Entrance credentials should in all cases be submitted to the Registrar and a registration permit secured, before consulting with the Director of the School of Music for assignment to classes and instructors.

By suitable arrangement with the Director, students may earn six elective credits in Music applicable to graduation from any degree curriculum.

A person at least twenty-one years of age who cannot meet the regular requirements, but who has the necessary training and experience profitably to pursue courses of college grade, may, with the approval of the Director, be registered as a special student. A special student is not a candidate for a diploma.

Other persons desiring to pursue work in Music may arrange, through the Director, with members of the Music faculty for instruction. These persons are not regularly registered in the College and are not subject to instructional fees or regulations, except those applying especially to Music.

HARMONY AND THEORY

COURSES

Mus 111. **Harmony.** Consideration of the theories of acoustics, the formation of the diatonic scale, intervals, chord construction, the relative importance of triads within one key, connection of primary and subordinate triads in both modes, rhythm, the elements of melodic construction, and part-writing; harmonization of melodies and unfigured basses; original phrases. Aural recognition of intervals demonstrated orally and in writing. Simple melodic dictation in both modes.

Required in all major courses in Music; elective to others; freshman year; first term; 3 credits; 2 recitations.

Mus 112. **Harmony.** The period form, chord inversion, sequences, the classes of discords, the dominant seventh and inversions.

Prerequisite: Mus 111. Second term; 3 credits; 2 recitations.

Mus 113. **Harmony.** Licenses in resolution of seventh chords; the dominant ninth, complete and incomplete; discords on all degrees of scale. Key relations and modulations.

Prerequisite: Mus 112. Third term; 3 credits; 2 recitations.

Mus 121, 122, 123. **History of Music.** Lectures on the evolution of musical thought, appreciation, and scholarship, presenting essential chronological data, with reference to the dominant characters of musical activity.

Required in all major courses in Music; elective to others; freshman year; three terms; 1 credit; 1 lecture.

Mus 211. **Harmony.** Altered and mixed chords; direct and indirect extraneous modulation; consecutive dominants; enharmonic transformation of the dominant seventh; organ point, suspension.

Prerequisite: Mus 113. Sophomore year; first term; 3 credits; 2 recitations.

Mus 212. **Harmony.** Irregular introduction and resolution of the suspension; embellishments; passing notes; the unprepared embellishments and double appoggiatura; harmonization of embellished melodies; elementary analysis.

Prerequisite: Mus 211. Second term; 3 credits; 2 recitations.

Mus 213. **Modern Harmony.** Study of the various modern harmonic theories. Analysis of excerpts from works of modern composers.

Prerequisite: Mus 212. Third term; 2 credits; 2 recitations.

Mus 221. **Pedagogy.** A pianoforte course, presenting systematically arranged material, and recommending approved methods of instruction for beginners or advanced students. Reference work and papers on psychology as applied in piano teaching. Open to sophomores, juniors, and seniors, and accomplished special students.

Elective; any term; 6 credits; 2 half-hour periods of private instruction; 1 to 2 hours class instruction, as arranged.

Mus 311. **Composition.** The application of harmonic material in the phrase, period, and group formations. Original exercises.

Prerequisite: Mus 212. Junior year; first term; 2 credits; 2 recitations.

Mus 312. **Composition.** Binary and ternary song forms, the double period. Consideration of irregular cadence conditions, influence of thematic idea on formal design. Dynamic design, contrast, and style.

Prerequisite: Mus 311. Second term; 2 credits; 2 recitations.

Mus 313. **Composition.** Fully developed and irregular part forms; compound song forms; the lyric, etude, and idealized dance classes. Brief analysis of works in the larger forms.

Prerequisite: Mus 312. Third term; 2 credits; 2 recitations.

Mus 321, 322, 323. **Analysis.** Detailed harmonic and formal analysis of representative works of the masters and other compositions; development of analytic memory.

Prerequisite: Mus 212. Junior year; three terms; 2 credits; 2 recitations.

Mus 411. **Counterpoint.** Fundamental principles of two voice polyphony. The conduct of the single melodic part; harmonic and rhythmic relation of two parts. Various modes of imitation, the contrapuntal associate, stretto. Consideration of the five orders. Comparative study of texts by leading authorities. Analysis and original exercises.

Prerequisite: Mus 212. Senior year; first term; 3 credits; 2 recitations.

Mus 412. **Counterpoint.** Structural factors of two and three voice inventions. The sectional and part forms compared with homophonic forms. The gigue, lyric invention, natural species of double counterpoint.

Prerequisites: Mus 312, 411. Second term; 3 credits; 2 recitations.

Mus 413. **Counterpoint.** Invention for more than three voices; distinctions of style. The prelude, toccata, fantasia, and mixed forms. Original work. Analysis of canons and fugues.

Prerequisite: Mus 412. Third term; 3 credits; 2 recitations.

Mus 421. **Orchestration.** The arrangement of music for orchestra; theoretical study of orchestral instruments and their functions.

Prerequisite: Mus 313. Senior year; first term; 2 credits; 1 recitation.

PIANO COURSES

Mus 131, 132, 133. **Piano.** A course for students whose major work is in piano. Scales and arpeggios; exercises for speed and rhythm; etudes from Czerny, Cramer, Moszkowski, and others; easy

sonatas of Haydn, Mozart, and Beethoven; easy compositions of Mendelssohn, Schubert, Schumann, Grieg, and others. Any student satisfying entrance requirements for admission to the College may take up this course. An examination, a part of which will include all major and minor scales in single notes in a moderate tempo and an easy classic sonata or other suitable composition by memory, will be given at the end of the third term; no credit will be given for any part of this course until this examination has been satisfactorily passed.

Freshman year; three terms; 6 credits each term; 2 private lessons; 3 hours daily practice.

Mus 231, 232, 233. **Piano.** Scales in double notes and technical exercises adapted to the particular needs of the student; etudes of Czerny, Cramer, Ruthardt, and others; suites and inventions of Bach; Mozart, Beethoven, and Weber sonatas of moderate difficulty; more difficult compositions by Mendelssohn, Schumann, Chopin, Liszt, and others; easy transposition, sight reading, and memory training.

Prerequisite: Mus 133 or equivalent. Sophomore year; three terms; 6 credits each term; 2 private lessons; 3 or 4 hours daily practice.

Mus 331, 332, 333. **Piano.** Advanced exercises in double notes and exercises based on technical difficulties in compositions studied in this course; a limited number of etudes by Rubinstein, Henselt, Haberier, and others; well-tempered clavichord; the more difficult sonatas of Beethoven and solos by Mendelssohn, Chopin, Schumann, Grieg, Liszt, Brahms, and modern composers; concertos by Mozart, Mendelssohn, Beethoven, and Moscheles.

Prerequisite: Mus 233 or equivalent. Junior year; three terms; 6 credits each term; 2 private lessons; 3 or 4 hours daily practice.

Mus 431, 432, 433. **Piano.** Inclusive study of the principal classic and romantic composers; etudes by Chopin and Moszkowski; solo works of modern composers; concertos by Schumann, Chopin, Rubinstein, and others. Public appearances under conditions approved by the Director. For graduation, students are required to perform publicly under the direction of the School of Music, playing a program not less than an hour in length, arranged by the instructor and approved by the Director.

Prerequisite: Mus 333. Senior year; three terms; 6 credits each term; 2 private lessons; 3 or 4 hours daily practice.

Electives

Mus 131a, 132a, 133a. **Piano.** Courses designed primarily for students from all departments and schools of the College studying Music as an elective. The fundamental principles of technique and their

application in various exercises. Elementary or more advanced studies and piano music assigned according to the degree of proficiency of the applicant. All major scales in single notes with correct fingering in a moderate tempo and a suitable composition by memory constitute a part of the required work.

Elective; any year; any term; 2 credits each term; 1 private lesson; 1 or 2 hours daily practice.

Mus 231a, 232a, 233a, 331a, 332a, 333a, 431a, 432a, 433a. **Piano.** Continuation of Mus 133a. Technical material and piano music selected to suit individual requirements of the student. Technical progress and a standard work by memory will be required in each course.

Prerequisite: Mus 133a. Elective; sophomore, junior, and senior years; three terms each year; 2 credits each term; 1 private lesson; 1 or 2 hours daily practice.

VOICE CULTURE AND SINGING

COURSES

Mus 141. **Voice Culture and Singing.** Exercises for correct breath action in speech and song; freedom of coordination through relaxation of muscles involved in vocalization; tone placing; establishment in correct proportion of vocal fundamentals. Exercises and songs selected in relation to needs and temperament of individual students. First term requirements: Mus 111, physical education, Mus 121.

Freshman year; first term; 6 credits; 2 private lessons; 1 to 2 hours daily practice.

Mus 142. **Voice Culture and Singing.** Development of greater technical facility; application of improved tone to simple songs and exercises. Second term requirements: Mus 112, physical education, Mus 122.

Prerequisite: Mus 141. Freshman year; second term; 6 credits; 2 private lessons; 1 to 2 hours daily practice.

Mus 143. **Voice Culture and Singing.** Exercises for tonal improvement and artistic application through speech and song; corrective exercises continued as appropriate to personal needs of individual students; chorus singing, public solo performances if approved by the Director. Third term requirements: Mus 113, physical education, Mus 123.

Prerequisite: Mus 142. Freshman year; third term; 6 credits; 2 private lessons; 1 to 2 hours daily practice.

Mus 241. Voice Culture and Singing. Technical studies for improvement of quality and volume of tone, style, and phrasing; suitable songs; development devices and songs selected with particular reference to psychological attributes of each student. First term requirements: Mus 211; first year French, Italian, or Spanish; physical education.

Prerequisites: Mus 141, 142, 143, or their equivalent. Sophomore year; first term; 6 credits; 2 private lessons; 1 to 2 hours daily practice.

Mus 242. Voice Culture and Singing. Technical development for improved tone, style, diction, delivery; songs and exercises adapted to personality of individual students; frequent public performances at discretion of Director. Second term requirements: Mus 212, first year modern language continued, physical education.

Prerequisite. Mus 241. Sophomore year; second term; 6 credits; 2 private lessons; 1 to 2 hours daily practice.

Mus 243. Voice Culture and Singing. Studies for "balanced" coordination of all vocal factors, improved diction, expressive singing. Songs in English, or familiar foreign language. Public appearances at discretion of Director. Third term requirements: Mus 213, first year modern language continued, physical education.

Prerequisite: Mus 242. Sophomore year; third term; 6 credits; 2 private lessons; 1 to 2 hours daily practice.

Mus 341. Voice Culture and Singing. Advanced technical development and interpretative skill, by means of difficult songs, vocalises, and ensemble singing, in English, and modern languages. Second year modern language continued three terms. Performance on public programs of the School of Music as required by the Director. First term requirements: Mus 311, physical education. Theory subjects as for pianoforte course, junior parallel.

Prerequisites: Mus 241, 242, 243, or their equivalent. Junior year; first term; 6 credits; 2 private lessons; 1 to 2 hours daily practice.

Mus 342. Voice Culture and Singing. Continuation of Mus 341 under same conditions. Theory as for pianoforte course, junior parallel.

Prerequisite: Mus 341. Junior year; second term; 6 credits.

Mus 343. Voice Culture and Singing. Continuation of Mus 342 under same conditions. Theory as for pianoforte course, junior parallel.

Prerequisite: Mus 342. Junior year; third term; 6 credits.

Mus 441. **Voice Culture and Singing.** Advanced study of vocal technique by means of masterpieces. Public singing as required under the rules and regulations of the School of Music. For graduation a public recital is required under conditions specified by the Director. First term requirements: Theory subjects as for pianoforte courses, senior parallel.

Prerequisite: Mus 341, 342, 343, or their equivalent. Senior year; first term; 6 credits; 2 private lessons; 1 to 2 hours daily practice.

Mus 442. **Voice Culture and Singing.** Continuation of Mus 441 under same conditions.

Prerequisite: Mus 441; senior year; second term; 6 credits.

Mus 443. **Voice Culture and Singing.** Continuation of Mus 442 under same conditions.

Prerequisite: Mus 442; senior year; third term; 6 credits.

Electives

Mus 141a, 142a, 143a. **Voice Culture and Singing.** Voice diagnosis and classification; exercises and songs suitable to personal needs of applicant, closely following the work of the freshman year in content and application.

Required: 1 or 2 private lessons a week; 1 or 2 hours daily practice. Two credits each term.

Mus 241a, 242a, 243a, 341a, 342a, 343a, 441a, 442a, 443a. **Voice Culture and Singing.** Exercises and songs suited to individual needs of applicants, closely following in principle the work of sophomore, junior and senior major Music requirements.

Prerequisite: Mus 141a, 142a, 143a, or acceptable equivalent. Required: 1 to 2 private lessons a week; 1 to 2 hours daily practice; 2 credits each term.

VIOLIN

COURSES

Mus 151, 152, 153. **Violin.** Preliminary exposition of the elements of violin playing. The study of the left hand and its technical requirements. Studies for intonation and finger independence. Technique of the right hand and arm in relation to the art of bowing. Selection of etudes and music from Sevcik, Joachim, Moser, Singer and Seifriz, Laoureux, David Carl Flesch, Kayser, Wohlfahrt, Sitt, Eberhardt, Mazas, and Alard to meet individual requirements. All major and minor scales and ability to perform acceptably in the seven positions are requirements in this course.

Freshman year; three terms; 6 credits each term; 2 private lessons; 3 hours daily practice.

Mus 251, 252, 253. **Violin.** Exercises, scales, and arpeggios for further technical development. Etudes from Mazas, Dont, Kreutzer, Fiorillo, Schradieck, and Sevcik. Duets by Mazas, Pleyel, and Viotti. Pupils' concertos by Seitz, Huber, and Accolay. Compositions of suitable grade.

Prerequisite: Mus 153 or equivalent. Sophomore year; three terms; 6 credits each term; 2 private lessons; 3 or 4 hours daily practice.

Mus 351, 352, 353. **Violin.** Advanced technical exercises. Etudes by Rode, Rovelli, DeBeriot, Casorti, Meerts, and David. Scales by Sevcik, Sitt, Happich, and others. The easier Mozart and Beethoven sonatas.

Prerequisite: Mus 253 or equivalent. Junior year; three terms; 6 credits each term; 2 private lessons; 3 or 4 hours daily practice.

Mus 451, 452, 453. **Violin.** Scales in three and four octaves. Scales in thirds, sixths, octaves, and tenths. Etudes and violin music by Wieniawski, Vieuxtemps, Brahms, Beethoven, Bach, Burch, David, Ernst, Haendel, Corelli, Lalo, Mendelssohn, Mozart, Nardini, Paganini, Sarasate, Spohr, Sinding, Saint-Saens, and Tschaikowsky. As a qualification for graduation, the student must give a public program of memorized compositions arranged by the instructor and approved by the Director.

Prerequisite: Mus 353. Senior year; three terms; 6 credits each term; 2 private lessons; 3 or 4 hours daily practice.

Electives

Mus 151a, 152a, 153a. **Violin.** For special Music students. The elements of violin playing. First progressions; bowing exercises; elementary exercises in first, second, and third positions; exercises for relaxation, tone, and muscular control. No credit will be given for any one of these three courses until the student can satisfactorily perform the major and minor scales in the first position and a suitable composition by memory.

Elective; any year; any term; 2 credits each term; 1 private lesson; 1 or 2 hours daily practice.

Mus 251a, 252a, 253a, 351a, 352a, 353a, 451a, 452a, 453a. **Violin.** Continuation of Mus 153a.

Prerequisite: Mus 153a. Elective; sophomore, junior, and senior years; three terms a year; 2 credits each term; 1 private lesson; 1 or 2 hours daily practice.

BAND INSTRUMENTS**COURSES****CORNET**

Mus 101d, 102d, 103d. **Cornet.** Exercises on the proper vibrations of the lips, and proper use of the breath. Attack; simple exercises by Clarke, Goldman, and others. Elementary solos and duets.

Mus 201d, 202d, 203d. **Cornet.** Exercises in single tonguing, studies on the slur; scales; chords; intervals; solos and duets.

Mus 301d, 302d, 303d. **Cornet.** Scales and chords; exercises in double and triple tonguing; ornamentation; sight reading; studies by Arban, Clarke, Weldon, St. Jacome, and others.

Mus 401d, 402d, 403d. **Cornet.** Characteristic studies by Arban and Clarke; duets by St. Jacome; the art of phrasing; solos approved by the instructor. Non-pressure system emphasized throughout.

TROMBONE

Mus 101e, 102e, 103e. **Trombone.** Exercises on the proper vibrations of the lips without the instrument; exercises in the use of the breath, attack; producing the tone; simple exercises in the use of the slide.

Mus 201e, 202e, 203e. **Trombone.** Short shifts and direct shifts; the use of the wind; tone development; scales and chords; simple melodies.

Mus 301e, 302e, 303e. **Trombone.** Exercises on the slur; the development of the legato on the trombone; tonguing; studies by Vaubaron, Arban, Dieppo, and others.

Mus 401e, 402e, 403e. **Trombone.** Studies in tonguing, sight reading, phrasing, breath control; advanced studies by Vaubaron, Manna, Rauda, Clodomir and others; solos approved by the instructor. Non-pressure system emphasized throughout.

CLARINET

Mus 101f, 102f, 103f. **Clarinet.** Instructions in the proper handling and care of the instrument, selection of reeds, placing the reed on the mouthpiece; method of producing the tone; exercises in sustained tones; the correct use of the tongue and the breath; exercises in mechanism; simple exercises in duet form.

Mus 201f, 202f, 203f. **Clarinet.** Exercises in scales and chords; tonguing; the development of the staccato; special exercises for the

lips and tongue; elementary studies by Klose, Lazarus, De Ville, Staats, and others.

Mus 301f, 302f, 303f. **Clarinet.** Intervals; advanced studies in duet form; technical exercises; sight reading; characteristic studies by Klose, Toll, Langenus, Baermann, and others.

Mus 401f, 402f, 403f. **Clarinet.** Advanced technical studies; phrasing; transposition; solo playing.

Courses similar in scope to those outlined above are offered for all other band instruments, including French horn, baritone, bass, flute, piccolo, oboe, bassoon, saxophone, bells, xylophone, and drummers' traps.

REGULATIONS

Any student in the Oregon Agricultural College with a satisfactory record in scholarship in his major courses may elect at least one hour a day in music, by arrangement with the Director of the School of Music. The authority to assign all applicants for music instruction is vested solely in the Director, who must be consulted for the arrangement of details of registration, or at any time when information is required that pertains to study in the various departments of the School.

Students in the School of Music may enter classes in other departments of the College; and they are encouraged to take at least one course throughout the college year in addition to their regular music work. Students may enter at any time, but it is advantageous to register at the opening of a term.

Young women whose homes are not in Corvallis are expected to live in the dormitories, where they are under the supervision of the Preceptress. Outside rooming and boarding places may be obtained, subject to the approval of the Dean of Women. The rates for board and room are listed on pages 62-63.

Students registered for study in the regular courses of the Oregon Agricultural College School of Music are subject to the same rules and regulations as other students.

No student is permitted to omit lessons or practice without sufficient excuse and no refund will be made for absence from lessons or practice or for discontinuance, except in cases of severe personal illness; for such unavoidable absence lessons may be made up only by appointment, and before the expiration of the term. Students missing lessons by reason of severe illness attested by the official Medical Adviser or other acceptable medical authority, are strongly advised immediately to notify all instructors concerned. Loss of

instruction time caused by failure to give such notification will be charged against the lesson account of the student.

Lessons falling on legal holidays, or on special holidays petitioned for by the student body or by special student organizations, which may be granted by the College authorities, will not be made up unless arranged for with the instructor before said holiday, and duly approved by the Director.

Students are not permitted to transfer tuition accounts to others, nor to receive credit for tuition fees beyond the assigned registration period, except in cases of severe personal illness, or similar extreme necessity, attested by the Medical Adviser, and then only by making suitable arrangements with the Director.

Students are required to inform themselves of all rules governing the School of Music by reference to the College catalogue, the bulletin boards in the Administration Building, and special notices issued from time to time by the Director. The letter and the spirit of all regulations will be consistently and impartially enforced, and it should be definitely understood that instructors are not expected to keep students informed of their obligations.

The college year in the School of Music, as in other schools of the College, consists of thirty-six weeks, divided into terms of approximately twelve weeks each. The Summer Session offers special opportunities for intensive study in Music. Announcement of the summer courses offered is by special bulletin obtainable from the Director of the Summer Session.

TUITION

Private individual instruction is given in lessons of thirty minutes each, in all departments of the School of Music. Class instruction in theoretical branches is required of candidates for graduation, as specified in the outlines of courses. Terms for instruction are as follows:

Voice Culture and Singing—Professor Gaskins, private instruction:

One lesson a week, a term.....	\$24.00
Two lessons a week, a term.....	48.00
Assistant Tulley:	
One lesson a week, a term.....	\$15.00
Two lessons a week, a term.....	30.00

Pianoforte—Gustav Dunkelberger, private instruction:

One lesson a week, a term.....	\$24.00
Two lessons a week, a term.....	48.00

Pianoforte—Genevieve Baum-Gaskins, private instruction:

One lesson a week, a term.....	\$24.00
Two lessons a week, a term.....	48.00
Dunning system, class instruction, minimum requirement two lessons a week, a term.....	30.00

Organ—Genevieve Baum-Gaskins, private instruction:

One lesson a week, a term.....	\$36.00
Two lessons a week, a term.....	72.00

Violin—Carl Grissen, private instruction:

One lesson a week, a term.....	\$24.00
Two lessons a week, a term.....	48.00

Band Instruments of all Kinds—Harry L. Beard, private instruction:

One lesson a week, a term.....	\$15.00
Two lessons a week, a term.....	30.00

Theory, class instruction, two recitations a week, a term

Gustav Dunkelberger.....	\$ 7.50
Stewart W. Tulley.....	7.50

Theory, private instruction

Harmony, Gustav Dunkelberger, hour lesson.....	\$ 3.00
Harmony, Stewart W. Tulley, hour lesson.....	2.00
Music History, Professor Gaskins, class instruction. Free to students registered in the School of Music. To students not so registered, one hour a week, a term....	\$ 5.00

Banjo, Guitar, Ukulele, and other small string instruments taught by special arrangement. See the Director.

One lesson a week, a term.....	\$15.00
Two lessons a week, a term.....	30.00

PIANO AND ORGAN PRACTICE

Rooms located in the Administration Building have been suitably furnished for the use of students wishing to practice in private. These rooms may be rented for about one-third the cost of using pianos located in private houses, and without any of the disadvantages connected therewith. The rooms have steam heat, good ventilation, electric light for night practice, and janitor service, and are furnished with good pianos, kept in tune by the College. Students living in the College dormitories are required to practice upon these

pianos. Students living away from the campus may arrange with the Director for practice under the same terms and conditions.

One pipe-organ, a new, modern Kimball two manual, concave pedal board instrument of beautiful tone, is available.

Rental Rates. The following rentals are charged for instrumental practice for each term of twelve weeks:

Piano—

One hour a day.....	\$ 5.00
Two hours a day.....	7.50
Three hours a day.....	10.00
Four hours a day.....	12.50
Five hours a day.....	15.00

Organ—

Term of twelve weeks, one hour a day.....	\$15.00
Two hours.....	20.00
Three hours.....	25.00

CORRESPONDENCE

For additional information address William Frederic Gaskins, Director of the School of Music, Room 30, Administration Building, Oregon Agricultural College, Corvallis, Oregon.

Summer Session

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.
M. ELLWOOD SMITH, Ph. D., Director of the Summer Session; Dean of the School of Basic Arts and Sciences.
ARTHUR BURTON CORDLEY, D.Sc., Dean of the School of Agriculture.
JOHN ANDREW BEXELL, A.M., Dean of the School of Commerce.
EDWIN DEVORE RESSLER, A.M., Dean of the School of Vocational Education.
HELEN LEE DAVIS, A.M., Acting Dean of the School of Home Economics.
EDITH LIVINGSTON, Acting Dean of Women.

*Professors**

WILLIAM BALLANTYNE ANDERSON, Ph.D., Professor of Physics.
WINFRED MCKENZIE ATWOOD, Ph.D., Associate Professor of Plant Physiology.
LOUIS BACH, M.A., Professor of Modern Languages.
FREDERICK BERCHTOLD, A.M., Professor of English Language and Literature.
ARTHUR GEORGE BOUQUET, B.Sc., Professor of Vegetable Gardening.
HENRY CLAY BRANDON, A.M., Professor of Industrial Arts.
JESSE FRANKLIN BRUMBAUGH, A.M., Professor of Psychology.
EDNA AGNES COCKS, A.M., Professor of Physical Education for Women.
HATTY ROSELLE DAHLBERG, A.M., Associate Professor of Home Economics Education.
WILLIAM HENRY DRESEN, Ph.D., Assistant Professor of Economics and Sociology.
WILLIAM HENRY ELLISON, Ph.D., Associate Professor of History.
JOHN FULTON, M.S., Professor of Chemistry.
WILLIAM FREDERIC GASKINS, B.Mus., Professor of Music.
HEBER HOWARD GIBSON, A.M., Professor of Agricultural Education.
WILLIAM JAMES GILMORE, B.Sc., Professor of Farm Mechanics.
DELMER MORRISON GOODE, A.B., Associate Editor of Publications.

* Names are arranged alphabetically under two divisions: Professors and Instructors.

SIBYLLA HADWEN, Professor of Institutional Management; Director of Women's Dormitories.

ROY RENO HEWITT, Ph.B., LL.B., M.A., Assistant Professor of Government and Business Law.

GEORGE ROBERT HYSLOP, B.Sc., Professor of Farm Crops.

ALMA GRACE JOHNSON, B.Sc., Professor of Household Administration.

LUCY MAY LEWIS, A.B., B.L.S., Librarian.

ALFRED GUNN LUNN, B.Sc., Professor of Poultry Husbandry.

CHARLES JARVIS MCINTOSH, B.Sc., Associate Professor of Industrial Journalism.

HECTOR MACPHERSON, Ph.D., Professor of Economics and Sociology.

ETHA MABEL MAGINNIS, Assistant Professor of Office Training.

CHARLES BUREN MITCHELL, A.M., Professor of Public Speaking.

ARTHUR LEE PECK, B.Sc., Professor of Landscape Gardening and Floriculture.

BENJAMIN WILLIAM RODENWOLD, B.Sc., Assistant Professor of Animal Husbandry.

CHARLES CURTIS RUTH, M.S., Assistant Professor of Farm Crops.

RICHARD BURR RUTHERFORD, A.B., Professor of Physical Education for Men; Director of Intercollegiate Athletics.

CHARLES VLADIS RUZEK, B.Sc., Professor of Soil Fertility.

HERMAN AUSTIN SCULLEN, A.B., Assistant Professor of Entomology.

HENRY CASE SEYMOUR, State Leader of Industrial Clubs.

DOROTHY SHANK, Professor of Household Science.

FRANCIS LAWRENCE SNOW, Professor of Industrial Journalism.

DORIS MABEL THORNELY, Assistant Professor of Physical Education for Women.

LOUISE WOOD, Field Supervisor in Home Economics Education.

Instructors

LEE CLEVELAND BALL, Instructor in Accounting.

MARJORIE BALTZELL, Instructor in Art.

ELIZABETH MARIA BARNES, Instructor in Expression and Dramatic Art.

LULA MAY BRANDT, B.Sc., Instructor in Household Art.

WILBUR DOANE COURTNEY, B.Sc., Instructor in Zoology and Physiology.

MARTIN LOUIS GRANNING, Instructor in Auto Mechanics.

ROBERT HENRY HAGER, Instructor in Physical Education for Men.

- KATHERINE BARBARA HAIGHT, Instructor in Home Nursing; Preceptress,
Margaret Snell Hall.
- GLENN HARTMAN HILL, Instructor in Machine Shops.
- RUTH HJERTAAS, Instructor in Physical Education for Women.
- WILLIAM HAMILTON HORNING, Instructor in Forging.
- AVERETT HOWARD, A.B., Instructor in English.
- MELISSA HUNTER, AB., Instructor in Institutional Management; Assistant Director of Women's Dormitories.
- HELEN McFAUL, A.B., Instructor in Household Art.
- LOCHE HARDEMAN MARDIS, B.Sc., Instructor in Accounting.
- AMBROSE REUBEN NICHOLS, B.Sc., Instructor in Industrial Education.
- JAMES COLEMAN SCOTT, A.B., Instructor in English.
- GERTRUDE STRICKLAND, Instructor in Household Art.
- LOIS JOHNSON RANKIN, A.B., Instructor in Physical Education for Women.
- BERTHA ALICE WHILLOCK, B.Sc., Instructor in Office Training.
- GLADYS LOUISE WHIPPLE, B.Sc., Critic Teacher in Home Economics Education.
- LYLE PORTER WILCOX, B.Sc., Instructor in Horticulture.
- GEORGE ALFRED WILLIAMS, A.B., Instructor in Mathematics.
- CHARLES GEORGE WILTSHIRE, Instructor in Plumbing and Steam Fitting; Superintendent of Plumbing.

*VISITING INSTRUCTORS*①

- EDMUND GURNEY,
Experienced Practicing Tailor, Portland, Oregon
Lecturer on Methods of Teaching Tailoring.
- CAROLINE HEDGER, M.D.,
Medical Director of Elizabeth McCormick Memorial Fund, Chicago
Formerly on Board of Infant Welfare Society, Chicago
Representative of Chicago Women's Clubs during World War in Belgium
for control of Typhoid Epidemic, especially among children.

CONVOCATION LECTURERS

- RICHARD F. SCHOLZ, Ph.D.
President of Reed College
- HENRY LAWRENCE SOUTHWICK, M.O.,
President of Emerson College of Oratory
Lyceum lecturer and reader
June 28, "Twelfth Night"; June 29, "Hamlet."

①Specialists in Dietetics, Costume Design, Education and Psychology, and other departments to be announced later.

HORACE A. EATON, Ph.D.,

Head of English Department, Syracuse University.

CAROLINE HEDGER, M.D.,^①

Director of Elizabeth McCormick Memorial Fund, Chicago

ROLLO A. TALLCOTT, A.M.,

Head of Department of Public Speaking and Dramatics, Butler University,
Indianapolis, Ind.

GENERAL INFORMATION

General facts relative to Scope, Admission, Expenses, Credits, etc., are given below. Further information of any kind, as well as any assistance that can be rendered students to plan their work in advance, or to make arrangements for coming, will be gladly furnished by the Director's office.

SCOPE

The Summer Session offers courses to meet the needs of a wide range of students and teachers with much or little previous preparation. Teachers, extension workers, students desiring either collegiate or entrance credit, and those interested in learning the practical arts of the home, the field, or the office, will find a variety of courses taught by experts.

Teachers in the secondary schools will find special methods of teaching technical courses required in the school curriculum. Experts from outside the state as well as on the regular College staff will demonstrate the latest methods of teaching Agriculture, Commerce, Home Economics, Industrial Arts, and Physical Education.

The provisions of the **Smith-Hughes Act** have created a special demand for teachers of Agriculture, Home Economics, and other vocational subjects in the high schools of Oregon and neighboring states. The Oregon Agricultural College has been designated by the State Board for Vocational Education to train teachers for this work. Although adequate training of such teachers involves full four-year courses leading to a degree, the Summer Session offers many opportunities for teachers to fit themselves more adequately to meet the requirements of the Federal law. Some teachers need additional technical training with reference to subject-matter; others need additional professional training in Education in order to qualify. In either case the Summer Session affords an opportunity to secure the necessary preparation.

^① Offers regular courses in Child Care and listed among visiting instructors.

Physical Education. Full provision is made in the Summer Session for a wide choice on the part of coaches and teachers, both men and women, wishing to take up Physical Education. It is possible for teachers without previous training in this field to acquire sufficient proficiency in the six weeks of the Summer Session to handle the most necessary courses in the schools during the year. A full staff of instructors will provide courses ranging from elementary gymnastics, and the coaching of the various competitive sports, to pageantry.

Education. Courses in general and technical Education have been arranged for teachers who must take additional courses in Education to satisfy requirements for **certification**.

Extension Work. Special courses in Community Entertainment and Public Speaking, in Industrial Journalism, Story Telling, Play-ground Methods, and other allied subjects offer special opportunities for those engaged or expecting to engage in Extension activities.

College Credit. Courses also will be offered for **students** who wish to make up collegiate work which they have missed, or for those who wish to shorten the time of residence by carrying some of their required subjects during the vacation period. Students who have not been graduated from high school, but who wish to secure additional credits which will count toward **college entrance**, will find courses which will meet this need.

Other Opportunities. Others, whether with or without high school or technical training of any kind, will find courses open to them in all the practical fields of **Agriculture, Homemaking, or Business**, with elementary work for those who need it, and advanced work for those who are already proficient. The wide range of courses offering practical experience in Practice House, cafeteria, laboratories, and shops; the instructional staff; and the equipment—these, and all the other facilities of the Oregon Agricultural College make the Summer Session an institution of opportunity.

ADMISSION

All students who believe that they can profit by the instruction offered will be admitted without examination or the presentation of credentials. It is presumed that all who apply for admission have a serious purpose and are of good moral character. College credit will be granted to those qualified by entrance credit to receive it, (*see Credit for Work*, p. 379).

EXPENSES AND ACCOMMODATIONS.

The amount of money required for six weeks attendance naturally varies with students. Some allowance must be made for incidental and personal expenses not included in the usual estimate.

The regular College registration fee of ten dollars, required of all students, is the only tuition charge. Those attending less than six weeks will pay at the rate of \$2.00 a week, a part of a week being counted as a full week, but no fee for less than \$5.00 will be accepted. This one fee will admit students as auditors to as many courses as they care to attend during the entire session. Laboratory and shop fees are listed under each course.

The new Margaret Snell Hall and Waldo Hall will be the halls of residence for women. A charge for the term of twelve dollars a person for a double room, or eighteen dollars for a single room, will be made to cover cost of heat, light, use of laundry, etc. The rooms are provided with bed, mattress, table, and chairs. Students desiring to occupy these rooms may either bring pillows, pillow-cases, sheets, blankets or comfort, and bed-spread of their own or rent them from the College for a moderate fee. Each student in the halls must provide her own towels. A well equipped laundry room will be open for the use of students without extra charge. The Y. M. C. A. assists men students to find desirable accommodations in private homes adjacent to the campus.

A cafeteria will be open at Waldo Hall, with prices as low as possible, consistent with prevailing costs of supplies and service. At the cafeteria maintained during the last Summer Session, board averaged seven dollars a week. The expense, however, is entirely dependent upon individual choice.

The dormitories for women will be open for lodging Saturday, June 16. Meal service will begin Sunday evening. Room charge for part of a week will be the same as for a full week.

Tenting privileges will be granted on application, for a nominal charge of \$1.00, to those providing their own tents. Water and toilet facilities are conveniently accessible. Fuel may be purchased at cost. Sheltering fir trees have been carefully inspected to insure against the presence of objectionable caterpillars sometimes to be found upon such trees. The camp ground will be free from such pests.

Since students registered for the Practice House course (HAD 450) will live in the Practice House throughout the Summer Session, they need make no other provisions for room and board.

Allowing \$54.00 for board and room, \$10.00 registration fee, \$1.00 for drayage on baggage, and \$10.00 for laundry and incidentals, the minimum cost for the entire six weeks may be estimated at \$75.00.

exclusive of railroad fare. Those who take courses requiring textbooks or laboratory fees must make some additional allowance.

REGISTRATION

Students are requested to file a preliminary registration by filling out the Informal Registration Blank and mailing it as early as possible in order that arrangements may be made more completely for handling the work in the different departments. This application is not binding either as to attendance or choice of studies. Final registration should be made at the Director's office in the Library Building as early as possible on Monday, June 18. The Committee on Registration will be in session from 9:00 until 12:00 and from 2:00 until 5:00 in the main reading room, Library Building. Students should consult this Committee in making out courses and schedules. Because of the shortness of the session, students should arrive in time to complete registration on Monday in order to attend the first meeting of all their classes on Tuesday. Full credit cannot be given for students entering more than one week late. No course will be offered for less than seven students, but if difficulty is experienced in arranging work, the student should consult the Director.

WITHDRAWAL

The term is so short and the fees are so low that refund of fees can be made only for withdrawal because of illness, certified to by some reputable physician and reported to the Director of the Summer Session at the time. Refunds can not be made for withdrawal reported later than one week from date of occurrence.

CREDIT FOR WORK

Students whose preparatory work qualifies them may receive college credit for the work taken to the extent indicated in the descriptions of the several courses. In general, the credit for Summer Session work is approximated to that of the regular college year on the basis of three credits for five recitations a week through the session. A maximum of nine credits may be earned during the Summer Session as against sixteen and one-half credits in one term of the regular year. Credit in excess of the approved maximum may be allowed only for unusual cause, on consent of the Director, and with the provision that the student's general average for all subjects taken during the session shall be at least 85 percent.

GRADUATE CREDIT

Graduate credit is to be by special arrangement with departments concerned and approval of the Director. Work to qualify for graduate credit must be of a superior character. In courses open to graduate and undergraduate students, the graduate students will be expected to do additional work beyond the minimum requirements under special guidance of instructor.

The following courses taken under approved conditions will be recognized as of graduate character:

Agriculture: Agricultural Education 1, 2, 3.

Commerce: Commercial Education 1; Economics and Sociology 1, 2; Political Science 2.

Education and Psychology 2, 3, 4, 5.

Home Economics: Home Economics Education 5; Household Administration 1; Household Science 3, 5; Institutional Management 2.

Physical Education: By special arrangement only.

Basic Arts and Sciences: Botany 2, 3; Chemistry 2; History 2; Mathematics 5; Public Speaking 3, 5; Zoology 2.

APPOINTMENT OFFICE

Students and teachers attending the Summer Session will be assisted to find teaching positions for the following year by the School of Vocational Education, Forestry Building 201.

SOCIAL AND OTHER FEATURES

A recreational, inspirational background is necessary for the best, most productive work in the summer time, and special attention will be given to the development of that spirit of friendliness and comradeship which should be a valuable part of the Summer School life. Besides week-end social affairs on the campus, hikes, a week-end at the Coast, and an excursion to Mary's Peak will be arranged.

POPULAR LECTURES

A feature of the Summer Session is the program of addresses by speakers of national distinction. Attention is called to the names of speakers already arranged for, announced on another page.

From June 17 to June 23 inclusive, the Ellison-White Chautauqua System will be offering a program in Corvallis which will be of interest to many of the students in the Summer Session.

SUMMER CLIMATE

Corvallis is pleasantly situated for summer study, the average summer temperature being 77 degrees F. A refreshing ocean breeze which sets in through a gap in the Coast Range to the west each afternoon insures a cool and tonic atmosphere. The city water system supplies absolutely pure mountain water.

COURSES OF INSTRUCTION

ARRANGEMENT OF COURSES

The courses in this Bulletin are arranged in two major groups, the first consisting of the more strictly technical or vocational departments, and the second comprising those subjects which constitute a part of any complete education and which are indispensable as foundation courses in technical education. To these are added miscellaneous or special courses. The schools or departments in the first, or Vocational group, are arranged in the Bulletin in alphabetic order, as follows: I. Agriculture. II. Commerce. III. Education. IV. Home Economics. V. Industrial Arts. VI. Industrial Journalism. VII. Physical Education. The second, or general group, consists of: VIII. Basic Arts and Sciences, under which head the different departments are arranged in alphabetic order. IX. Short Course for Boys and Girls. X. Summer School of Music.

CLASSES

Except in special cases, there are no classes scheduled to meet on Saturday. Because July 4 comes on Wednesday, it is arranged this year to hold classes on the second and fourth Saturdays, June 30 and July 14, so as to omit classes on July 5 and 6 without any decrease in the regular total of classroom hours. This arrangement will open up the week-end of the Fourth for the excursion to Newport.

I. AGRICULTURE

AGRICULTURAL EDUCATION

These courses are intended chiefly for two groups of students: (1) rural school teachers, supervisors, and club workers who are interested primarily in elementary agriculture; (2) those teachers who desire special training for teaching vocational agriculture in high schools and part-time classes of farmers. The subject-matter in science and agriculture will be considered incidentally with reference to its effective use in training students and farmers.

1. **Secondary Education in Agriculture** (AE^d 402). A consideration of the various methods of teaching with reference to their value, use, and adaptation in the field of agricultural teaching. Emphasis is given to the organization of field and laboratory work and the supervision of practical work on the farm.

Five periods; 3 credits.

H. H. Gibson

2. **Rural Education** (AE^d 431). The social and community elements of rural and agricultural education in relation to the school program; the place of the school in relation to other educational agencies in rural communities; the organization of a course dealing with social and community activities.

Five periods; 3 credits.

H. H. Gibson

3. **Seminar in Agricultural Education** (AE^d 482). A consideration of special problems in the teaching of agriculture and in the administration of agricultural education. Required of graduate students and elective for seniors in Agricultural Education.

Time and credits to be arranged.

H. H. Gibson

TECHNICAL AGRICULTURE

Special courses for graduates and teachers of Agriculture in Service given during the first two weeks of the Summer Session. These courses deal with special problems in the field of Agriculture, Agricultural Economics, and Agricultural Education. Staff members of the various departments concerned will conduct these courses and will recommend graduate credit where specific requirements for graduate work have been met. Full description of these courses may be secured from the department of Agricultural Education. Correspondence regarding these courses is advised before the opening of the Summer Session. Students other than teachers of Agriculture are admitted by special permission.

All departments of the School of Agriculture are at the service of Summer Session students. Courses will be arranged to meet the needs of groups of students whether they may be prospective teachers or farmers. The following courses are suggestive of courses which will be adapted to meet the needs of those who may desire them.

1. **AH 111. Stock Judging I.** The various types of farm animals are studied by score cards and cooperative methods, and the student is made familiar with the desirable and undesirable types of beef and dairy cattle, sheep, swine, and horses.

Two recitations; 5 two-hour laboratory periods; 3 credits.

B. W. Rodenwold

2. **Staple Crop Production for Rural and High School Pupils** (FC Special). The presentation of practical phases of crop production and improvement; methods and material for laboratory work; use of field and laboratory demonstrations; field trips; chart, blackboard, and other illustrative material; material and methods for boys' and girls' club work; important phases of production that lend themselves to rural educational work. This course is useful to rural and Smith-Hughes teachers.

Three lectures; 3 two-hour laboratory periods; 3 credits. Fee \$1.00. *G. R. Hyslop, C. C. Ruth*

3. **Farm Mechanics** (FM 111 or 112). This course deals with types of mechanism of various machines, farm lighting plants, farm water-supply systems, concrete construction, gas engines, tractors, automobiles, and accessories, plow adjustments and plow contests, and similar subjects.

Three lectures; 2 three-hour laboratory periods; 3 credits. Fee \$1.00. *W. J. Gilmore*

4. **Farm Mechanics for Smith-Hughes Teachers** (FM Special). Similar to the preceding course but presented from teacher's point of view. Arranged for if demand arises.

Three credits. Fee \$1.00. *W. J. Gilmore*

5. **Vegetable Gardening** (Hrt 221s). A course dealing with the fundamental principles and practices of growing vegetables, paying particular attention to methods of production on a small, rather than an extensive, basis. Laboratory practicums include study and actual handling of vegetables in College testing grounds, student gardens, and greenhouses.

Daily lectures and practicums; 3 credits. *A. G. Bouquet*

6. **Landscape Gardening for School Grounds and Country Homes** (Hrt 231). This course aims to prepare the student to take a leading and intelligent part in the improvement of country home grounds, school grounds, church grounds, and areas of public nature. The course includes lectures on simple principles of design of grounds, followed by actual practice in the drafting room; out-of-door trips for familiarity with ornamental trees, shrubs and vines; and studies in plant propagation, growth, and maintenance.

Two lectures; 3 laboratory periods; 3 credits. *A. L. Peck*

7. **Elements of Horticulture** (Hrt 100s). This course is to give a student enough training in horticulture to enable him to care for the home orchard as well as to understand some of the fundamentals of commercial orcharding. The course deals with such subjects as choosing the orchard; purchasing of nursery stock; planting the orchard; tillage; spraying; intercropping; and pruning.

Three lectures; 3 two-hour laboratory periods; 3 credits. Fee \$1.00. Text: Sears, Productive Orchardng. *L. P. Wilcox*

8. **Poultry Husbandry** (PH 201). Includes a general discussion of breeds and varieties of poultry and of the practical application of the principles of incubation, brooding, rearing, feeding, breeding for egg production, housing, marketing, diseases, and general poultry management. Laboratory work includes a study of incubators and brooders; poultry houses and appliances; poultry feeds; study of eggs; candling and grading eggs; preserving eggs; methods of selecting laying hens and breeding fowls. The College poultry plant offers exceptional opportunities for study of practical poultry keeping. As far as possible students who desire it will be given practical work to do on the College farm.

Three lectures; 2 laboratory periods; 3 credits. Fee \$1.00.

A. G. Lunn

9. **Soils** (Sls 201). History and origin of soils; fertility and composition; exhaustion and replenishment; physical properties and constituents; relative value and importance; handling soils; practice in judging soil types; effect upon soils of tillage, manuring, crop rotation, drainage, and irrigation. Adapted for teachers of Agriculture.

Three three-hour periods; 3 credits. Fee \$2.00. Deposit \$2.00.

C. V. Ruzek

II. COMMERCE

Each of the four departments of the School of Commerce offers courses both for teachers and general students. As indicated below, several of the courses are designed primarily for elementary and high-school teachers.

The departments of Business Administration and Office Training and Stenography offer work emphasizing methods in teaching, as well as practical instruction in the respective subjects. The Government and Business Law courses will also appeal to both teachers and general students. The courses in Economics are offered with the expectation that they will appeal to any or all of the following classes:

(1) The citizen of Oregon. (2) The college student. (3) Farmers and those interested in farming. (4) Teachers in public schools. (5) Those desiring training in Office Training and Stenography.

COMMERCIAL EDUCATION

1. **Secondary Education in Commerce** (CEd 451). Principles of education as applied to the teaching of shorthand, typewriting,

business English, and bookkeeping in high schools, rapid review of subject-matter, with model lessons in each subject; lectures covering aims, materials, methods of presentation, organization of courses and arrangement of curriculum.

Five periods; 3 credits.

Bertha Whillock

BUSINESS ADMINISTRATION

1. **Introduction to Accounting** (BA 101). A thorough but rapid study of the general principles of bookkeeping. The aim of this course is to afford those students entering the degree curricula in Commerce, who have not had a year of bookkeeping, an opportunity to secure preparation which will enable them to carry BA 102.

Five periods; 3 credits. Fee \$1.00.

L. C. Ball

2. **Teachers' Course in Bookkeeping** (BA 104s). A course for high-school teachers of bookkeeping, based upon the State Course of Study and the bookkeeping text followed in Oregon. Methods of presenting the subject of bookkeeping most effectively to high-school students will receive emphasis. A thorough knowledge of bookkeeping based upon at least a year's study or teaching is a prerequisite for this course.

Three periods; 2 credits. Fee \$0.50.

L. C. Ball

3. **Penmanship** (BA 11s). A mastery of the best forms of business writing and lettering with emphasis on methods of instruction.

Two periods; 1 credit.

L. C. Ball

4. **Business Organization** (BA 331). General nature of business organization; evolution and forms of business units; structure and life-history of typical corporations; the corporation and trust problem; public utility corporations; reorganization and receivership; blue sky laws and state control.

Five periods; 3 credits.

L. H. Mardis

5. **Business Management for Women** (BA 371). The aim of this course is to treat in a practical way the ordinary rules and methods of conducting business affairs. Two distinct phases are emphasized as follows: (a) Finance. Value of money, how savings grow, banking and credit, general principles of investment, loan associations, stocks, and insurance. (b) Fundamentals of Business Law. The principles of the law of contracts, of negotiable paper, mortgages, real property, and wills.

Five periods; 3 credits.

L. H. Mardis

ECONOMICS AND SOCIOLOGY

1. **Educational Sociology** (ES 307). A study of the field of Sociology from the educational point of view; social institutions in their origin and development; social activities in their relation to institutions and the individual; social control or the molding of social institutions and the directing of social activities; different methods of social investigation and their comparative results. May be substituted for Introduction to Sociology, ES 391.

Five recitations; 3 credits; junior elective. *H. Macpherson*

2. **National Vitality** (ES 365). A study of the economic, social, moral and political aspects of national health; an analysis of the means of preserving and increasing national vitality; a comparative study of vital statistics. Lectures and library investigation.

Five recitations; 3 credits; junior elective. *H. Macpherson*

3. **Introduction to Economics** (ES 391). Abbreviated course covering the elementary problems of our industrial and commercial organization, the nature of wealth, its production and consumption, the different forms in which it is found, conditions underlying successful commerce and manufacturing.

Five periods; 3 credits. *W. H. Dreesen*

4. **Money and Banking** (ES 311). (a) Money. The nature and functions of money; legal tender; factors affecting price, and their relation to business conditions; brief history of the various forms of paper money; silver legislation; present problems and conditions. (b) Banking. Functions of banks; history of banking, including our national banking system, with emphasis upon the Federal Reserve Banking Act; currency and banking principles underlying United States and foreign banking systems; comparison of our banking system with those of foreign countries; assigned readings.

Prerequisite: ES 203. Three credits; five periods. Text: Holdsworth, Money and Banking. *W. H. Dreesen*

POLITICAL SCIENCE

1. **Business Law** (PS 163.) A short course in the laws of business, covering briefly much the same field as PS 201 and PS 202, but applied particularly to the special needs of students. Recitations and discussions.

Five periods a week; 3 credits. Text: Huffcut, Elements of Business Law. *Roy R. Hewitt*

2. **National Government** (PS 301). Consideration of the organization, functions, and present-day problems of the American Fed-

eral Government. Methods are emphasized. Illustrative material and bibliography for teachers of Civics and History are discussed.

Five periods; 3 credits. Text: Munro, Government of the United States. *Roy R. Hewitt*

3. **State and Local Government** (PS 302). Consideration of the organization, functions, and present-day problems of state, county, and township government in the United States. During the past school year the faculties in Political Science in the various higher educational institutions of the state have prepared an "outline of the Government of Oregon." This will be used in the course. Emphasis will be placed on teaching state government.

Five periods; 3 credits. Text: Munro, Government of the United States. *F. A. Magruder*

OFFICE TRAINING AND STENOGRAPHY

1. **Elementary Stenography** (OT 101). Theory of Manual, Gregg Shorthand, first eight lessons covered thoroughly. Short-hand penmanship given special attention.

Ten periods; 3 credits. *Mabel Maginnis*

2. **Advanced Stenography** (OT 103). Theory of manual completed; thorough review of principles; attention to phrase writing; dictation.

Prerequisite: OT 102. Ten periods; 3 credits.

Bertha Whillock

3. **Elementary Typing** (OT 111). Touch typing. Theory and practice of touch typing, covering mastery of alphabet and numerals; finger gymnastics; rhythm drills; dictation exercises.

Ten periods; 2 credits. Fee \$2.00. *Mabel Maginnis*

III. EDUCATION AND PSYCHOLOGY

For special courses in Agricultural Education, Commercial Education, Industrial Arts Education, and Home Economics Education, see the descriptions of courses given under the respective heads, Agriculture, Commerce, Industrial Arts, and Home Economics. For example, for "Elementary Education in Agriculture" see the general section devoted to "Agriculture."

1. **Elementary Psychology** (Psy 301). A preparatory course in the fundamentals of mental life from the functional standpoint; emphasis upon the application of psychical laws to the ordinary affairs of life.

Five periods; 3 credits.

J. F. Brumbaugh

2. **Vocational Psychology.** The results of psychological investigations in the field of vocational education. Various methods of vocational guidance and vocational counseling will be considered. Five periods; 3 credits.

3. **Educational Psychology** (Psy 322). Principles and laws of mental life and development as applied to the teaching process; psychological value of the various methods and paraphernalia of school life.

Five periods; 3 credits.

4. **The Child Mind** (Psy 433). A review of the mental development of the child from birth to the adolescent period. Special attention given to the marked characteristics of successive stages and best methods of moral training.

Four periods; 2 credits.

J. F. Brumbaugh

5. **Supervised Study.** Different systems of teaching pupils to study will be demonstrated. Also different methods of supervised study will be considered.

Five periods; 3 credits.

6. **School Administration** (Ed Spec II). Problems of Administration and Teaching, correlation of the vocational branches with other subjects in the curriculum.

Five periods; 3 credits.

Note: Arrangements with visiting instructors are still in process of adjustment. Some variation in courses 2, 3, and 5 is possible. Those interested should write.

IV. HOME ECONOMICS

The work in Home Economics aims to meet a wide range of needs. Courses are offered for:

(1) Teachers seeking further professional development, whether in foods, clothing and textiles, scientific home management, child care, or allied subjects, in elementary, advanced, or graduate courses. Special provision is made for those engaging in Smith-Hughes work.

(2) Those who are not teachers, who have a knowledge of the fundamentals of Home Economics work, but who desire more extended or specialized training.

(3) Students in Home Economics curricula seeking to shorten their work for the degree or get subjects outside of the regular curricula.

(4) Other students, not aiming at a degree, who take such work as they are prepared for, for its practical value.

Equipment. The School of Home Economics of the Oregon Agricultural College is classed with the leading schools of its kind

in the United States. Its special building, two of the three units of which are now in use, is well equipped with laboratories, home kitchens, dining-rooms, living-rooms, etc. The laboratories are large and airy and the new electric ranges which have just been installed will add much to the comfort of those taking foods work during the Summer Session. The school established one of the first practice houses in the country, and has worked out a course through a series of years that is meeting the needs of the students.

HOME ECONOMICS EDUCATION

1. **Home Economics Education** (HEd 304). A brief history of development of Home Economics in the elementary and secondary schools; a study and analysis of a number of high school courses of study. Planning a course of study for a high school; planning and equipping a homemaking department.

Five periods; 10 hours outside work; 3 credits.

Hatty R. Dahlberg

2. **Smith-Hughes Home Economics** (HEd Special 1). State-aided courses in homemaking and their relation to the community. An intensive course designed to meet the needs of those who expect to engage in Smith-Hughes work in the state. Specific community organization, such as grange and women's clubs, will be studied to help the teacher form definite judgment of community interests.

Five periods; 10 hours outside work; three weeks (June 18 to July 6); 1½ credits.

Louise Wood

3. **The Project Method of Teaching** (HEd Special 2). Both home and class projects will be carried out, developing the project method of teaching, its place and how applied. Special use in vocational homemaking. Reports, etc., will be studied from general point of view of teachers in service.

Five periods; three weeks (July 9-27); 1½ credits. *Louise Wood*

4. **Home Economics in the Junior High School** (HEd Special 3). A study of the place of Home Economics in the junior high school curriculum, the aims, content of course, projects suitable for the group; a study of the special problems of organizing and maintaining a department.

Five periods; three weeks (June 18 to July 6; repeated July 9 to 27 if sufficient demand); 1½ credits.

Hatty R. Dahlberg

5. **A Survey of What is New in Home Economics** (HEd Special 4). A review of progress and changes which have been made during the past few years particularly as they affect the public schools. Each phase will be presented by a specialist. The course is designed

especially for teachers who wish to bring themselves up-to-date in the whole field of Home Economics. Open to seniors also.

Five periods; 10 hours outside work; 3 credits.

Hatty R. Dahlberg and other heads of departments

In addition to these methods courses, the part-time and evening teacher should find among the courses suggested below, the work that should fit her particular needs.

Household Science:

Principles of Foods and Cookery (meal planning).....	HS 101
Food Problems for Teachers of Household Science.....	HS 214s
Nutrition (personal and family diets).....	HS 320

Household Art:

Millinery	HA 321
House Planning and Furnishing	HA 431
Costume Design	HA 331
Tailoring	HA 416

Household Administration:

Child Care	HAd Special 1s
Household Management	HA 440

HOUSEHOLD ADMINISTRATION

1. **Child Care** (HAd Special 1s). This course will be centered on standards of health and the rational care of children at various ages, and will include some detailed instruction in nutrition of school children with practical work in chart making.

Ten periods a week for the last three weeks; 12 hours outside work; 3 credits. Fee \$0.50.

Caroline Hedger, M. D.

2. **Home Nursing** (HAd 430). Care of the patient under home conditions. Symptoms. First aid to the injured. Management of communicable diseases. For the homemaker and teacher of Home Economics. (Section limited to 16.)

Prerequisites: ZP 321, Bac 205. Five periods a week; 12 hours outside work; 3 credits.

Katherine B. Haight

3. **Household Management** (HAd 440). Application of the principles of scientific management to the home; study of the management of household operations and finances; study of family and community relationships. For homemakers and teachers of Home Economics.

Prerequisite: Economics. Five periods a week; 12 hours outside work; 3 credits. Fee \$0.50.

A. Grace Johnson

4. **Practice Housekeeping** (HAd 450). (HAd 440 should be taken parallel.) This course deals with the problems of the homemaker. It puts into actual practice under actual household conditions the knowledge gained in all other Home Economics courses, including child care. Students reside in the house for the entire period of six weeks, and take turns in doing the various duties involved in the management of the house. Special attention is given to scientific management of the income as well as the various operations of the household. Other courses which do not have long laboratory hours may be carried at the same time. For homemakers and teachers of Home Economics, especially those desiring to teach in Smith-Hughes high schools. Students living in the house need be under no expense for board and room elsewhere. (Section limited to eight.)

Prerequisite: HS 213 or equivalent. Three hours daily house work; 4 credits. Fee approximately \$6.00 a week for living expenses.

A. Grace Johnson

HOUSEHOLD ART

1. **Clothing Problems for Household Art Teachers** (HA 311s). Planning, designing, and constructing different types of garments with the purpose of developing good taste and judgment in selection of materials, combinations, decorations, designs, etc., and of increasing the speed, skill, initiative, and efficiency of the worker. Short cuts in sewing. Practical aids in teaching, etc. (Limited section.)

Five lectures; 5 two-hour laboratory periods; 3 hours outside work; 3 credits. Fee \$1.50.

Gertrude Strickland

2. **Textiles and Clothing** (HA 113). Designing and constructing of simple silk dresses; remodeling problem in wool; art blouse; pattern modeling; emphasis on color, design, and texture; textile study. (Limited section.)

Prerequisite: HA 112 or equivalent. Five lectures; 5 two-hour laboratory periods; 9 hours outside work; 4 credits. Fee \$1.50.

Gladys Whipple

3. **Costume Design** (HA 331). Study of proportions of figure, color, types, and personality; effects of line, proportion, color, and form in dress; problems in design and modeling based on art principles and historic study. (Limited section.)

Four lectures; 4 two-hour laboratory periods; 6 hours outside work; 3 credits. Fee \$1.50.

4. **House Decoration** (HA 431). Planning and furnishing of the home from the standpoint of art, economy, convenience, and sanitation. (Limited section.)

Five lectures; 2 two-hour laboratory periods; 9 hours outside work; 3 credits. Fee \$1.50.

5. **Millinery** (HA 321). Designing and constructing of frames; methods of covering; trimming; renovating. (Limited section.)

Five three-hour laboratory periods; 3 hours outside preparation; 3 credits. Fee \$1.50. *Helen McFaul*

6. **Tailoring** (HA 416). Development of principles and processes of tailoring. Application on coats and suits. Vocational aspects emphasized, for teachers and prospective teachers. Course given by experienced tailor. (Limited section.)

Five three-hour laboratory periods; 3 hours outside work; 3 credits. Fee \$1.50. *Edmund Gurney*

7. **Applied Design** (HA 435). Decorative art involving careful consideration of line, form, proportion, and color; original or adapted designs executed in various media for clothing and house furnishing problems; lamp-shade making, embroidery, tie-dyeing, batik, etc.

Five three-hour laboratory periods; 3 hours outside work; 3 credits. Fee \$2.00. *Lula May Brandt*

HOUSEHOLD SCIENCE

1. **Principles of Food and Cookery** (HS 101). For women who are unable to enter the regular courses in foods offered in School of Home Economics and students who have not had food work in high school. The instruction covers food preservation; study of foods, their selection and preparation; food requirements; planning and serving of meals and computation of their cost.

Two recitations; 4 three-hour laboratory periods; 4 hours outside work; 3 credits. Fee \$4.00. *Amelia Burns*

2. **Food Problems for Teachers of Household Science** (HS 214s). This course is designed to assist teachers of Household Science in solving special teaching problems, and to enable teachers to develop skill and efficiency in cookery.

Four two-hour laboratory periods; 2 recitations; 8 hours outside work; 3 credits. Fee \$4.00. *Dorothy Shank*

3. **Nutrition** (HS 320). Scientific study of food materials in their relation to the daily dietary of families under various conditions of environment; dietary standards of metabolism; comparison of the nutritive values of common foods by computing, preparing, and serving dietaries of specific costs, furnishing specific nutrients. (Limited section.)

Prerequisites: HS 213, ZP 321. Five recitations; 4 three-hour laboratory periods; 13 hours outside work; 5 credits. Fee \$4.00.

4. **Camp Cookery (for Men)** (HS 350). Preparation of palatable and nutritious products from foods available in camps; outdoor

food preparation, involving the use of Dutch ovens, reflectors, and improvised camping utensils.

Two three-hour laboratory periods; 1 credit. Fee \$2.50.

Amelia Burns

5. Advanced Nutrition (HS 620s). Lectures and seminar. (Limited section.)

Prerequisite: HS 320 or equivalent. Five lectures; 13 hours outside work; 3 credits. Fee \$0.50.

INSTITUTIONAL MANAGEMENT

1. Institutional Management Experience (IM 330). This course will consist of studies of business methods employed; inventories; records; equipment; time studies of regular and student help; practical work in kitchen and dining-room. This course is planned to meet the individual needs of students in so far as possible.

Four two-hour laboratory periods; 2 lectures; 8 hours outside work; 3 credits.

Melissa Hunter

2. Advanced Institutional Management (IM 431). Marketing; organization; standardization; methods of training and choosing employees; keeping account records. Menu planning, as applied to different institutions; equipment. Plans of various types of institutions. Two weeks of this course featuring fancy cookery will be given by an experienced hotel chef.

Five periods; 10 hours outside work; 3 credits. *Melissa Hunter*

V. INDUSTRIAL EDUCATION AND INDUSTRIAL ARTS

INDUSTRIAL EDUCATION

The courses listed below and those in Industrial Arts are planned to fit the needs of both Manual Training and vocational teachers in Trades and Industries. Teaching principles and methods will also be given to those who have had little or no teaching experience.

1. Vocational Analysis (IEd Special I). A careful, detailed analysis of type jobs which are included in Industrial Arts teaching; found in cabinet-making, pattern-making, blacksmithing, smithing, machine shop practice, plumbing, auto mechanics, carpentry, etc. The organization of the material into a course of study for use in the public schools; also outlines of model course of study for both elementary and secondary grades; plans for desirable equipment for shop and classroom work.

Five periods; 3 credits.

A. R. Nichols

2. Foreman Training course as applied to the Manual Training Instructor (IEd 400s). This course will deal with supervision and

management of material, equipment, operations, and man factors in the industries, and in the manual training shops. Topics discussed will include: the teacher's place in the shop, the teacher as a supervisor, the teacher as a manager, management of equipment, safety, the promotion of interest, job pride, carelessness.

Five periods; 3 credits.

A. R. Nichols

3. **Special Methods in Manual Training** (IEd Special II). A careful detailed study of the methods of organization and planning of lessons for public school teaching. The working out of at least twenty-four type lessons to serve as a guide in teaching in the public schools.

Five periods; 3 credits.

A. R. Nichols

4. **Seminar, Industrial Education** (Special III). This course will be conducted three times a week, probably the first hour after lunch (1:00 to 2:00). The course will consist of problems brought up by the different men and discussed by the group. A similar course was given last year with no credit attached and no requirement for attendance, but the average attendance was twelve with some days as high as eighteen.

Hours to be arranged; 1½ credits.

A. R. Nichols

INDUSTRIAL ARTS

These courses are adapted to the needs of those who are preparing to be special teachers and of special teachers who have good preparation but who realize the necessity of getting new ideas and of talking over problems with educational leaders and with fellow teachers.

1. **Practical Wood Finishing** (IA 223s). Emphasis upon the care and adjustment of wood working machinery of the average instructional shop; setting up of the machines; laying out and construction of gigs to secure uniformity and accuracy of results, combined with rapidity of production; work on these appliances to illustrate their uses; routing processes of stock and students through the shop; discussions and demonstrations in veneering featured.

Ten periods; 2 credits. Fee \$6.00. Deposit \$1.00. *D. G. Thayer*

2. **Blacksmithing, Elementary** (IA 152s). The student is taught to make and manage a fire, to shape iron by bending, upsetting, drawing and welding. Useful articles are made, such as hooks, staples, rings, clevises, and chains. Considerable attention is given to shop equipment.

Ten periods; 2 credits. Fee \$4.00.

W. H. Horning

3. **Blacksmithing, Advanced** (IA 252). For those having an elementary knowledge of blacksmithing considerable attention is given to the making of tools and to the treatment of steel.

Ten periods; 2 credits. Fee \$4.00.

W. H. Horning

4. **Machine Shop Practice, Elementary** (IA 262s). Discussions and lectures are held upon the care and operation of the various machines as applied to high school use. A large variety of light projects is given, showing the possibilities of the small shop equipment. If desired, larger projects, involving the use of the other machines, may be selected.

Ten periods; 2 credits. Fee \$4.00. Deposit \$1.00.

G. H. Hill

5. **Machine Shop Practice, Advanced** (IA 263). Continuation of IA 262s.

Ten periods; 2 credits. Fee \$4.00. Deposit \$1.00.

G. H. Hill

6. **Automobile Mechanics, Elementary** (IA 181s). The object of this course is to afford the student a systematic introduction to automobile mechanics by means of a detailed survey of the vital parts and their function. It includes practical work involving the assembling and disassembling of parts, testing for and locating troubles, making replacements and repairs. Lectures, demonstrations, and class discussions. A modern text is used.

Ten periods; 2 credits. Fee \$4.00.

M. L. Granning

7. **Automobile Mechanics** (IA 182s). Continuation of IA 181s. Course involves a study of carburetors, ignition, starting and lighting systems, the more complex adjustments and repairs, to the extent that time will permit. Lectures, demonstrations, and class discussions. A modern text is used.

Prerequisite: IA 181s, or equivalent experience. Ten periods; 2 credits. Fee \$4.00.

M. L. Granning

8. **Plumbing** (IA 74s). Instruction and practice in care and handling of tools; in working with fittings, traps, valves, faucets, etc.; in working with sewer, soil, waste water, and gas lines; in cutting and threading water pipe to measurements; using different fittings; in laying out and constructing plumbing; in making range, boiler, and hot-water connections; and in the practical uses of the soldering iron.

Fifteen periods; 3 credits. Fee \$6.00.

C. G. Wiltshire

VI. INDUSTRIAL JOURNALISM

Elementary Industrial Journalism (IJ 200). The course is intended to give the student practical experience in the fundamentals of news writing. It will be of value (1) for teachers who are

called upon to supervise the publication of school periodicals or take charge of the preparation of copy for the school news column of local newspapers; (2) for county agents and home demonstration agents who desire journalistic training as part of their equipment. Students will assist in the preparation and editing of copy for the weekly Summer Session News. Methods of obtaining news of various types, the writing of the lead, and the general style of the news story are carefully explained. Requirements of individual students are considered.

Five periods; 3 credits. Fee \$1.00. *F. L. Snow, C. J. McIntosh*

VII. PHYSICAL EDUCATION

The use of the big 100-by-50-feet tiled swimming pool, the use of both men's and women's gymnasiums, and the varied program of courses for both men and women allow of expert training under the most pleasant conditions.

Fees. Each student registering for work in Physical Education will be charged a general fee of \$1.50 to cover cost of soap, towels, showers, etc. An additional fee of \$0.50 will be charged for use of the big swimming pool at specified hours without lessons, or \$1.50 with lessons.

FOR MEN

The department of Physical Education for Men has frequent requests to recommend men for positions in which, besides teaching various academic subjects, they shall act as coaches of the various scholastic sports. The following courses are designed to qualify men for such positions. Students should have had some experience, however limited, either in coaching or in competitive sports. The six weeks work cannot in every case qualify for successful coaching, but it cannot fail to be of value to those who are fitted for the work.

The Staff will include Coach Rutherford and assistant.

Note: The work in the following courses is sufficiently varied to be of value to those having taken it during a previous summer, as well as to the new students.

1. **Football.** The theoretical work will take up the rules from the standpoint of coach, players, and officials; the several styles of offense and defense with consideration of their special strengths and weaknesses; generalship and strategy. The practical work will include training, conditioning, and player's equipment; punting, the various kinds of kicking, tackling dummy and charging sled; special

drills for linemen, ends, and backs; interference and team work: fundamental plays, freak plays, and signal systems. Lectures and practical work.

Two two-hour periods; 3 credits.

R. B. Rutherford

2. **Basket-ball.** Instruction will be given in basket-ball with the idea of fitting men to coach. The course will cover passing, goal throwing, dribbling, team play, how to condition a team, and the different styles of play used by the leading coaches.

Two two-hour periods; 3 credits.

R. B. Rutherford

3. **Baseball.** Theory and practice in batting; base running; proper methods of fielding each position; team work and coaching methods; study of the rules; physical condition; methods of indoor practice.

Two two-hour periods; 2 credits.

4. **Track and Field Athletics.** Instruction and practical demonstration in starting, sprinting, distance running, hurdling, high and broad jumping, pole vaulting, shot putting, and discus; practical talks on methods of preparing contestants for different athletic events; adaptations to individual peculiarities; rules of competition; study of physical condition, including endurance, speed, fatigue, and all means of training for condition; work is assigned for the promotion, management and officiating of games and meets. Lectures and practical work.

Two two-hour periods; 2 credits.

5. **Swimming.** Elementary and advanced courses in the various strokes will be taken up, together with simple and fancy diving; also a course in life-saving.

Three hours; 1½ credits. Fee to be arranged.

R. B. Rutherford

6. **Training.** Theories of training, massage, treatment of sprains, bruises, bandaging, and first aid. Lectures and practical work.

Three periods; 1 credit.

7. **Tennis.** Theory and practice together with a course in organizing tennis clubs, and management and organization of tournaments.

Two periods; ½ credit.

R. B. Rutherford

8. **Schoolroom Games and Gymnastics for Rural School Teachers.** This course outlines the work for schools in which all grades take their gymnastic work together.

Four periods; 2 credits.

9. **Elementary Gymnastics, Calisthenics and light apparatus work for men exclusively.**

Three periods; 1 credit.

R. B. Rutherford

Scout Master's Course

1. **Theory and Practice of Scout Work** (PEM Spec I). Survey of the field of Scout work, supplemented by lectures and demonstrations from various selected departments, such as Physical Education, Political Science, Psychology, Public Speaking, Camp Cookery, etc. The course aims rather to map out the needs than to attempt covering the field, although this course taken with courses in other departments will offer valuable training.

Five periods; 3 credits.

H. A. Scullen, D. M. Goode, and special lecturers

FOR WOMEN

The work in Physical Education for Women is outlined for students and teachers wishing training for work in elementary schools, high schools, and playgrounds. These courses aim to help the teachers generally throughout the state as well as special teachers in Physical Education.

Staff. The courses are taught by the regular members of the department under the direction of Professor Edna A. Cocks.

Supervisors and Extension Workers will find such practical courses as 3 (PEW 131bs), 9 (PEW 375), and 14 (PEW 472) adapted to their needs in organization of recreation and community gatherings. Attention is also called to courses in Rural Entertainment, Story Telling, Public Speaking, Industrial Journalism, and other allied subjects to be found in their appropriate departments.

Teachers untrained in Physical Education wishing to take up this work in high schools or elementary schools will find the program of courses they should take at the conclusion of the list of courses below.

Outfit. Women will require for the regular gymnasium work and dancing classes and for basket-ball the regulation black gymnasium suit or middy and bloomers, with black hose and black gymnasium or black tennis shoes. For aesthetic dancing the ballet shoe is worn. Suits may be obtained through the gymnasium office. For field and athletic work a full, short, white skirt and middy, with tennis or sport shoes are worn.

1. **Elementary Gymnastics** (PEW 111s). A course in Swedish gymnastics, combining floor and apparatus work with training in correct posture and breathing.

Five periods; 1 credit.

Ruth Hjertaas

2. **Elementary Aesthetic Dancing** (PEW 131as). Aesthetic technique and practice of rhythmic movements; simple aesthetic dances.

Five periods for first three weeks; ½ credit.

Ruth Hjertaas

3. **Elementary Folk Dancing** (PEW 131bs). The simple national folk dances of all nations.

Five periods for the last three weeks; $\frac{1}{2}$ credit. *Ruth Hjertaas*

4. **Outdoor Sports** (PEW 141s). (a) Tennis, first three weeks; 5 periods; $\frac{1}{2}$ credit. (b) Hockey and (g) Track Athletics and Volley ball, last three weeks; 5 periods; $\frac{1}{2}$ credit. (c) Basket-ball, first three weeks; 5 periods; $\frac{1}{2}$ credit. (d) Baseball, last three weeks; 5 periods; $\frac{1}{2}$ credit. *Lois Rankin*

5. **Elementary Swimming** (PEW 151s). The teaching of the ordinary back stroke, side stroke, breast stroke, and simple diving.

Five periods; 1 credit. *Lois Rankin*

6. **Advanced Swimming** (PEW 252s). The teaching of more intricate strokes, fancy diving, fancy swimming, and life-saving.

Five periods; 1 credit. *Lois Rankin*

7. **Advanced Aesthetic Dancing** (PEW 331as). For students who have had Elementary Aesthetic Dancing.

Note: In this and the following course material and notes of the various dances helpful to teachers will be given.

Five periods for last three weeks; $\frac{1}{2}$ credit. *Ruth Hjertaas*

8. **Advanced Folk Dancing** (PEW 331bs). Continuation of Elementary Folk Dancing. (See note for preceding course.)

Five periods for first three weeks; $\frac{1}{2}$ credit. *Ruth Hjertaas*

Theoretic Courses

9. **Playground and Gymnastic Games**. (See below, Public School Methods.) *Ruth Hjertaas*

10. **Pageantry and Community Recreation** (PEW 437s). How to conduct pageants; kinds and development of pageants; community recreation necessary for leaders in community work.

Five periods; 3 credits. *Ruth Hjertaas*

11. **Theory and Coaching of Athletic Sports for Women** (PEW 376s). Includes all organized sports and track athletics, with lectures and reference reading.

Five periods; 3 credits. *Lois Rankin*

12. **Public School Methods in Physical Education** (PEW 461s). This course is based on the State Course of Study for Physical Education and the Manual. Training is given in teaching physical work in the schoolroom, and in games for the schoolroom and playground.

Five periods; 3 credits. *Doris Thornely*

13. **Practice Teaching** (PEw 464s). This course is to be taken in connection with course 12 above, giving practical application of the principles of Physical Education.

Five periods; 1 credit.

Doris Thornely

14. **Organization and Administration of Physical Education and Recreation** (PEw 472). Development, organization, and management of physical education; the playground movement, construction and equipment; use of apparatus; government and discipline.

Five periods; 3 credits.

Doris Thornely

15. **Theory of Corrective Gymnastics** (PEw 473s). A course planned for teachers, who desire to know what exercises can be given to correct poor posture, spinal curvature, flat feet, and some functional disorders. Adapted to all grades of school children.

Five periods; 3 credits.

Doris Thornely

Special Training Courses

Students untrained in physical education needing such training for work in high schools or elementary schools should take such of the following work as the Director of this department advises.

1. **Elementary Gymnastics** (PEw 111s).
2. **Elementary Aesthetic Dancing** (PEw 131as) and 3. **Elementary Folk Dancing** (PEw 131bs).
4. **Tennis, Hockey, Basket-ball, Baseball, Track Athletics, and Volley Ball** (PEw 141as, 141bs, 141cs, 141ds, 141gs, respectively).
5. **Elementary Swimming** (PEw 151s).
12. **Public School Methods in Physical Education** (PEw 461s).
13. **Practice Teaching** (PEw 464s).

VIII. BASIC ARTS AND SCIENCES

ART

1. **Drawing and Composition** (A 110s). This course covers work in representation; still life in line and dark and light; free-hand perspective of circles, and linear perspective; some of the principles of composition and design. The pencil, charcoal, and brush and ink are used as media.

Three double periods; 2 credits. Fee \$0.50. *Marjorie Baltzell*

2. **Design** (A 120s). The elements of design construction and their application to problems of dress and the home are made the basis of the course.

Three two-hour periods; 2 credits. Fee \$0.50. *Marjorie Baltzell*

3. **The Theory and Harmony of Color** (A 130s). This course covers the study of the so-called primary colors, the development

of the prismatic colors with their complements, color quality, color value, and the various harmonies. Problems are rendered in original color schemes. The study and the adaptation of nature color and color from color prints are an important feature of the course. All problems point to appropriate use of pleasing color schemes as applied to articles of household use, home interiors, and dress.

Three two-hour periods; 2 credits. Fee \$0.50. *Marjorie Baltzell*

BOTANY

The members of the Botany department staff stand ready at all times to confer with students of the Summer Session who may desire information or assistance along any of the lines of work included within the field of general botany, plant physiology, plant diseases and their control, weeds, poisonous plants, drug plants, ornamental plants, plant classification, methods of preparing botanical or plant pathological specimens. A large staff of workers, engaged in work along these special lines, is always ready to give advice and information to students interested in botany and plant pathology. The large collection of flowering plants, fungi, and plant diseases, are at the disposal of students.

1. **Principles of Botany: The Seed Plants (Bot 203).** A study of the structure and vital activities of seed plants, the root, stem, leaf, flower, and fruit. The relation of growing plants to the environment; to light, air, moisture supply, soil elements, etc.

One lecture; 1 recitation; 3 two-hour laboratory periods, or 4 two-hour laboratory periods at the discretion of the instructor; 3 credits. Fee \$1.50. Text: Martin, Botany. *W. M. Atwood*

2. **The Teaching of Botany (Bot 471).** (For prospective teachers of agriculture or natural science in secondary schools.) Deals with point of view, methods, materials, texts, and equipment in teaching plant science subjects and considers the manner in which the work should be adapted to the interests, needs, and possibilities of any particular community.

Prerequisite: An elementary course in Botany. Three credits; 1 lecture; 1 recitation; 3 two-hour laboratory periods or field trips; an extra laboratory period or field trip may be scheduled at the discretion of the instructor; 3 credits. Fee \$1.50. Deposit \$1.00.

W. M. Atwood

3. **Graduate Work in Botany.** Work toward a master's degree with major in Botany and Plant Pathology in the School of Agriculture is open to any college graduate who has completed the requirements expected of students who enter this field. The work is outlined by the head of the department with the approval of the Graduate Committee. The studies are carried forward under the

immediate direction of the specialist in the department whose training and experience best fit him to direct the student in the particular field he has chosen for his major.

CHEMISTRY

1. **General Chemistry** (Ch 101, 102). (1) Fundamental principles and their application; the non-metallic elements and their compounds; laboratory work in the identification of anions. A two-week introductory course in elementary physical concepts precedes the regular work. (2) Metallic elements and their compounds; introductory study of chemical equilibrium; theory of solution; law of mass-action and the periodic law. The laboratory work completes anion classification and identification, and includes study of the reactions of the cations and their identification.

Five four-hour laboratory periods; 6 credits. Fee as below. Ch 101 and Ch 102 may be taken separately first or last three weeks respectively.

2. **Organic Chemistry** (Ch 221s or 224s). Study of occurrence, methods of preparation, characteristic reactions, and properties of the more common organic compounds; the paraffins, alcohols, aldehydes, ketones, ethers, fatty acids, esters, benzene, phenols, aniline and a few dyes.

Prerequisite: Ch 103 or equivalent. Five four-hour periods; 5 credits. Fee as below. Three credits by special arrangement.

Laboratory Fees. For each course in Chemistry, a fee of \$1.50 a credit hour, and a deposit of \$3.00 are charged, the latter returnable, less breakage.

ENGLISH

Composition

Third Year of High School English:

A. First semester of third year high school English; 5 periods; no college credit; $\frac{1}{2}$ unit ($\frac{1}{2}$ year) entrance credit. *A. Howard*

B. Second semester of third year high school English; 5 periods; no college credit; $\frac{1}{2}$ unit ($\frac{1}{2}$ year) entrance credit. *A. Howard*

C. **Corrective English** (Eng K). A review of the fundamentals of English Grammar. Required of students failing the classificatory examination for English 101.

Five periods. No college credit.

J. Scott

1. **Principles of English Composition** (Eng 101). Review of principles of rhetoric; practice in written and oral composition; frequent conferences between instructors and students as aids in meeting individual needs.

Five periods; 3 credits. Text: Foerster and Steadman, Sentences and Thinking. *J. Scott*

2. **Business English** (Eng 105). The business letter in detail, special attention being given to letters of application and letters of inquiry and information. At least two long themes, one being a sales argument and the other an advertising narrative, are required. Recitations, note-book work, conferences.

Five periods; 3 credits. Text: Hotchkiss and Kilduff, Advanced Business Correspondence. *A. Howard*

3. **Technical Composition** (Eng 103). Outline and precis making; technical reports; a study of scientific exposition.

Five periods; 3 credits. Text: Fulton, Expository Writing.

J. Scott

4. **Industrial Journalism** (IJ 200). See "Industrial Journalism" above.

Literature

5. **American Literature** (Eng 433). Emphasis on the period from 1870 to the present. Lectures, discussions, reports on assigned topics.

Five periods; 3 credits.

F. Berchtold

6. **Contemporary English Literature** (Eng 323). English literature of the late nineteenth and twentieth centuries.

Five periods; 3 credits.

F. Berchtold

7. **Public Speaking and Dramatics**. See announcement under "Public Speaking."

HISTORY

Hst A. **Civics**. For entrance credit only.

Five periods; $\frac{1}{2}$ unit ($\frac{1}{2}$ year) entrance credit. *W. H. Ellison*

1. **European History II**. (Hst 213). A study of Europe from the fall of Napoleon to the present time.

W. H. Ellison

2. **The History of the Pacific Ocean Area** (Hst 361). The history of the activities of European peoples and of the United States in the Pacific Ocean and adjacent regions; study of the struggle for political and economic leadership; consideration of the present situation and problems within the area.

Five periods; 3 credits.

W. H. Ellison

LIBRARY PRACTICE

To students in the Summer Session one of the most valuable assets is the library. The Oregon Agricultural College library, now housed in the beautiful new Library Building, consists of a classified collection, numbering 60,000 volumes, of standard works of history, biography, pure and applied science, economics, sociology,

education, literature, and reference. In addition there are many thousand reports, bulletins, and other publications of the various colleges and experiment stations, and of societies and commissions. All this material is easily accessible through catalogues and indexes.

Library Practice for School Librarians (Lib 400s). This course is designed to aid teachers who have charge of school libraries in connection with their teaching work. It is not a course in librarianship, and can in no respect be considered a substitute for a library training course. The work consists in lectures on school libraries in Oregon; Oregon library law; the Oregon State Library, its lists, publications, and traveling libraries; selection and ordering of books; simplified classification and catalogue forms; business records and loan systems. There will be one demonstration in mending and cleaning books. The lectures on selection of books will include notes on publishers of school books, dealers in second-hand books and remainders, specially prepared lists for school needs, and selection of technical books for Smith-Hughes courses.

Three periods; 2 credits.

Lucy M. Lewis

MATHEMATICS

1. **Elementary Algebra** (Mth 21). This course deals with the fundamental operations, factoring, highest common factor, lowest common multiple, and fractions. Emphasis is placed upon factoring.

Five periods; 3 credits (entrance credit only). *G. A. Williams*

2. **Elementary Algebra** (Mth 24). The chief topics considered are the theory of exponents, radicals, quadratic equations, and logarithms.

Five periods; 3 credits (entrance credit only). *G. A. Williams*

3. **Plane Geometry** (Mth 81). The first two books of Wentworth and Smith's Geometry. (High school students who have had no geometry are strongly advised not to attempt this course. Students registering for this course may not carry more than three additional credits.)

Five periods; 3 credits (entrance credit only). *G. A. Williams*

4. **Teacher's Course in Algebra and Geometry** (Mth 400s). A study of selected topics in both algebra and geometry with emphasis upon methods of presentation. Application of the laboratory method to the teaching of high-school mathematics will receive particular attention. This course is intended for prospective high-school instructors but is open to all who are interested in the subjects offered.

Five periods; 3 credits.

G. A. Williams

MODERN LANGUAGES

1. **Elementary French** (ML 111). Drill in the rudiments of the language; oral and written exercises; idiomatic translations; reading of easy selections.

Five periods; 3 credits.

L. Bach

2. **Elementary Spanish** (ML 121). Essentials of vocabulary and grammar; auxiliaries, regular and radical changing verbs, and some of the more common irregular forms; reading of easy prose selections; idiomatic translations, oral drill and conversation.

Five periods; 3 credits.

L. Bach

3. **Elementary German** (ML 131). Rudiments of the language; oral and written exercises; translations of easy selections.

Five periods; 3 credits.

L. Bach

PHYSICS

1. **General Physics** (Ph 111, or 201, 202). A brief course in General Physics for the Agriculture or Commerce student, or others not needing a more thorough course. Physics 111 may be obtained under special arrangement by those offering trigonometry.

Prerequisites: Elementary Physics, Plane Geometry. Ten or twenty hours recitation, lecture, or laboratory work; 3 or 6 credits. Fee \$2.00.

W. B. Anderson

PUBLIC SPEAKING AND DRAMATICS

1. **Principles of Story Telling** (PSP 467s). For students preparing for playground, kindergarten, nursery, and extension work. Purpose of story; psychological reasoning for selected stories for different periods of childhood; fairy tales; folk lore; fable; Bible stories; myths; legends; nature and animal stories; hero tales; realistic stories; allegories; symbolic stories; dramatic stories; individual practice with criticism and suggestion, under critic teacher.

Five periods; 3 credits.

Elizabeth Barnes

2. **Practical Public Speaking I** (PSP 254). Practice in the construction and presentation of original speeches; study of gesture, bearing, and the elements of ease and force in presentation; voice training; criticism on organization of material and delivery.

Five periods; 3 credits.

C. B. Mitchell

3. **Argumentation** (PSP 256). Practical work in brief-drawing, collection and handling of evidence, and construction of the argumentative speech. Each student constructs several briefs and delivers several speeches. Criticism on presentation and construction.

Five periods; 3 credits.

C. B. Mitchell

4. **Play Reading** (PSP Special 1s). The dramatic interpretation of an entire play cut for public reading. Selections of material.

method of cutting, characterization, mood interpretation, setting, descriptive presentation, personation, etc.

Five periods; 3 credits.

Elizabeth Barnes

5. **Community Entertainment** (PSP Special 2s). This course is designed to meet the needs of rural leaders. It deals with the forms of entertainment that are suitable for presentation in rural communities, and gives practice in utilizing the facilities in rural halls, school-houses, churches, and private lawns. (a) or (b) may be taken separately, but it is strongly recommended that they be taken together.

(a). Pantomimes, tableaux, plays, etc. Five periods; 3 credits.

Elizabeth Barnes

(b). Make-up, pageantry, shadow pictures, costumes, etc. Five periods; 3 credits.

C. B. Mitchell

ZOOLOGY

1. **General Zoology** (ZP 101). The fundamental problems of zoology. This course will feature outdoor work.

Three credits; 2 lectures; 1 recitation; 2 three-hour laboratory periods. Fee \$2.00.

W. D. Courtney

2. **Graduate Work in Zoology** (ZP 690s). Students wishing to investigate special problems for graduate credit will be directed by members of the staff under special arrangements.

Hours and credits to be arranged.

W. D. Courtney

SUMMER SCHOOL FOR MEMBERS OF BOYS' AND GIRLS' CLUBS

Direction of H. C. SEYMOUR, State Club Leader

A two-week course for boys and girls in practical Agriculture and Home Economics, correlated with Club work, will be given on the campus of the Oregon Agricultural College June 11 to 23. Over two hundred were enrolled in 1922. The Club members at the State Fair who placed first in the various projects or divisions of the projects, are all members of this summer school, their expenses being paid by Portland business men and livestock breeders' associations, who donate the money for these trips. The Union Pacific Railway system are sending one representative from each county affected by their road. In addition, many counties, organizations, and clubs, have offered scholarships as prizes to their Club members and will send large delegations. Other Club members will be admitted upon the acceptance of their applications, up to the number that may be accommodated, expenses to be paid by the applicant.

The girls will be quartered in Waldo Hall and the boys in Cauthorn Hall. They will all be chaperoned by members of the faculty, who will be on duty both day and night. Supervisors will

be in charge of the boys and girls in all forms of recreation and during all time outside of classrooms, to insure each individual boy or girl enjoying his or her share of all the good times provided.

Classroom and field instruction will occupy about four hours each day, except Saturday and Sunday. This instruction not only will be quite different in matter and method from the usual school instruction but will be varied so as to avoid monotony. Physical recreation for both boys and girls will be a prominent feature of the course. Indoor and outdoor sports of all kinds will be taught. These will include swimming in the pools under safe and expert instruction, and only under adequate supervision. Trips to neighboring points of interest will also be taken.

At each general assembly the speaker will be some prominent official or business man or woman of the state. The Club members have an opportunity at such gatherings to come into contact with people of importance.

Method of Admission. The names of those winning trips at the state and county fairs have been filed with the Director of the Summer Session, and reservations made. All others who wish admittance should fill out the Application Blank and send it as soon as possible to the Director of the Summer Session or the State Club Leader. A few days before leaving home a card should be mailed, notifying the State Club Leader on what train you will arrive in Corvallis.

Those whose names have not been filed should note carefully the following directions:

(1) The applications must be approved by the county school superintendent or county club leader.

(2) Applications should be filed on or before June 1. All applications will be acknowledged and acted upon at once.

(3) Applications may be sent after June 1, but no assurance can be given that they will be accepted.

Expenses. The fee for board and lodging is \$15.00. An additional allowance of a dollar or two should be made for note-books, pencils, etc. It is not well for young people to have too much spending money.

Each boy should be provided with complete change of underwear, shirts, and socks, for two weeks (he should have overalls or extra suit to work in); with bedding, including sheets, blankets or comforts, and pillows; with towels, soap, handkerchiefs, comb, brushes for hair, teeth, and clothes. Tennis shoes are required on the gymnasium floor; baseball gloves, bats, etc., tennis rackets, and bathing suits, will also find use. Lockers will be provided for safe keeping of each boy's clothing and equipment.

Each girl will need to bring a sufficient number of changes of underwear to last the entire two weeks, wash dress and apron to wear exclusively for cookery; a pair of bloomers (these may be galatea or of some kind of woolen material), and tennis shoes. Other items of personal effects, bedding, etc., are the same as for the boys, listed above.

SUMMER SCHOOL OF MUSIC FACULTY

WILLIAM FREDERIC GASKINS, Mus.B., Director
Voice Culture and Singing, Music History

Graduate student Hillsdale College Conservatory, Michigan; graduate student American Conservatory, Chicago; graduate pupil of Karlton Hackett, Chicago; F. X. Arens, New York; J. Harry Wheeler, New York; J. D. Mehan, New York; Percy Rector Stephens, New York.

GENEVIEVE BAUM-GASKINS, Instructor
Organ, Piano

Graduate American Conservatory, Chicago; pupil of Wilhelm Middleschulte, Chicago; John J. Hattstaedt, Chicago; Karlton Hackett, Chicago; William Nelson Burritt, New York; William Frederic Gaskins, Chicago.

GUSTAV DUNKELBERGER, Mus.B., Instructor
Pianoforte and Theory

Graduate of Bethel College Conservatory; graduate student American Conservatory, Chicago; student of Heniot Levy, Chicago; Arthur Olaf Anderson, Chicago; Adolph Weidig, Chicago; pianoforte pupil of Richard Buhlig, a pupil of Leschetizky; pupil of Dr. Percy Goetschius; pupil of Louis Victor Saar.

CARL GRISSIN, Instructor
Violin, Viola

Student of Karl Halir, Gustav Hollaender, Berlin; Edmund Singer, Samuel d'Lange, Joseph Mayer, Stuttgart.

EDWIN WOODCOCK, Instructor
Theory and Art of Playing Band Instruments; Band Conducting

Arrangements for the study of voice culture and singing, piano, pipe-organ, harmony, history of music, string and band instruments may be made only with the Director of the School of Music at his office, early in the session. Elective courses are offered suited to individual needs. The College has recently authorized the counting of six credits in Music towards a degree in any school of the institution.

Required: Eighteen private lessons, one to four hours daily practice.

A limited number of pupils in the study of the pipe-organ will be accepted on application therefor not later than July 1.

Unless otherwise designated, all instruction is in private individual lessons of 30 minutes' duration. Only such lessons will be made up as may have been omitted by reason of the severe illness of the student or the instructor's unavoidable absence.

Tuitions will not be refunded for discontinuance of lessons.

Fees for instruction are as follows, payable in advance at the Business office of the College after registration with the Director of the School of Music, 30 Administration Building.

Professor Gaskins, Mr. Grissen, or Mr. Dunkelberger.....	\$36.00 a term of 18 lessons
Pipe-organ, Mrs. Gaskins.....	\$36.00 a term of 12 lessons
Band Instruments, Mr. Woodcock.....	\$18.00 a term of 18 lessons
Harmony, Theory, class instruction, Mr. Dunkelberger.....	\$ 7.50 a term of 18 lessons
Harmony, Theory, private instruction, Mr. Dunkelberger.....	an hour \$3.00
Harmony, Theory, private instruction, Mr. Tulley.....	an hour \$2.00

Practice on piano in private room may also be obtained by application to the Director. Pianos are located on the campus, and within easy reach of living quarters and classrooms.

Rates for practice are as follows:

One hour a day, for six weeks.....	\$2.50
Two hours a day, for six weeks.....	5.00
Three hours a day, for six weeks.....	7.50

Practice on pipe-organ:

Two hours a day, for six weeks.....	\$15.00
Four hours a day, for six weeks.....	20.00

For additional information address William Frederic Gaskins, Director of the School of Music, Administration Building, Oregon Agricultural College, Corvallis, Oregon.

Non-Collegiate Courses

ONE YEAR COURSES IN AGRICULTURE

In this state there are thousands of young men who are to become our future farmers. To keep pace with the rapid development in the science and practice of agriculture and thus be prepared to attain his maximum success on the farm every one of these young men should obtain an agricultural education.

Many, however, are without the high school credits necessary for entrance to the degree curriculum in Agriculture or find it impossible to devote the time necessary to complete such a course. To meet the needs of such young men two one-year courses have been established, one in General Agriculture and one in Horticulture.

These short courses are not preparatory to degree curricula. They are provided especially for those who have been unable to complete a high school course and for farmers or prospective farmers, young or old, who may desire a short intensive course of instruction in Agriculture. In these short courses each term's work is complete in itself. The student, therefore may attend during the year any one or more terms as circumstances may permit.

Certificates are awarded to students who complete either of the one-year courses.

ONE YEAR COURSE IN GENERAL AGRICULTURE

OUTLINE

	1st	Term 2d	3d
Farm Soils (Sls 50).....	5	.....	.....
Elementary Stock Judging (AH 11).....	.....	5	.....
General Farm Mechanics (FM 10).....	.....	.....	5
General Farm Crops (FC 10).....	5	.....	.....
Feeding and Management (AH 21).....	.....	5	.....
Diseases of Domestic Animals (VM 41).....	.....	.....	5
Plant Disease Control (Bot 11).....	3	.....	.....
Practical Farm Management (FMg 12).....	.....	3	.....
Injurious Insects (Ent 14).....	.....	.....	3
English (Eng 10).....	.....	.....	3
Farm Accounts and Business Methods (BA 61).....	.....	3	.....
Practical Farm Drainage (Sls 60).....	3	.....	.....
Gymnasium (PEm 11, 12, 13).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics	2	2	2
	18 $\frac{1}{2}$	18 $\frac{1}{2}$	18 $\frac{1}{2}$

Practical Poultry Keeping (PH 201) may be substituted for any other three-credit subject upon the request of at least five students.

FIRST TERM COURSES

September 28 to December 20, 1923

Sls 50. Farm Soils. Brief history of origin of soils; fertility of soils; most valuable chemical constituents; their exhaustion and replenishment; most important physical factors; their deterioration and improvement; the physical components; their relative value and amounts in soil mixtures; practice in judging the chief soil types of Oregon; effects upon soils of tillage, manuring, crop rotation, drainage, and irrigation.

Five credits; 3 recitations; 2 two-hour laboratory periods. Fee \$1.00. Deposit \$1.00.

FC 10. General Farm Crops. Practical production, improvement, and marketing of farm crops for grain, forage, cover, and special purposes. A brief course combining the practical features of cereal, forage crop, and seed production, with special attention to north-western conditions.

Five credits; 3 lectures; 2 laboratory periods. Fee \$0.75. Text: Wilson and Warburton, Field Crops.

Bot 11. Plants and Plant Diseases. Elementary study of the structure and life activities of plants; causes, effects, symptoms, and methods of control of some of the common and destructive diseases of field crops, fruits, and vegetables.

Three credits; 1 lecture; 1 recitation; 2 two-hour laboratory periods. Fee \$1.50. Deposit \$1.00. Texts: Transeau, Science of Plant Life. Stevens, Diseases of Economic Plants.

Sls 60. Practical Farm Drainage. The value of drainage, the methods and cost of installing drainage systems under different soil and land conditions, district drainage, etc.

Three credits; 2 recitations; 1 two-hour laboratory period. Fee \$1.00.

PEm 11. Practical Gymnastics. $\frac{1}{2}$ credit.

SECOND TERM COURSES

January 2 to March 19, 1924

AH 11. Elementary Stock Judging. A thorough drill in the judging of beef cattle, sheep, swine, and horses, accompanied by textbook and lecture work on types and breeds of livestock.

Five credits; 1 recitation; 5 two-hour laboratory periods. Fee \$0.25. Text: Vaughan, Types and Market Classes of Live Stock.

AH 21. Feeding and Management. Practical details of the feeding, care, and management of all kinds of livestock with special reference to practices in the West.

Five credits; 4 recitations; 2 two-hour laboratory periods. Fee \$1.00. Text: Potter, Western Live Stock Management.

FMg 12. Practical Farm Management. The principles and factors in farm management that are most important to the practical farmer are discussed in this course. The laboratory work deals with the solution of the home-farm problems.

Three credits; 2 recitations; 1 laboratory period. Fee \$0.50.

BA 61. Farm Accounting. An elementary course in the principles of bookkeeping and business methods as they apply to the farm; farm cost accounts and financial reports, with special reference to the income tax report; special records; inventories, valuation and depreciation; elements of banking; negotiable papers; the business letter; business forms; office equipment.

Three credits; 1 lecture; 2 recitations.

PEm 12. Practical Gymnastics. $\frac{1}{2}$ credit.

THIRD TERM COURSES

March 25 to June 12, 1924

FM 10. General Farm Mechanics. A course in farm mechanics dealing with farm power machinery, farm implements, farm conveniences, farm concrete construction, and repair of farm equipment.

Five credits; 2 recitations; 3 three-hour laboratory periods. Fee \$3.00.

VM 41. Diseases of Domestic Animals. Study of the common diseases of livestock, veterinary sanitation, and veterinary hygiene.

Five credits; 3 recitations; 1 lecture; 2 two-hour laboratory periods. Fee \$0.50. Text: Hadley, The Horse in Health and Disease.

F. W. Miller

Ent 14. Injurious Insects. A practical course in Entomology, including the life-history, habits, and control of insects of farm, garden, and orchard.

Three credits; 2 recitations; 1 two-hour laboratory period. Fee \$1.00. Text: Osburn, Economic Entomology. *W. J. Chamberlin*

Eng 10. English. English grammar; beginnings of composition.

Three credits; 3 recitations. Text: Buehler, Practical Exercises in English.

PEm 13. Practical Gymnastics. $\frac{1}{2}$ credit.

ONE YEAR COURSE IN HORTICULTURE

OUTLINE

	Term		
	1st	2d	3d
Farm Soils (Sls 50).....	5	.....	.....
General Farm Mechanics (FM 10).....	.....	.....	5
Farm Accounts (BA 61).....	.....	.....	3
Farm Dairying (DH 20).....	.....	3	.....
Feeding and Management (AH 21).....	.....	5	.....
General Farm Crops (FC 11).....	3	.....	.....
Orchard Management (Hrt 11, 12, 13).....	5	5	5
Vegetable Gardening (Hrt 21, 22, 23).....	3	3	3
Gymnasium (PEm 11, 12, 13).....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Military Science and Tactics.....	2	2	2
	18½	18½	18½

FIRST TERM COURSES

September 28 to December 20, 1923

Sls 50. **Farm Soils.** For description see page 411.

Five credits; 3 recitations; 2 two-hour laboratory periods. Fee \$1.00. Deposit \$1.00.

FC 10. **General Farm Crops.** For description see page 411.

Five credits; 3 lectures; 2 laboratory periods. Fee \$0.75. Text: Wilson and Warburton, Field Crops.

Hrt 11. **Orchard Management.** This work aims to give as much practical instruction in Horticulture as can be consistently given in the time allowed to persons without uniform preparation for the work. Emphasis is laid continually on laboratory and field work. The work takes up the various phases of horticulture from the cultivation of the orchard until the crop is harvested, and includes such subjects as harvesting, grading, packing, pruning, spraying, thinning, fruit setting, etc.

Five credits; 3 recitations; 3 two-hour laboratory periods. Fee \$1.50. Text: Sears, Productive Orchardring.

Hrt 21. **Vegetable Gardening.** The work given during the fall term consists largely of a study of the important varieties of vegetables; methods of harvesting, packing, and marketing fall and winter vegetables; manner of handling vegetables for storage; fall management of the vegetable garden; observations of methods of selecting stocks of biennial vegetables for seed; and saving seed of annual vegetables. The texts are mimeographed notes and assigned references.

Three credits; 2 recitations; 1 two-hour laboratory period.

*A. G. Bouquet*PEm 11. **Practical Gymnastics.** $\frac{1}{2}$ credit.

SECOND TERM COURSES

January 2 to March 19, 1924

DH 20. Farm Dairying. The history and development of the dairy breeds and their adaptability to various economic conditions; how to manage a dairy herd as a part of the operations on a general farm; selection of the cows and herd sire; calf raising; keeping records of the herd; feeding for milk production.

Three credits; 2 lectures; 1 two-hour laboratory period.

AH 21. Feeding and Management. Practical details of the feeding, care, and management of all kinds of livestock with special reference to practices in the West.

Five credits; 4 recitations; 2 two-hour laboratory periods. Fee \$1.00. Text: Potter, Western Live Stock Management.

Hrt 12. Orchard Management. Continuation of Hrt 11.

Five credits; 4 recitations; 3 two-hour laboratory periods. Fee \$1.50. Text: Sears, Productive Orchardng.

Hrt 22. Vegetable Gardening. Continuation of Hrt 21. Principles of production of vegetable crops, such as soil adaptability, selection of areas for certain vegetables, plans and methods of cropping, fertilizing materials and their application, value and methods of irrigation, field seeding, transplanting, etc.

Three credits; 2 recitations; 1 two-hour laboratory period.

PEm 12. Practical Gymnastics. $\frac{1}{2}$ credit.

THIRD TERM COURSES

March 25 to June 12, 1924

FM 10. General Farm Mechanics. For description see page 412.

Five credits; 2 recitations; 3 three-hour laboratory periods. Fee \$3.00.

BA 61. Farm Accounting. For description see page 412.

Three credits; 1 lecture; 2 recitations.

Hrt 13. Orchard Management. Continuation of Hrt 11, 12.

Five credits; 4 recitations; 3 two-hour laboratory periods. Fee \$1.50. Text: Sears, Productive Orchardng.

Hrt 23. Vegetable Gardening. Continuation of Hrt 21, 22. Study of methods of vegetable seedling production and actual methods of growing of all important vegetables. Attention is also given to green-

house and frame crops which are grown to maturity during spring and summer.

Three credits; two recitations; one two-hour laboratory period.

PEm 13. **Practical Gymnastics.** $\frac{1}{2}$ credit.

WINTER SHORT COURSES

The principal objects of the various Winter Short Courses are:

1. To provide in the most practical way the largest amount of information and training in scientific agriculture that can be obtained in the allotted time in a thoroughly well manned and equipped agricultural college.

2. To provide this information at the season of the year when those who are engaged in agricultural work can best spare the time from their actual farm work.

3. To enable young men to broaden and intensify their acquaintance with scientific agriculture and thus acquire full confidence and pride in farm pursuits; to enable experienced farmers to keep abreast of new developments of the most progressive farm activities, thus becoming experts in the art of agriculture.

4. To enrich the whole field of rural life by pointing out resources not yet utilized or enjoyed, by relieving the drudgery of farm work, and by opening up the inspiring possibilities of new and increased production and improved methods of marketing.

The work offered will be adapted to the practical needs of farmers, fruit growers, dairymen, and others interested in agriculture or in rural development. The various courses are planned to provide the largest amount of practical information in the short time available. The subjects taught are those in which every farmer can be interested and the aim will be to present the subject-matter in the most practical manner possible. The laboratories, the creamery, the orchards, the college farm and herd, and the college library all offer facilities for study, for demonstration, or for practical exercises by the students attending these courses.

The courses have been arranged to come at a time when the work on the farm is the least pressing. All who attend will enjoy the time spent.

The only admission requirements are that the applicant must be at least eighteen years of age, and must have completed the eighth grade of the public schools, or by practical experience have acquired the ability to carry the work successfully.

SHORT COURSE IN DAIRY MANUFACTURING**January 7 to February 2, 1924**

A four weeks' course for buttermakers, creamery managers, cheesemakers, and ice-cream makers. Fee \$15.00.

Laboratory Practice in pasturization of sweet and sour cream; preparation of starters; cream ripening; churning; butter and cheese judging; testing milk and cream; moisture, salt, fat determinations in butter, cheese, and ice-cream; acidity tests; refrigeration; cheesemaking; ice-cream making; laboratory practice, one period a week, including manufacture; home trade, and export types of cheese, manipulation of various quality tests of milk, practice in whey separation, acidity tests, lactometer and its uses, fat and water determination of cheese, determination of casein in milk, cheese and butter scoring.

Lectures. Eight lectures on buttermaking, including starters, neutralization of cream, pasteurization, cream ripening, churning, workmanship, moisture control. Eight lectures on creamery management, including purchasing milk, cream, and supplies, marketing creamery products; creamery losses; creamery accounting. Special lectures on butter judging and demonstrations; feeding and breeding of dairy stock; creamery by-products for hog feeding; factory sewage disposal; milk and cream judging; review of the dairy laws. Eight lectures on bacteriology, including bacteria, entrance of bacteria into milk and cream, changes produced in milk by bacteria, relation of temperature to growth of bacteria in milk and cream, relation of milk to spread of disease, fermented milks, bacteria in relation to ice-cream making, importance of bacteria in market milk. Four lectures on creamery tests, including milk and cream testing, ice-cream tests, acidity tests, total analysis of butter, bacteria in relation to butter and cheese making. Eight lectures on ice-cream making, including standardization of cream, testing ice-cream for fat, methods of measuring swell, standardization of the mix, importance of milk solids and total solids, comparisons of different formulas. Eight lectures on cheese making, including manufacture of Cheddar cheese, starter preparation and rennet substitutes, defects and remedies in cheese making, paraffining, boxing, and shipping cheese, whey separation, paying for cheese milk, factory organization and construction.

DAIRY HERDSMAN'S SHORT COURSE**January 2 to June 12, 1924**

There is a very definite demand for men qualified to assume positions of considerable responsibility in charge of dairy herds. It has been difficult to find men qualified for this work. Further, no course

of instruction that has been offered has exactly met the needs of students who wanted to follow this kind of work. There has been a real need apparent for some time for a course of instruction that would fit men for positions as herdsman. This five months' course, beginning January 2 and ending June 12, 1924, is designed to meet the needs of the men who want training for herdsman'ship. The Herdsman's Course is a strictly practical or laboratory course. Students are taught by actual practice how to handle dairy cattle properly. The main part of a student's time is spent in the barn working with the College herd. This work is under the supervision of instructors and a competent, well-trained herdsman. It may appear to some that too much actual work is being required of the students, but it is a fact that experience is a very important factor in handling dairy cattle. It is the aim of the College to give sufficient experience while at the College so that if at the end of the course the student is unable to do the work required of him by practical breeders it will not be because of lack of experience. Without this experience a man cannot expect to take over a piece of responsible work in connection with a herd.

Laboratory Work. The laboratory work consists of feeding and caring for dairy cows under barn conditions. Each student is assigned five cows and in addition to taking care of these cows during the period of the course is required to care for a certain number of calves and do other work with the dairy cattle under the direction of the instructors. Work begins at 4:30 a. m. and continues to 6:30. It begins again at 8:00 and continues to 6:30, and from 3:00 until 6:00, or in case the students are assigned to work with test cows until 7:00 or 8:00 p. m., depending upon the arrangements that are made. When students are assigned to cows milked three times a day they are not required to report at certain other hours of the day. Each student is required to milk, feed, groom, and to care for in every respect the cows or animals that are assigned to him. This work continues daily throughout the course.

Classroom Work. In addition to the laboratory work there are three two-hour laboratory periods devoted to judging cattle, showing fitting, and pedigree study. Lectures and recitations covering the feeding of cows, conduct of official tests, methods of testing milk, types and breeds of dairy cattle, herd record keeping, and the general management of dairy cattle.

The College Dairy Herd. The College has a herd of more than one hundred and fifty head of pure-bred dairy cattle upon which the students can work. These cattle are used in illustrating the breed-

ing methods that are taught in the classroom. A number of these cows are now on official test and are making creditable records. In the Northwestern Fair Circuit last fall thirty-four of these animals were exhibited and won creditable honors, including eight championships and four grand championships. The herd is in charge of William Hennis, an experienced herdsman who has put high records on many cows and thoroughly understands show-ring work. The laboratory instruction is in his direct charge.

Limited Attendance. Owing to the nature of the work only a limited number of students can be accommodated. Not more than ten are admitted for instruction.

Cost. An entrance fee of \$3.35 is charged each term. In addition to this there is a \$5.00 laboratory fee and about \$5.00 for books and supplies each term. Board and room cost between thirty-five and forty dollars a month.

FARM MECHANICS SHORT COURSE

January 2 to March 19, 1924

A short course in Farm Mechanics and Tractor Operation is given during the second term, January 2 to March 19, 1924. The course deals with the technical as well as the practical side of farm power. The work includes tractor operation and much over-hauling of farm equipment, especially motors and tractors.

Demand for the Course. There is a growing demand for skill in tractor operation as indicated by the enrollment in such courses in the past and the number of recent inquiries. The change from animal to mechanical power necessitates knowledge of mechanical equipment on the part of the user if the greatest efficiency is to be obtained. The present age demands greater shop knowledge on the part of the farmer. The farmer today operates more types of machines and has more responsibility in their upkeep than the average professional mechanic in the city. Frequent repairs and adjustments, many of a minor character, call for shop experience of an extremely practical nature, which can be acquired by the operator with comparatively little training. Delays in making such repairs are expensive in both time and money.

Facilities and Equipment. In addition to equipment owned by the College, many tractors and other machines are loaned by tractor and implement companies for the use of students in the various courses in Farm Mechanics. The student thus receives instruction on the latest types of equipment. Ten different makes and types of tractors are available for class work in addition to those avail-

able for overhauling. Since Corvallis is situated in the vicinity of many users of farm equipment, a large number of machines are brought to the College shops for overhauling by students under direction of the instructors.

Assisting the regular members of the Farm Mechanics staff are many factory men, assuring valuable instruction on machines the students now own or types they are interested in. Eleven three-and-one-half-hour laboratory periods a week, devoted to tractor operation and repairs, and to general farm implement repairs. Fee \$20.00.

THIRD ANNUAL CANNERS' SCHOOL

February 4 to 23, 1924

The Horticultural Products section of the department of Horticulture announces its third annual short course for cannery operators. This course has been designed to meet the needs of those men actively engaged in the manufacture of canned fruits and vegetables. The work in science deals with the basic principles underlying food preservation.

This course is open to anyone wishing more knowledge along the lines of commercial canning.

The following fees are required for students entering this work: Registration fee, \$1.25 for students who are residents of Oregon, \$7.00 extra tuition for non-resident students. Laboratory fees to cover cost of materials as follows: Chemistry, \$1.00; Bacteriology, \$1.00; Horticultural Products, \$1.00.

Double Seaming Machines. Seaming machine adjustment, repair, and operation will be a feature of this course. This work will be handled by representatives of the American Can Co.

Commercial Canning. This course will cover the problems of the packer of the Northwest, and will also deal with the fundamentals of food preservation by canning. Problems of preparation, exhausting, heat penetration, processing, and storing will be taken up.

Bacteriology of Canning. An elementary course in the study of micro-organisms found in the canning industry; the study of organisms in food preservation and their control in fruits, vegetables, and other food stuffs; the relation of micro-organisms to curing, ripening, and preservation of food products; study of general cleanliness and sanitation of the plant must be considered in the successful conduct of the canning business. Distribution of overhead, depreciation, valuation, inventories, forms of records, and so on, will be treated.

Growers' Contracts and Cooperative Law. The student will be offered instruction in the essential elements of the valid contract with the grower, and also in the general provisions of the Oregon Cooperative law.

Talks will be given by experienced men from time to time, dealing with different phases of the canning and allied industries.

SHORT COURSE IN LAND CLASSIFICATION AND APPRAISAL

January 7 to 12, 1924

At the request of Federal Farm Loan Joint Stock Land Bank officials and realtors, a short course in land classification and appraisal is to be offered January 2 to 12, 1924. The purpose of the course is to familiarize those interested with the large fund of useful information which has accumulated in connection with soil surveys by the Experiment Station, as well as studies in farm management, rural economics, and related subjects bearing on land values. Daily lectures, demonstrations, laboratory and field practice and conferences will be offered.

(1) **Soil work** to be offered includes soil classification; physical qualities and improvement; analysis of irrigation and drainage projects as to feasibility; water rights; dry farming; soil fertility and soil management in their relation to land values.

(2) **Laboratory demonstrations and field work** will be offered daily in **Soil Judging**; recognition of soil types; soil mapping, map reading and explanation for different sections of the state; characteristics of different soil types and their relative values as affected by climate, topography, depth and fertility; also crops and types of agriculture adopted relative to productiveness and methods of utilization and improvement as related to productive values.

(3) **Daily lectures in Farm Management** will be offered dealing with size and character of farm unit and equipment suitable for different farm enterprises; utilization of logged-off lands; cost of production of staple farm crops and products as related to farm values.

(4) **Daily lectures in Rural Economics** and related subjects will include (1) land value trends, prices from 1850 to 1923; (2) economic valuation of land, factors entering the productivity formula; (3) relation of marketing to appraisals, farm market analysis; (4) titles; and (5) transfers and contracts.

(5) An hour will be used daily to consider appraisals for specialized types of agriculture such as orchard location and orcharding, meat production, poultry production, and crop adaptation.

(6) **A conference hour** has been suggested. Questions and problems it is desired to have discussed by representatives of Federal Farm Loan or Joint Stock Land Bank representatives or others should be arranged in advance. Advance registration is desirable.

NON-COLLEGIATE COURSES IN ENGLISH AND MATHEMATICS

The College makes provision for work of secondary grade in the case of the following courses in English and Mathematics, intended (with the exception of Eng K, the function of which is indicated in the course description) for entering students, who, while presenting a total of 15 entrance units, are deficient in the specific requirements of the College or any of its schools in either of these subjects. *The credits indicated are non-collegiate*, and are applicable towards admission requirements only. For basis of evaluation of entrance credits see page 72.

ENGLISH

Eng K. **Corrective English.** For students who fail to pass the classificatory examination for Eng 101 (college freshman English) and all who are deficient in the fundamentals of English grammar.

Prerequisite: Three years of high school English. Any term; 3 recitations. Texts: Kittridge and Farley, Concise English Grammar. Greever and Jones, Century Handbook of Writing.

Eng 21. **English.** Elementary composition.

Prerequisite: One year high school English. First term; 3 non-collegiate credits; 3 recitations. Text: Genung and Hanson, Outlines of Composition and Rhetoric.

Eng 22. **English.** Continuation of Eng 21.

Prerequisite: Eng 21 or equivalent. Second term; 3 non-collegiate credits; 3 recitations. Text: Genung and Hanson, Outlines of Composition and Rhetoric.

Eng 23. **English.** Continuation of Eng 22.

Prerequisite: Eng 22 or equivalent. Third term; 3 non-collegiate credits; 3 recitations. Text: Genung and Hanson, Outlines of Composition and Rhetoric.

Eng 31. **English.** Advanced composition.

Prerequisite: Two years high school English or Eng 23. First term; 3 non-collegiate credits; 3 recitations. Text: Hitchcock, Composition and Rhetoric.

Eng 32. **English.** Continuation of Eng 31.

Prerequisite: Eng 31 or equivalent. Second term; 3 non-collegiate credits; 3 recitations. Text: Hitchcock, Composition and Rhetoric.

Eng 33. **English.** Continuation of Eng 32.

Prerequisite: Eng 32 or equivalent. Third term; 3 non-collegiate credits; 3 recitations. Text: Hitchcock, Composition and Rhetoric.

MATHEMATICS

Mth 21, 22, 23. **Algebra.** Drill in the fundamental operations; use of parentheses; special rules of multiplication and division; factoring; solutions of equations by factoring; highest common factor; least common multiple; fractions; equations containing fractions; ratio and proportion; graphical representation; linear system; square root; radicals; graphical solution of equations in one unknown.

Three terms; 3 non-collegiate credits each term; 5 recitations.

Belva P. Dixon

Mth 24. **Algebra.** Quadratic equations; graphs of quadratic equations; system solved by quadratics; theory of exponents; irrational equations; variation and imaginaries.

Required in Engineering of freshmen who enter with but one year of Algebra; any term; 3 non-collegiate credits; 5 recitations.

N. Tartar, H. L. Beard, G. A. Williams

Mth 81. **Plane Geometry.** The first two books of Plane Geometry.

Required of freshmen entering deficient in first semester of Plane Geometry; any term; 3 non-collegiate credits; 5 recitations.

N. Tartar

Mth 82. **Plane Geometry.** A continuation of Mth 81, covering the last three books of Plane Geometry. Many original exercises are studied.

Required of freshmen who enter deficient in second semester of Plane Geometry; second or third term; 3 non-collegiate credits; 5 recitations.

N. Tartar

Experiment Station

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.

JAMES TERTIUS JARDINE, B.Sc., Director of the Experiment Station.

EDWIN THOMAS REED, B.Sc., A.B., Editor of Publications.

Agricultural Chemistry

SHIRLEY JONES, M.S., Chemist.

REGINALD HEBER ROBINSON, M.S., Associate Chemist.

HARRY GEORGE MILLER, M.S., Associate Chemist.

DELOSS EVERETT BULLIS, B.Sc., Assistant Chemist.

WILLARD WILSON YATES, B.Sc., Assistant Chemist.

Animal Husbandry

ERMINE LAWRENCE POTTER, M.S., Animal Husbandman.

ORAN MILTON NELSON, B.Sc., Associate Animal Husbandman.

ALFRED WEAVER OLIVER, B.Sc., Assistant Animal Husbandman.

Bacteriology

GODFREY VERNON COPSON, M.S., Bacteriologist.

WILLIAM VERNAL HALVERSEN, M.S., Assistant Bacteriologist.

Botany and Plant Pathology

HOWARD PHILLIPS BARSS, A.B., S.M., Plant Pathology.

MARION BERTICE MCKAY, M.S., Associate Plant Pathologist.

SANFORD MYRON ZELLER, Ph.D., Associate Plant Pathologist.

HORACE M. WOOLMAN, Field Agent, Office of Cereal Investigations,
United States Department of Agriculture.

LESLIE NEWTON GOODDING, B.A., B.Sc., Junior Plant Pathologist, United
States Department of Agriculture.

Dairy Husbandry

PHILLIP MARTIN BRANDT, B.Sc., A.M., Dairy Husbandman.

ROY CARROLL JONES, B.Sc., Associate Dairy Husbandman.

Entomology

LESTER LOVETT, B.Sc., Entomologist.

*FRANK HEIDTMAN LATHROP, M.S., Associate Entomologist.

BENTLEY BALL FULTON, B.A., M.S., Associate Entomologist.

* On leave of absence.

Farm Crops

- GEORGE ROBERT HYSLOP, B.Sc., Farm Crops Specialist.
CHARLES CURTIS RUTH, B.Ped., M.S., Assistant Farm Crops Specialist.
JOHN RICHARD NEVIUS, B.Sc., Assistant Farm Crops Specialist.
HARRY AUGUST SCHOETH, M.S., Junior Agronomist in Forage Investigations, United States Department of Agriculture.
BERTHA COURTRIGHT HITE, United States Department of Agriculture (Seed Analyst).

Farm Management

- HENRY DESBOROUGH SCUDDER, B.Sc., Chief in Farm Management.

Horticulture

- WALTER SHELDON BROWN, A.B., M.S., Horticulturist in Charge.
EDWARD MARIS HARVEY, Ph.D., Horticulturist (Physiology).
ARTHUR GEORGE BOUQUET, B.Sc., Horticulturist (Vegetable Gardening).
ERNEST HERMAN WIEGAND, B.Sc., Horticulturist (Horticultural Products).
CARL EPHRIAM SCHUSTER, M.S., Assistant Horticulturist (Pomology).
*ANDREW EDWARD MURNEEK, M.S., Assistant Horticulturist (Physiology).

Poultry Husbandry

- ALFRED GUNN LUNN, B.Sc., Poultry Husbandman.
FRANK LESTER KNOWLTON, B.Sc., Assistant Poultry Husbandman.
*CHARLES KELLY POWELL, B.Sc., Assistant Poultry Husbandman.

Soils

- WILBUR LOUIS POWERS, M.S., Chief, Department of Soils.
CHARLES VLADIS RUZEK, B.Sc., Associate in Soils (Fertility).
EDWARD FRITCHOFF TORGERSOHN, B.Sc., Assistant in Soils (Soil Survey).
WILLIAM WATERS JOHNSTON, B.Sc., Assistant in Soils (Irrigation).

Veterinary Medicine

- BENNETT THOMAS SIMMS, D.V.M., Veterinarian.
FREDERICK WILHELM MILLER, M.S., D.V.M., Assistant Veterinarian.

Zoology

- HOWARD MARSHALL WIGHT, M.S., Assistant Zoologist.

* On leave of absence.

Branch Experiment Stations

- DAVID EDMUND STEPHENS, B.Sc., Superintendent, Sherman County Branch Experiment Station, Moro.
- FRANK CHARLES REIMER, M.S., Superintendent, Southern Oregon Branch Experiment Station, Talent.
- ROBERT WITHYCOMBE, B.Sc., Superintendent, Eastern Oregon Branch Experiment Station, Union.
- LEROY CHILDS, A.B., Superintendent, Hood River Branch Experiment Station, Hood River.
- GEORGE GORDON BROWN, B.Sc., Horticulturist, Hood River Branch Experiment Station, Hood River.
- HAROLD KARL DEAN, B.Sc., Superintendent, Umatilla Branch Experiment Station, Hermiston.
- ALBERT EDWARD ENGBRETSON, B.Sc., Superintendent, John Jacob Astor Branch Experiment Station, Astoria.
- OBIL SHATTUCK, M.S., Superintendent, Harney County Branch Experiment Station, Burns.

THE HOME STATION

The Oregon Agricultural College Experiment Station was organized July 2, 1888, in accordance with the Act of Congress of 1887 known as the Hatch Act. The Experiment Station includes the Home Station at Corvallis and seven branch stations advantageously located throughout the state in such a way as to cover the varying agricultural conditions of the state. At the Home Station about 900 acres of land are used by the College and Station workers engaged in the scientific investigation of problems presented by the different branches of agriculture. The Station organization includes the following departments: Agricultural Chemistry, Animal Husbandry, Bacteriology, Botany and Plant Pathology, Dairy Husbandry, Entomology, Farm Crops, Farm Management, Horticulture, Poultry Husbandry, Soils, Veterinary Medicine, Zoology. In addition to the experimental work carried on by the departments of the Station proper, experimental work is conducted by the School of Engineering, the School of Home Economics, and the School of Pharmacy.

The scientific investigations of the Station Staff strongly support the instruction given in the classroom and through the Extension Service. Aside from the original investigations of economic significance to agriculture, the work affords daily object lessons in modern farm methods. To the students in the various fields of

study the value of the investigative work can hardly be overestimated. To the state, from the point of view of economic progress, its value has been greater, in the estimation of many people, than the entire cost of the College to the people. The work of the Experiment Station is fundamental in the agricultural development of the state. Oregon's soil and climatic conditions present many problems that are unique and that must be solved before the state can develop its great potential agricultural wealth.

As an instance of the general appreciation on the part of Oregonians of the services rendered by the Experiment Station, mention may be made of the strong endorsement presented to the 1919 Legislature through special delegations. No less than six separate delegations representing respectively the horticultural interests, the dairy interests, the Hood River district, the Southern Oregon district, and the Astoria district, covering practically every part of the state, urged upon the Legislature that the assistance of the Experiment Station was essential to the progress and development of their work.

As an illustration of the comprehensive character of the investigational work carried on by the Station, the following brief summaries of projects, by departments, are presented:

Agricultural Chemistry. Chemical research in agriculture at present is concerned with the following: (1) Spray materials. The effect of suspensoids or spreaders on the chemical and physical properties of arsenicals is the latest phase of this work. (2) Soil acidity, the specific object in view being to determine the fundamental reasons explanatory of the fact that some acid soils respond to lime treatment while others (acid by the same tests) do not. (3) Sulfur in the role of a fertilizer. Remarkable increases in yields of legumes have been secured on some types of soil in Oregon from the use of sulfur-carrying fertilizers; investigations in progress indicate a far-reaching effect of sulfur on the chemical nature of the proteins in clover and alfalfa. (4) The composition of commonly grown legumes. The data secured bear upon relative feeding values and the agronomic significance of the several legumes. (5) Yellow-berry in winter wheat. The objective points are the determination of the cause of yellow-berry and means of control on wheat farms of the middle Columbia River Basin. (6) Soil survey. This is cooperative with the department of Soils. Analytical work on leading soil types determines for them their content of the several elements of plant food. It enables comparison of soil types from the standpoint of native fertility and suggests needful fertilizer practice. (7) Enforcement of State Fertilizer and Lime laws. This work involves analyses of fertilizer and lime samples and insures compliance on the part

of fertilizer manufacturers and dealers in lime with the very reasonable requirements of the respective laws.

Animal Husbandry. Experiments in Animal Husbandry, which comprehend tests with horses, beef cattle, sheep, and swine, are conducted partly at the Corvallis Station and partly at the Eastern Oregon branch station. Experiments with horses are directed to determine the cost of horse-power for various types of farm and other work, the amount of work that may reasonably be expected from a horse, the cost of keep, etc. Experiments with beef cattle, conducted chiefly at Union, are concerned with fattening steers on various rations and with methods of maturing range cattle. Experiments with sheep have been directed to determine the cost of production, the carrying capacity of different types of pasture, methods of fattening sheep, maturing ewes, and methods of rearing and marketing lambs for meat purposes. Experiments with hogs involve the cost of production, including rapidity of gain; and comparison of different feeding rations and methods of feeding, including the use of pasture.

Bacteriology. Experimental work in Bacteriology at present is confined to one major problem and two minor problems. The major problem is a microbiological study of certain acid soils in Oregon. The reason some acid soils show crop response when lime is applied while others do not may be found by careful study of the biological activities involved in the elaboration of the plant food. Preliminary results indicate that liming of the soil brings about a biological response in correlation with increased crop-producing power. An attempt is also being made to determine the relationship between the reaction of the soil and the amount of atmospheric nitrogen fixed in the soil by the soil bacteria.

As minor problems so far (1) preliminary work on the sulfur-oxidizing power of different soils is being undertaken, the object being to determine why some soils show such enormous crop response to sulfur while others show very little response. (2) Bacteriological studies of hemorrhagic septicemia in cattle, sheep, and hogs are being carried on in cooperation with the department of Veterinary Medicine. So little is known about this disease that the diagnosis is often in doubt and the causative organism questioned. Vaccines properly prepared from the supposed causative organism seem to be effective as a prophylactic and curative agent, but definite results from controlled experiments are disappointing.

Bacteriological studies, field observation, and vaccination studies are being carried on.

Botany and Plant Pathology. The work in this department includes the following investigations: methods of control for grain smuts and their effect on the vitality of the seed; wilt diseases of potatoes and potato blackleg; onion smut control; relative efficiency of various fungicides both liquid and dust; control of peach diseases; Oregon crop-disease survey; the deterioration of orchard trees through bark and wood decays and other causes; European canker of apple and pear.

Dairy Husbandry. Investigations in this department are now concerned primarily with problems of production, although a few of the studies in manufacturing are being continued. The problems of raising calves on milk substitutes and suitable home-grown milk substitutes for this purpose are under study; comparative study of different forage crops for silage for dairy cows is in progress; winter rations for growing dairy heifers are being studied to determine the most economical feeds for this purpose; and mill-run, bran, cottonseed meal, cocoanut meal in different combinations are under comparative study as to their value as feeds for milk production. Observations are being made to determine the keeping quality of butter as affected by different methods of cream neutralization and pasteurization; to determine the cost of manufacture of different dairy products under commercial conditions; to determine, by testing the different factors in the handling of milk, what are the essentials in reducing the bacterial count of milk for market.

Entomology. Experiments in Entomology include: (1) tests to determine the toxicity of various insecticides, to discover new and cheaper insecticides, to discover possible combinations of sprays that will reduce the number of necessary applications, to determine the actual amount of poison necessary to kill a given insect; (2) artificial propagation of beneficial insects; (3) control of root borers and other root-infesting insects; and (4) ecological, life-history, and control studies on orchard plant lice, leaf-rollers, and codling-moth; (5) forest insects.

Farm Crops. The experimental work in Farm Crops consists of: (1) Forage work with vetches and related plants, red, burr, and sweet clovers; soy-beans; horse beans; alfalfa; grasses for seed and for hay; pasture mixtures; the study of hay in the stack and in the mow; and some experiments on the making of silage. (2) Cereal experiments in varietal testing; breeding and nursery work with wheat and oats; varietal testing with barley, corn, and flax. (3) Potato experiments, including varietal trials; time and method of planting; methods of cutting; and hill selection and fertilizer work.

(4) Weed control and eradication. (5) Crop rotations. (6) Miscellaneous experiments with hard seed and milling quality of wheat.

It is proposed, when sufficient funds and land are available, to establish an extensive plant-breeding experiment in field crops, a rotation experiment based on crop yield and economy of production, and a tillage experiment to work out problems of seed bed preparation, seeding, and handling of various crops.

Farm Management. By means of the farm survey and through farm-record keeping and study of individual cases, a number of the important phases of farm management are being investigated. These are as follows: (1) The determination of the chief factors in successful farming in six different counties of the state, through farm surveys and records. (2) Determination of the cost of production of different crop and livestock products and the cost of various farm operations, in sixteen counties, through record keeping. (3) Methods, efficiency, and costs in manure handling and preservation, through a survey. (4) Farm organization and management planning on individual farms. (5) Methods and costs of land clearing under different conditions.

Some special study is being given to labor supply and labor efficiency on the farm at this time.

Horticulture. Experiments in Horticulture comprise the following types of investigations: (1) More complex phases of pruning including (a) relation of the nitrogen-carbohydrate ratio to pruning practices, and (b) relation of carbohydrates and nitrogen to the behavior of apple spurs. (2) Varietal pruning, the working out of the best pruning practices adapted to the growth of different varieties of fruits. (3) Experiments with stocks of prunes. (4) Propagation of the filbert. (5) Breeding investigations with the filbert. (6) Strawberry variety tests. (7) Fertilizer investigations. (8) Breeding investigations with walnuts, apples, prunes, and strawberries. (9) Vegetable Gardening investigations in (a) field irrigation, (b) seed strain trials, (c) miscellaneous greenhouse crops. (10) Investigations with the by-products of fruits and vegetables. (11) Harvesting and storage investigations with pears.

Poultry Husbandry. Experiments in Poultry Husbandry are chiefly concerned with problems of incubation and with breeding fowls for high average egg production, and for a combination of egg production and meat value. Results in both fields of experimentation have already been remarkable and promise, still greater progress towards the objects desired.

Soils. The work in this department includes the following twelve specific investigational projects: fertility rotations; fertilizer experiments; soil-acidity tests and lime trials; cooperative soil survey; soil correction trials; toxicity of alkali salts to crops; cooperative tillage and soil moisture studies; surveys and feasibility of irrigation and drainage projects; cooperative duty of water and related investigations; experiments in the distribution of water and improvement of irrigation practice; drainage and improvement of wet soils; evaporation and weather studies in relation to soil production; improvement of water laws; critical soil-moisture points for different crops; phosphorus in "red hill" soils; maintenance of organic matter in the soil; functions of sulfur in relation to soil; the use and value of manure. A comprehensive system of crop rotations and fertilizer trials is being conducted on some fifteen of the chief soils of the state to help develop a permanent system of agriculture. The duty of water and related investigations are conducted cooperatively with the United States Department of Agriculture. It is state-wide in scope with agents at Klamath, Redmond, and Burns in Eastern Oregon. The aim is to determine the right amount of water for the chief soil types and leading crops under the main types of farming in the principal irrigated valleys of the state. The surveys to determine the feasibility of proposed drainage or irrigation projects are made as demand arises. The experiments in drainage are to determine the most efficient depths and distance apart for placing drains in soils of different types, and for testing the efficiency of bedding drains in straw as compared with soils. Since there are one-half million acres of marsh lands in the state and three million acres of land periodically wet, the value of these investigations is obvious. If efficient drainage should add to the value of the land the average determined for this work in the Middle West, the reclamation of the state's wet soils would add at least \$10.00 an acre to the value of these millions of acres.

Veterinary Medicine. The experimental work of this department is for the present devoted primarily to investigation of diseases of cattle, most attention being given to infectious abortion and sterility in breeding cattle. Some attention is given to anthrax and hemorrhagic septicemia in cattle, to hog cholera, "shipping fever" and forage poisoning in horses, and botulism (limberneck) in fowls.

Zoology. The limited funds and man power devoted to investigations have been centered on studies in the control of damage to agricultural crops by pocket-gophers and moles.

THE BRANCH STATIONS

The seven branch stations at Astoria, Burns, Hermiston, Hood River, Moro, Talent, and Union, conduct experiments on the major agricultural problems of their respective agricultural sections of the state.

The John Jacob Astor Branch Station. At Astoria the major problems are dairying, improvement of farm crops, soil fertility, and soil management for Coast conditions and the drainage, improvement, and cultivation of tide lands.

The Harney Valley Branch Station. The station at Burns is conducting experiments in both dry-farming and irrigation agriculture as to: (1) varietal tests of grain and forage crops for this section of the state; (2) rates and dates of seeding; (3) tillage methods; (4) amount of irrigation water and methods of distribution for different crops; (5) fertilizers.

The Umatilla Branch Station. The station at Hermiston is studying problems of agriculture under irrigation on the Umatilla Reclamation Project and similar lands of the Columbia River Basin. Major attention is given to: (1) the amount of water needed for irrigation of different crops and methods of irrigating; (2) varietal trials of farm crops; (3) crop rotation experiments; and (4) fertilizer experiments.

The Hood River Branch Station deals with orchard pests and horticultural problems of this important orcharding section. Experiments and demonstrations are conducted to decide upon the most satisfactory sprays and the most efficient equipment and methods of applying them to control the various orchard pests of the region. In horticulture, investigations are directed primarily to methods of pruning for different fruit crops, fertilizers for orchards, varietal tests with strawberries and potatoes, and an orchard survey of methods and costs of production.

The Sherman County Dry-Farm Branch Station. The Moro station is conducting investigations on the major problems of dry-land farming in the Columbia Basin, including: (1) varietal tests and rate and date of sowing experiments with field crops; (2) cereal breeding investigations; (3) tillage experiments; (4) soil moisture and nitrate investigations; (5) crop rotation experiments; and (6) cereal disease investigations.

The Southern Oregon Branch Station at Talent is centering attention almost wholly upon problems involved in fruit production in

this important fruit-growing region. The studies under way include: (1) investigations to determine relative resistance to pear blight of all the known species of *Pyrus* and all available varieties of cultivated pears in the hope of finding suitable blight-resistant pear stocks; (2) a test orchard of pear stocks, including the principal pear stocks of France, Japan, and China to determine those most satisfactory for Southern Oregon conditions; (3) testing new varieties of pears; (4) pear breeding experiments; (5) disinfectants for blight-control work; and (6) fertilizers for orchards.

The Eastern Oregon Branch Station. The Union Station is equipped with land and buildings for experiments with both livestock and farm crops. Major attention is at present devoted to the problems of growing and feeding cattle, sheep, and hogs with comparative study of different feeds and methods of feeding. Attention is given also to varietal trials of forage and grain crops, to soil fertility problems, and to selection work with a view to crop improvement.

Extension Service

WILLIAM JASPER KERR, D.Sc., LL.D., President of the College.

PAUL VESTAL MARIS, B.Sc., Director of Extension Service; State Leader of County Agents.

MARGARET FARQUHAR COOK, Secretary of the Extension Service.

County Agricultural Agent Work

WALLACE LA DUE KADDERLY, B.Sc., Assistant State County Agent Leader.

FRANK LLEWELLYN BALLARD, B.Sc., Assistant State County Agent Leader.

County Home Demonstration Work

JESSIE DUNLAVY MCCOMB, M.S., A.M., State Leader of Extension Home Economics.

MARGERIE MAY SMITH, S.B., Assistant in Nutrition.

ESTHER BELLE COOLEY, B.Sc., Assistant in Clothing.

Boys' and Girls' Club Work

HARRY CASE SEYMOUR, State Club Leader.

HELEN JULIA COWGILL, B.Sc., Assistant State Club Leader.

LEONARD JOHN ALLEN, M.S., Assistant State Club Leader.

Field Specialists

CALVIN JEHU HURD, Extension Specialist in Marketing and Organization.

REUBEN VEERIN GUNN, B.Sc., Extension Specialist in Farm Management Demonstrations.

HUBERT ELMER COSBY, Extension Specialist in Poultry Husbandry.

CLAYTON LEWIS LONG, M.S., Extension Specialist in Horticulture.

HARRY ARTHUR LINDGREN, B.Sc., Extension Specialist in Animal Husbandry.

NEAL CLEMENT JAMISON, B.Sc., Extension Specialist in Dairying.

IRA NOEL GABRIELSON, A.B., United States Biological Survey Assistant Biologist.

GEORGE WALLACE KABLE, B.Sc., Extension Specialist in Farm Mechanics.

EDWIN RUSSELL JACKMAN, B.Sc., Extension Specialist in Farm Crops.

RALPH STEPHEN BESSE, M.A., Extension Specialist in Marketing and Organization.

The Extension Service is one of the three great divisions of the Oregon Agricultural College, the functions of which include: resident instruction, experiment and research, and college extension.

The Extension Service is charged with the duty of extending the benefits, advantages, and available information of the College and of the United States Department of Agriculture to every portion of the state and to all those persons who for any reason are unable to come to the College.

The Extension Service includes all forms of off-campus instruction and assistance in those subjects in the College curriculum which lend themselves to extension methods or which can be taken and adapted to the direct needs of the people of the state. The various Extension activities are the means through which information, instruction, assistance, and methods of self-help are carried to all persons who desire them at any point within the state. In brief, the Extension Service represents the medium, both independently and in hearty cooperation with all other organized forces of betterment, for enlarging and enriching the agricultural and home interests of Oregon. No county, town, hamlet, farm, or home need be without some evidence of this service.

In a field so large, with such a multiplicity of problems and conditions, and with numerous methods of action care must be exercised to avoid wastefulness. As a protection in this respect the law requires the preparation of written plans for work and proposed expenditure of funds. These plans must be approved by the United States Secretary of Agriculture and by the President of the Oregon Agricultural College. These detailed plans of work are called projects. They must be approved before they are inaugurated, must be reported on at the close of each fiscal year, and when once adopted and signed cannot be altered or deviated from without the written consent of the authorities of the United States Department of Agriculture.

The several distinct lines of work now covered by written projects, from which the citizens of some portion of the state are receiving benefit, include:

- (1) General Administration and Organization of the Extension Service.
- (2) Printing and Distribution of Publications.
- (3) Extension Schools and Meetings.
- (4) County Agricultural Agent Work.
- (5) Home Economics and Home Demonstration Work.
- (6) Boys' and Girls' Club Work.
- (7) Drainage and Irrigation.
- (8) Horticulture.
- (9) Animal Husbandry.

- (10) Dairying.
- (11) Poultry Husbandry.
- (12) Farm Crops.
- (13) Farm Management Demonstrations.
- (14) Marketing and Organization.
- (15) Rodent Control.

It should not be assumed that these projects cover the only problems of importance within the state. It is the purpose to put into operation and to emphasize those lines of Extension Service that are fundamental to large and important interests of farm or home welfare, or to material agricultural development.

Importance of Extension Work in Oregon. The magnitude of the problem of College Extension in Oregon can be fully realized only by keeping in mind that the state has a population of nearly 900,000 distributed over a total area of 96,699 square miles—a territory greater than the combined areas of Illinois and Indiana and almost as great as the combined areas of New York, New Jersey, and Pennsylvania. The state, moreover, has few railroads, and in certain sections is very sparsely settled. The people who are to be reached by extension methods represent the greatest extremes in age, capacity, education, experience, and environment. Oregon's great diversity in elevation, precipitation, temperature, soil, and climatic conditions, complicates the problem of Extension Service, and makes it important in proportion to its complexity.

All persons or communities in the state wishing to make use of the assistance to which they are entitled and which will freely be given in any of the lines indicated, should communicate with the county representative of the Extension Service (County Agricultural Agent, Home Demonstration Agent, or County Club Agent) direct, or with the Extension Service, Oregon Agricultural College, Corvallis, Oregon, as far as possible in advance of the time the appointment is desired. Short-notice requests may not find the College in position to render the service desired. If an Extension School is desired, particulars should be given, pertaining to the time proposed, the nature of the subjects in which the community will be interested, and the plans for the meeting. If a single lecture or demonstration or exhibit is wanted, it is important to be equally prompt and explicit.

It must be remembered that while the College is eager and willing at all times to help all who apply, its staff, facilities, and funds are limited. On this account, the Extension Service is sometimes unable to give aid where it would like most to give it. Requests for instruction or other assistance, however, should not be withheld. The great majority of the state's needs have been, and generally can be, cheerfully and efficiently met.

ADMINISTRATIVE

The administrative work of the Extension Service is vested in a Director. The administrative duties consist of planning and coordinating the several lines of Extension work, dividing and assigning funds, planning the Extension campaigns, meetings, schools, conferences, demonstrations, etc., authorizing all Extension publications, planning and arranging exhibits, and supervising the prosecution of all phases of the work. Reports are required covering all lines of Extension Service, and periodical reports are made to College officials and other cooperating agencies.

PUBLICATIONS

Short, practical bulletins and leaflets are issued on subjects concerning the agricultural and home interests of the state. These publications are sent out free upon request.

EXTENSION SCHOOLS AND MEETINGS

Extension schools along definite project lines are organized in various sections of the state. These schools are arranged in such way that they may continue from year to year at the same points and yet not repeat the work previously given. The length of time spent at each place is dependent upon the subject-matter to be handled in each case.

When possible, speakers are furnished local organizations through County Agents and Home Demonstration Agents in territory occupied by these agents, or direct through the Extension Service in case there is no agent in the territory. In all lecture work it is desirable both as regards economy and efficiency to arrange the work in circuits.

Judges are furnished fairs as far as this is possible with the limited staff available. Exhibits are made at a few large fairs.

All the work outlined above is arranged directly through County Agricultural Agents, Home Demonstration Agents, and other representatives of the Extension Service in the territory from which the requests are received.

COUNTY AGENT WORK

The largest branch of the Extension Service at the present time is the County Agent work. In charge of this division are the State Leader and Assistant State Leaders. Prosecuting the work throughout the state are twenty-two County Agents, each agent being charged with the development of the agricultural interests of the county which he serves.

The work is conducted under the authorization of Section 3 of Chapter 10 of the Session Laws of Oregon for 1913. The appropriation for Extension work within a county made by a county having an area

of 5,000 square miles or less is duplicated up to \$2,000.00 by state funds. In counties of larger area, the maximum duplication by state funds is \$4,000.00. The provisions of the Oregon law place the County Agent work under the direct supervision of the Oregon Agricultural College.

The County Agent is the representative of the United States Department of Agriculture, the State Agricultural College, and the county in which he is located. Through a union of these forces and working with a county organization he is able to bring the fullest measure of practical and scientific knowledge to the solution of the agricultural problems of the county and to the improvement of country life conditions.

Counties not provided with county agents and interested in securing them should correspond with the Director of Extension Service, who will render every assistance possible in explaining the plan and methods of work and necessary steps to be taken in establishing it.

HOME ECONOMICS

Extension work in Home Economics is organized, correlated, and conducted by means of public demonstrations, home demonstrations, conferences, lectures, publicity, correspondence, and otherwise, for the purpose of:

- (1) Giving assistance to women with problems concerning foods, fabrics, household management, housing, and home industries.
- (2) Securing adoption of approved household practices, organization, and administration.
- (3) Increasing knowledge of hygiene and of home and community sanitation.
- (4) Promoting the most wholesome and satisfactory living conditions.

Four counties in the state now have Home Demonstration Agents who work with the women and coordinate and apply the results of the work of the several departments of the Oregon Agricultural College, of the United States Department of Agriculture, and of other research institutions, in helping to solve the problems affecting homes and communities.

A State Leader is in charge of this branch of the Extension Service. Two assistants help the Home Demonstration Agents in the clothing and nutrition projects, and work through various organizations in counties where there are no Home Demonstration Agents.

BOYS' AND GIRLS' CLUB WORK

Junior Extension activities of the Oregon Agricultural College take the form of Club work consisting of demonstrations and judging contests among the boys and girls. Those who are interested in the basic farm and home enterprises, such as the growing of plants, the raising of animals, or the work in home economics, are encouraged to enroll for one or more Club projects.

The Club projects, which consist of definite work to be done at home, are as follows: Corn Growing, Potato Growing, Vegetable Gardening, Poultry Raising, Pork Production, Sheep Raising, Calf Raising, Dairy Herd Record Keeping, Sewing, Cookery, Homemaking, Canning, Rabbit Raising, Home Beautification, Milk Goat Raising, Wheat Raising, and Bee Keeping, seventeen projects in all.

This work is organized by Clubs representing each of the above projects, being coordinated with other lines of Extension activity, including County Agricultural Agent and Home Demonstration Agent work.

The bulletins and circulars containing the lessons and instructions for each project are prepared by the Oregon Agricultural College and the United States Department of Agriculture and mailed to the local Club leader of each Club.

Help on organization, follow-up work, and training of demonstration and judging teams is given the local Club leaders by the State Leader and assistants, the County Club Agent, the County Agricultural Agent, the Home Demonstration Agent, county school superintendent, and rural school supervisor.

Prizes are offered to the winners in Club projects and contests at the local, county, state, and interstate Club festivals and fairs. The Club members are made to see, however, that the most worthwhile prizes are the knowledge, skill, and profit that each one may derive from the work.

Club work in Oregon is maintained and supervised by the Oregon Agricultural College Extension Service in cooperation with the United States Department of Agriculture and the State Department of Education. The activities of all these agencies are led by the State Leader of Club work.

SPECIAL FIELD DEPARTMENTS

DRAINAGE AND IRRIGATION

Drainage work includes soil management subsequent to installing drains as well as drainage construction work. Assistance is given in planning drainage systems as well as through personal demonstration in the laying out of drainage systems for individuals and communities.

Information is given through lectures, extension schools, personal conference, and correspondence. Assistance and advice are also given in the organization of feasible drainage districts.

Irrigation is concerned with economic use of water, handling of soils and crops under irrigation, removal of alkali by drainage, and like matters. Assistance is rendered in this work as outlined above under drainage. Design of farm distribution systems and individual pumping plants and organization of irrigation districts where feasible are among the activities of this department.

HORTICULTURE

Extension Horticulture covers the whole subject of orchard operations, including cultivation, pruning, spraying, thinning, harvesting, and marketing, laying emphasis upon the vital question of reducing the cost of producing and handling fruits.

Small fruits and vegetables have their share of attention and the improvement of the surroundings of our farm homes is emphasized as a matter of great importance.

Improvement in the quality of the exhibits of county and community fairs, better arrangements of such exhibits, and a clearer and more uniform method of classification of exhibits is a subject that is given considerable attention.

ANIMAL HUSBANDRY

Extension Animal Husbandry takes up all problems connected with the improvement of beef cattle, horses, swine, sheep, and goats. The slogan is, "Better breeding and more efficient feeding." Information is gathered from many sources and distributed throughout the state. The Extension work in Animal Husbandry is being much strengthened through the rapid accumulation of valuable livestock data by the Experiment Station at Corvallis and by the Eastern Oregon Branch Experiment Station at Union. The great diversity of conditions in various parts of the state is given due consideration and the work planned to fit the particular locality where given.

DAIRYING

Extension Dairying carries throughout the state, and helps to put into effective use, information regarding all branches of the dairy industry, such as the care and management of the herd, the raising of the calf, the treatment of diseases, the care of milk and cream, and the manufacture of dairy products. Emphasis and aid are given toward effecting dairy cooperative organizations such as Cow Testing Associations, Breeders' Associations, Bull Associations, Farmers' Cooperative

Creameries, Farmers' Cooperative Cheese Factories, and Farmers' Cooperative Cream Selling Agencies.

POULTRY HUSBANDRY

Extension Poultry Husbandry covers all the branches of the poultry industry in a practical way as they apply to actual farm conditions in the state.

The work embraces such subjects as breeds and methods of breeding; feeds and methods of feeding; methods of housing and management of fowls for egg production and for market; hatching and rearing chickens; marketing of poultry and eggs. Particular attention is being given to the breeding of fowls for egg production.

Through cooperation with County Agents, special demonstrations in caponizing and in selecting and culling laying hens are made possible.

The general aim is to help poultry raisers to produce better eggs and more of them at less cost.

FARM CROPS

Farm Crops Extension work covers the bulk handling of grain, the grading and classification of grain, potatoes, hay, etc., the selection of land for cropping purposes, the preparation of soil, seed selection, planting, culture, harvest, and storage methods for grain, potatoes, beans, peas, corn, flax, and other crops and forage plants, as well as potato certification, seed inspection, crop rotation, and special crop problems. This service is given through personal advisory conferences, special demonstrations, lectures, institutes, bulletins, correspondence, and extension schools.

FARM MANAGEMENT DEMONSTRATIONS

The purpose of the department of Farm Management Demonstrations is to demonstrate to farmers, in connection with their own farms, a practical and efficient method of summarizing and analyzing a farm business as a means of measuring the profit or loss incurred in conducting it and of deciding upon readjustments that promise to increase its net income.

In a management demonstration the business of each farm in a community is analyzed from an economic standpoint and then compared with the others to determine some of the changes which should be made in its organization to make it more profitable.

The Federal Income Tax makes necessary a more careful study of farm accounts and keeping of more accurate records. Special attention is given to meet this requirement through the farm record work and farm business analysis.

MARKETING AND ORGANIZATION

For the past several years there has been a growing interest in the so-called economic problems of the farmers as distinguished from the problems of production. The Extension Service has from the beginning recognized that its responsibilities are as great in this field as in the field of production. Accordingly the Service has been expanded as interest and demand have increased. Two specialists are now devoting full time to marketing and organization problems, and the county agents and other members of the staff give a liberal portion of time to this phase of work. Particular stress is being laid upon the commodity type of organization which has characterized recent developments along marketing lines. A general campaign of education in the principles and practices of community cooperative marketing is being conducted. Assistance is rendered in connection with surveys to determine the need and feasibility of marketing organizations, and also in connection with developing the most appropriate type to meet the need. Timely articles on the subject are printed in the press and in bulletin form.

RODENT CONTROL

Work in the control of rodent pests is conducted by the Oregon Agricultural College in cooperation with the Biological Survey of the United States Department of Agriculture.

Statistics of Enrollment

Note: Due to the fact that the College catalogue goes to press in February this year, rather than as formerly at the close of the academic year, it is impracticable to include the registration lists and summaries for the present year, names of members of the graduating class, honor students, etc. Since these statistics and lists for the last complete year (1921-22) have already been published in the preceding catalogue (1922-23), only the enrollment summaries are repeated here. Following the 1923 Commencement in June, a list of all students enrolled during the present year, names of graduates and of recipients of prizes and other honors, and statistical summaries will be published as a supplement to the catalogue, and copies may be had on request.

STUDENTS CLASSIFIED AS TO CURRICULUM, 1921-22

(All duplicates excluded)

<i>Curriculum</i>	<i>Men</i>	<i>Women</i>	<i>Total</i>
Agriculture	838	18	856
Commerce	550	385	935
Engineering:			
Civil	163	.....	163
Electrical	277	.....	277
Industrial Arts	64	.....	64
Mechanical	296	.....	296
Mines	83	.....	83
Chemical	79	2	81
Forestry	120	.....	120
Home Economics .....	.....	573	573
Military Science and Tactics	8	.....	8
Pharmacy	174	29	203
Vocational Education	25	73	98
Optional	4	72	76
Music Only	37	44	81
Summer School	476	550	1026
Short Courses	267	304	571
Total	3461	2050	5511

COMPARATIVE ENROLLMENT

1888-89	97	1905-06	735
1889-90	151	1906-07	833
1890-91	201	1907-08	1156
1891-92	208	1908-09	1352
1892-93	282	1909-10	1591
1893-94	240	1910-11	1778
1894-95	261	1911-12	2868
1895-96	397	1912-13	2314
1896-97	316	1913-14	2435
1897-98	336	1914-15	4176
1898-99	338	1915-16	3265
1899-00	405	1916-17	3798
1900-01	436	1917-18	3453
1901-02	488	1918-19	4086
1902-03	541	1919-20	4865
1903-04	530	1920-21	5170
1904-05	680	1921-22	5511

REGISTRATION TOTALS BY CURRICULUM AND CLASS,

1921-22

	Vocational	Fr.	So.	Jr.	Sr.	Gr.	Sp.	Total	
Agriculture	206	...	140	150	152	102	20	86	856
Commerce	41	18	370	201	153	81	...	71	935
Engineering:									
Civil (Hy. & Irr.) .....	...	...	40	38	46	25	...	14	163
Electrical .....	...	...	107	77	63	21	1	8	277
Industrial Arts .....	...	...	13	10	20	5	...	16	64
Mechanical	74	3	67	58	51	33	...	10	296
Mines .....	...	...	20	22	19	18	...	4	83
Chemical Eng. ....	...	...	26	18	17	14	...	6	81
Forestry & Lg. E. ....	...	...	32	28	23	10	...	27	120
Home Economics ...	18	...	187	107	114	90	6	51	573
Military Sci. & Tc. ....	...	...	3	1	2	2	...	...	8
Pharmacy .....	...	...	86	48	40	8	1	20	203
Vocational Educ. ....	...	...	31	20	20	15	4	8	98
Optional .....	...	...	...	...	...	...	...	76	76
Music only .....	...	...	...	...	...	...	...	81	81
	339	21	1122	778	720	424	32	478	3914
Summer Session									1026
Farmers' Week									253
Short Courses Second Term									80
Homemakers' Conference									230
Short Course Third Term									8
									1597
									5511

DEGREES CONFERRED, JUNE 5, 1922

Master of Science:		
In Agriculture		2
Bachelor of Science:		
In Agriculture	99	
In Commerce	74	
In Engineering:		
Chemical Engineering	14	
Civil Engineering	25	
Electrical Engineering	16	
Industrial Arts	4	
Mechanical Engineering	25	
Mining Engineering	12	
	96	96
In Forestry		11
In Home Economics		86
In Military Science and Tactics		1
In Pharmacy		7
In Vocational Education		14
	388	388
Graduate in Pharmacy		20
Pharmaceutical Chemist		10
Music Diploma		2
Total		422

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